CORE

sCience and human factOr for Resilient sociEty

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ABSTRACT

Recent natural and manmade disasters have shown gaps in the level of preparedness of European society for disasters, highlighting the importance of increasing risk awareness, which ensures a direct positive impact on citizen and organisational resilience among people and decision-makers in Europe. Recognising the need to examine, explore, capture and compare the challenges of effectively responding to all manner of major disasters and crises to improve societal resilience and compliance, project CORE (sCience & human factOr for Resilient sociEty) strategic objectives includes conducting a thorough and in-depth analysis of natural and manmade disasters and crisis incident case studies to extract lessons learnt from a variety of perspectives including human factors, organizational issues and quantitative and qualitative aspects of lessons learnt from societal aspects, including gender and ethnicity, education, income, physical abilities. For this to be effectively achieved and programmed, to identify best practices and lessons learned from a suite of disaster scenarios, requires a structured and programmed approach.

This report serves to explain, examine and explore the methodological approach undertaken to develop the design and delivery of the Disaster Scenarios Analysis Framework, presenting the framework programme, accompanied with template and guidance to ensure a consistent, coherent, and standardised approach is followed by consortium partners when investigating the identified disaster scenarios, enabling the effective collection and examination of data to capture best practices and lessons learned. The Disaster Scenarios Analysis Framework serves to shape the scale and scope of research activities within the identified CORE natural and manmade disaster scenarios to be examined which include terrorist attack, earthquake, flash flooding, wildfire, industrial accident, tsunami, and pandemic, providing a broad set of use cases across the disaster event landscape. The completion of the Disaster Scenarios Analysis Framework marks an important phase in the delivery of CORE strategic objectives, serving to drive the analysis of the identified case studies within a structure developed by contributions from all CORE partners. The Disaster Scenarios Analysis Framework, which includes a programme for delivery, a comprehensive template and analysis model, provides a robust and rigorous framework to forensically analyse all manner of disaster scenarios to identify best practices and lessons learned to improve Disaster Risk Reduction (DRR).

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ACRONYMS

CORE sCience & human factOr for Resilient sociEty

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DRR	Disaster Risk Reduction
ETHZ	Swiss Federal Institute of Technology Zurich
EU	European Union
GA	Grant Agreement
HANKEN	Hanken School of Economics
H2020	Horizon 2020 Programme
HUD	University of Huddersfield
INFC	Italian National Fire Corp
KOM	Kick-Off Meeting
MR	Multi-Risk
NGO	Non-Governmental Organisation
REA	Research Executive Agency
SAHER	SAHER (Europe) OU
SDG	Sustainable Development Goals
SEC	Security
UN	United Nations
UNISA	University of Salerno
WHO	World Health Organisation
WP	Work Package

INTRODUCTION

A common lesson learnt from previous disaster crisis situations is the need to optimise public information communication to promote risk awareness and vigilance without raising levels of fear, uncertainty and insecurity leading to public panic. Societal acceptance and public compliance with official public

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safety instructions represents a major challenge for managing risk during all manner of crises and disaster events. An orderly evacuation during a volcanic crisis is as essential as maintaining social distancing during a pandemic. Following advice from authorities during sustained and ongoing terrorist attacks is essential to ensure citizens do not put themselves at greater risk. Public compliance with regulations is also key to minimising adverse behaviours in triggering forest fires and industrial accidents. Optimal crisis decision-making can be negated by a lack of sufficient public compliance, therefore, a prerequisite for societal disaster resilience is achieving public compliance.

Recognising the need to examine, explore, capture and compare the challenges of effectively responding to all manner of major disasters and crises to improve societal resilience and compliance, project CORE (sCience & human factOr for Resilient sociEty) strategic objectives includes conducting a thorough and in-depth analysis of natural and manmade disasters and crisis incident case studies to extract lessons learnt from a variety of perspectives including human factors, organizational issues and quantitative and qualitative aspects of lessons learnt from societal aspects, including gender and ethnicity, education, income, physical abilities. Moreover, the project CORE seeks to identify and forensically examine the public messaging challenges faced by authorities responsible for decision-making and associated processes to inform and share public information during the identified series of case studies, extracting best practices and lessons learned, including screening for ethics core-values that need to be further applied.

To effectively achieve these key objectives, a methodological approach is required to be designed, developed, and delivered, supported and underpinned by guidance within a framework to ensure consistency of research and captured data to be analysed. The CORE *Disaster Scenarios Analysis Framework* serves to shape the scale and scope of research activities within project CORE *Work Package 2: Natural and Manmade Disasters,* providing a framework for CORE consortium partners within which to conduct their research and analysis of natural and manmade disasters. The identified CORE natural and manmade disaster scenarios to be examined include terrorist attack, earthquake, flash flooding, wildfire, industrial accident, tsunami, and pandemic, providing a broad set of use cases across the disaster event landscape.

This report serves to explain, examine and explore the methodological approach undertaken to develop the design and delivery of the *Disaster Scenarios Analysis Framework,* presenting the framework programme and model for disaster scenario analysis, accompanied with template and guidance to ensure a consistent, coherent, and standardised approach is

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followed by consortium partners when investigating the identified disaster scenarios, enabling the effective collection and examination of data to capture best practices and lessons learned.

1. METHODOLOGY

Delivery of the *Disaster Scenarios Analysis Framework* has been informed following extensive review of the research requirements, structures and timescales set out in the CORE programme of work agreed by CORE consortium partners, ratified by the European Union (EU) Horizon 2020 Programme under Grant Agreement (GA) 101021746.

The CORE consortium of partners recognise that safety depends on beliefs, knowledge and behaviours of all human actors involved at any stage of a disaster. How individuals and groups apply knowledge, interpret data, and adopt their own criteria for decision making with respect to known and unknown risks in safety critical situations is strongly affected by their culture, values, behaviours, and knowledge commonly shared within a community. In the Disaster Risk Reduction (DRR) context, culture and safety culture are the framework that enable individuals and organizations to reach an appropriate risk awareness, to benefit from shared knowledge and practices, to engage themselves in cooperative and more effective disaster management. Within this framework, as described in the CORE Grant Agreement Part B, the CORE project methodological approach relies upon the following five building blocks:

Building block 1: Safety culture - In any safety critical context, high levels of safety performance are only achievable with proper safety culture, that make people able to develop awareness of the situation (clear picture of present and future state of a situation), make wise judgement, undertake proper actions at personal and collective level.

Building block 2: Social media support & threats to safety culture & community resilience - The efficiency of spread of information through social media depends on many factors. Among these there are trust in this source of information, perceptions about easiness of its use, existing digital infrastructure, experience of usage, examples from peers and many others.

Building block 3: Disaster scenarios, human behaviour & disaster community identity as resilience factors - Collective elaboration (social and cultural) of risk is a historical and social product. It arises from a public debate (i.e. from the level and quality of information, from the credibility of the political and scientific institutions, from the predictive ability of science, from the experienced/supposed rescue capacity, from local beliefs and knowledge,

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from the feasibility and acceptability of emergency management plans and from the priority between different risks).

Building block 4: Cascading effects - Societal resilience is eroded by a lack of awareness and preparedness for a sequence of cascading effects which may be associated with an initial triggering event. The high multiplicity of potential cascading effects is exemplified by the COVID-19 global crisis.

Building block 5: Governance - In the context of governance, which is multi-stakeholder and multi-layered, different actors will have different perceptions and evaluations of risk; they will have different types of knowledge and evidence; and they will have different incentives and political interests
Delivery of the *Disaster Scenarios Analysis Framework* has been designed with due cognisance of the 5 building block methodological approach, serving to frame and provide the parameters within which the appropriate scale and scope of disaster analysis should be delivered. Moreover, the CORE programme of work identified a rich set of disaster scenarios to be examined and explored against the 5 building blocks. The disaster scenario use cases include the following:

Use Case 1: Terrorist Attack: Manchester Arena bombing (UNITED KINGDOM) on 22 May 2017
Use Case 2: Earthquake: L'Aquila (ITALY) on 6 April 2009
Use Case 3: Flash Flooding: Aude region (FRANCE) 14-15 October 2018
Use Case 4: Wildfire: Judean Mountains, Jerusalem (ISRAEL) 15-19 August 2021
Use Case 5: Industrial Accident: Venkata Puram (INDIA) 7 May 2020
Use Case 6: Earthquake & Tsunami: Great East (JAPAN) 11 March 2011
Use Case 7: Pandemic: COVID-19 (CHINA) WHO Declaration 19 December 2019 & 30 January 2020

The suite of selected disasters covers a broad range of critical incidents requiring major emergency responses. The disasters purposefully include both natural and manmade disasters, differing in size and scale of impact including the loss of human life, causalities, destruction to property, damage to infrastructure, interruption to essential services and economic impact. The set of disasters have also been carefully selected to include security matters of critical concern to nations across the world including terrorism in all of its forms, global health crisis and climate change, and have been purposefully selected to include disasters across the EU and in countries beyond EU borders. Taken together, the set of CORE disaster use cases offer a set of disasters for unique analysis using the 5 building block methodological approach.

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Following extensive review of the CORE programme of work the importance and significance of the *Disaster Scenarios Analysis Framework* became clear to the methodology of CORE and the delivery of project outputs. The *Disaster Scenarios Analysis Framework* provides the very foundations for research and analysis activities across the CORE project activity landscape within the scope of *Work Package 2: Natural and Manmade Disasters* and importantly, throughout the fabric of the whole project, with the potential to impact and inform key areas of CORE research. Following a series of initial meetings and discussions with CORE project partners following review of the programme of work, it was evident that to effectively achieve the key project objectives, a methodological approach was required to be designed, developed, and delivered to progress the Disaster Scenarios Analysis Framework itself. Moreover, it became clear that a framework for disaster scenario analysis had to include the provision of a delivery ***programme*** to manage and schedule the analysis. This programme would be required to be activated through the design and development of a ***template*** as a practical tool underpinned by guidance notes to ensure and support the consistency of research and data captured to be analysed. And finally, the methodological approach of designing and delivering the *Disaster Scenarios Analysis Framework* would require to be moulded into a single ***model*** providing a visual representation of the framework architecture for strategic oversight. Presentation of the ***programme***, ***template*** and ***model*** of the *Disaster Scenarios Analysis Framework* are presented below in this report.

2. FRAMEWORK PROGRAMME FOR DISASTER SCENARIO ANALYSIS

The early examination of CORE project activities within *Work Package 2: Natural and Manmade Disasters* and the wider CORE programme of work served to identify several interdependencies which required a planned and programme approach to maximise effort while avoiding duplicity. Within WP2 it was clear that important links had be made ensure efficient gathering of data across several specialist fields. The key research tasks within WP2 included the following:

Task 2.2: Natural and manmade disaster case study identification, research, and analysis - This task involves the identification of a set of seven natural and manmade disaster case studies for investigation and analysis.

Task 2.3: Natural and manmade case study social media analysis - This task provides a tool-based semantic analysis of the role, influence and impact of social media communications during each of the identified case studies.

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Task 2.4: Natural and manmade case study aerial imagery analysis - This task involves the examination of satellite images and Unmanned Aerial Vehicle data for public preparedness and information.

The importance of gathering data for analysis for specialist fields of study across the full suite of seven diverse disaster scenarios in different jurisdictions presented a key challenge. This research challenge was amplified by the requirement for a comparative analysis of all seven use cases across all specialist modes of study in Task 2.5 described as follows:

Task 2.5: Natural and man-made disaster scenarios comparative analysis - This task involves a rigorous analysis of each individual natural and manmade disaster and crises case studies, identifying lessons learned, patterns, trends and highlighting best practices.

The comparative analysis across the identified set of seven CORE disaster scenarios necessitated a coherent and consistent approach, without which comparative analysis could not be readily conducted. The scale and scope of research therefore needed to be guided within a set structure if it was to be achieved successfully, allowing the identification of common and critical factors to the success of preparing, responding, and managing disasters to be made. This approach was considered essential and further evidence to strengthen a programmed way forward was provided by a set of interdependencies identified with other research and analysis activities outside of WP2. These included research and analysis activities in *Work Package 3 - Community resilience in selected past crisis*, *Work Package 4 - Cascades* and in *Work Package 7 - Social media information, misinformation, and risk communication.* To bring these elements together, and to increase collaboration and cooperation between partners and the programme of work, a phased approach was designed providing structure to the programming of work within WP2 and across the WP3, WP4 and WP7 described follows:

Phase 1: Disaster Scenario Research Requirements – from Month 1 to Month 12, scheduling meetings and workshops with partners to inform and review a template to guide research activities

Phase 2: Disaster Scenario Analysis Knowledge Exchange – from Month 12 to Month 18, timetabling a series of opportunities for partners to present and share use case research findings.

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Phase 3: Disaster Scenario Comparative Analysis – from Month 18 to Month 24, scheduling a series of workshops to discuss, compare and analyse use case research findings.

From the 3 key phases a Disaster Scenario Analysis Framework Programme was constructed, shown below in *Table 1: Disaster Scenario Analysis Framework Programme.*

Table 1: Disaster Scenario Analysis Framework Programme

PHASE 1: Disaster Scenario Research Requirements [M1-12]			
Month	Date	Event	Purpose
M1	September 2021	WP2 CORE KOM Consortium Meeting	To provide an overview of the aim of WP2 and introduce WP2 tasks, timescales, and deliverables
M2	October 2021	WP2 Partners Meeting	To introduce WP2 Task 2.1 and identify interdependencies with WP2 tasks
M4	December 2021	WP2 & WP3 Leaders Meeting	To examine and explore WP2 & WP3 tasks, activities, deliverables, and interdependencies
M7	March 2022	Disaster Scenario Use Case Template Version 1	To publish initial version of the template and seek feedback from partners
M9	May 2022	Workshop 1 - Disaster Scenario Analysis Framework	To examine WP2 tasks, activities, deliverables, and interdependencies with WP3, WP4 & WP7
M9	May 2022	Disaster Scenario Use Case Template Version 2	To publish second iteration of the template and seek further feedback from WP3, WP4 and WP7
M10	June 2022	Workshop 2 - Disaster Scenario Analysis Framework	To explore WP2 tasks, activities, deliverables, and interdependencies with ALL CORE project partners
M11	July 2022	Disaster Scenario Use Case Template Version 3	To publish final version of the Disaster Scenario Use Case Analysis template
PHASE 2: Disaster Scenario Analysis Knowledge Exchange [M12-18]			

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M13	September 2022	Disaster Scenario Use Case Analysis Presentation 1	To present findings and data captured for each use case keeping all partners sighted on research
M15	November 2022	Disaster Scenario Use Case Analysis Presentation 2	To present findings and data captured for each use case keeping all partners sighted on research
M17	January 2023	Disaster Scenario Use Case Analysis Presentation 3	To present findings and data captured for each use case keeping all partners sighted on research
M18	February 2023	Disaster Scenario Use Case Conclusions	To present key research findings and draw initial conclusions for each use case
PHASE 3: Disaster Scenario Comparative Analysis [M18-24]			
M19	February 2023	Workshop 4: Comparative analysis for WP2 and WP3	To compare all use cases, identifying common and critical factors for future disaster risk reduction
M20	June 2023	Workshop 5 Comparative analysis for WP4 and WP7	To compare all use cases, identifying common and critical factors for future disaster risk reduction
M24	August 2023	Comparative Analysis Finalisation	To finalise the comparative analysis of all use case disaster scenarios identifying recommendations

3. DISASTER SCENARIO CASE STUDY RESEARCH TEMPLATE

Following a series of initial meetings and discussions with CORE project partners following review of the programme of work, it became clear that a framework for disaster scenario analysis had to not only include the provision of a delivery ***programme*** to manage and schedule the analysis but most importantly, this programme would be required to be activated through the design and development of a ***template*** as a practical research recording tool. The template would serve several purposes at different levels, including being a strategic management instrument to ensure completion of research within identified timescales, to a document of tables with proscribed fields for researchers to enter and record captured data and findings for future comparative analysis.

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The development of the research template was conducted over several months and included a series of meetings shown in above in Table 2: Disaster Scenario Analysis Framework Programme. The progress of the template development lent itself to the design and completion of three separate iterations, with each iteration improving upon detail, content and becoming increasingly complex as additional partners contributed from across the CORE programme of work who had a vested interest and active stake in the design and development of the template. As the complexity of the template grew, partners welcomed a set of guidance notes to complete each field of the template which served to develop a common and agreed undertsanding of what data was required, amplifying the consistancy of approach.

The incremental journey to design, develop and deliver the final version of the template is included below, and provides both an explanation of, and evidence for, including certain fields for completion in the template. The design of the template served to promote a collaborative and cooperative approach within and between CORE consortium partners and Work Package leaders which proved essential to inform the delivery of the template.

3.1 Development of Case Study Template Version 1

3.1.1 WP2 integration

The inclusion of WP2 research activities in the template were considered essential to provide uniformity of presentation of findings to support comparative analysis. The examination of the following key tasks was undertaken to produce a set of research questions for WP2:

Task 2.2: Natural and manmade disaster case study identification, research and analysis - This task involves the identification of a set of six natural and manmade disaster case studies for investigation and analysis including a terrorist attack, wildfire, industrial accident, earthquake, tsunami and flash flooding. Following the Natural and manmade disaster scenarios analysis framework provided by Task 2.1, partners will conduct in-depth analysis of identified case studies examining public information sharing challenges, ethical issues and extracting lessons learned. Particular attention will be also given to the lessons learned by the recent COVID- 19 experience. This task also provides an analysis of cascading effects modelling for each of the identified case studies. This analysis will determine the cascade effect of the identified case studies, assessing the inevitability or unforeseen chain of events affecting the response to natural and manmade disaster and crises.

Task 2.3: Natural and manmade case study social media analysis - This task provides a tool-based semantic analysis of the role, influence, and impact of social media communications during each of the identified case studies. Advanced text-mining and network representation techniques will be used to identify patterns of interactions between opinion makers and recurring topics in the Twitter debate that follows a crisis incident. The analysis of social media will be conducted for each of identified crisis incidents, examining the

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earthquake, flood, forest fire, industrial accident, and terrorist attack case studies. This task compliments and adds specialist value to the activities of Task 2.2 Natural and manmade disaster case study identification, research, and analysis.

Task 2.4: Natural and manmade case study aerial imagery analysis - This task involves the examination of satellite images and Unmanned Aerial Vehicle data for public preparedness and information. Analysing the identified manmade and natural disaster case studies, this task will assess the positive benefits to be derived from the use of satellite images and Unmanned Aerial Vehicle data during disasters and crises to inform decision-making and the sharing of public information. The analysis of aerial imagery will be conducted for each of the identified crisis incidents, examining the earthquake, flood, forest fire, industrial accident, tsunami, and terrorist attack case studies.

Following analysis, *Table 2: WP2 Disaster Scenario Analysis Framework Questions* shown below, provides the set of WP2 research questions which were confirmed for inclusion in the *Disaster Scenarios Analysis Framework Template.*

Table 2: WP2 Disaster Scenario Analysis Framework Questions

WP 2	Task 2.2: Natural & manmade disaster case study identification, research, & analysis
What were the public information sharing challenges?	
What were the ethical issues?	
What lessons have been learned?	
What were the cascading effects across events, sectors and supply chain disruptions? Including the inevitability or unforeseen chain of events affecting the response to the disaster? What were the societal vulnerabilities in health and retail sectors?	
What was preparedness before and after the event with regards to prepositioning, training, framework contracts and supplier management.	
WP 2	Task 2.3: Natural and manmade case study social media analysis

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What was the role, influence, and impact of social media communications during this incident?	
What patterns of interactions between opinion makers and recurring topics in the Twitter debate following the disaster have been identified?	
WP 2	Task 2.4: Natural and manmade case study aerial imagery analysis
What positive benefits can be derived from the use of satellite images and Unmanned Aerial Vehicle data during this disaster to inform decision-making?	
What positive benefits can be derived from the use of satellite images and Unmanned Aerial Vehicle data during this disaster to inform the sharing of public information?	

3.1.2 WP3 integration

The examination of WP3 revealed the main objective was to develop a community resilience strategy which had interdependencies with WP3 and so required to be included in the template design. WP3 will compare plans and procedures associated with seven identified disaster scenarios to understand people response and identify possible protocols pitfalls. The overview of WP3 activities are explained and illustrated in the ***Errore. L'origine riferimento non è stata trovata.***: *Overview of WP3 activities* shown below.

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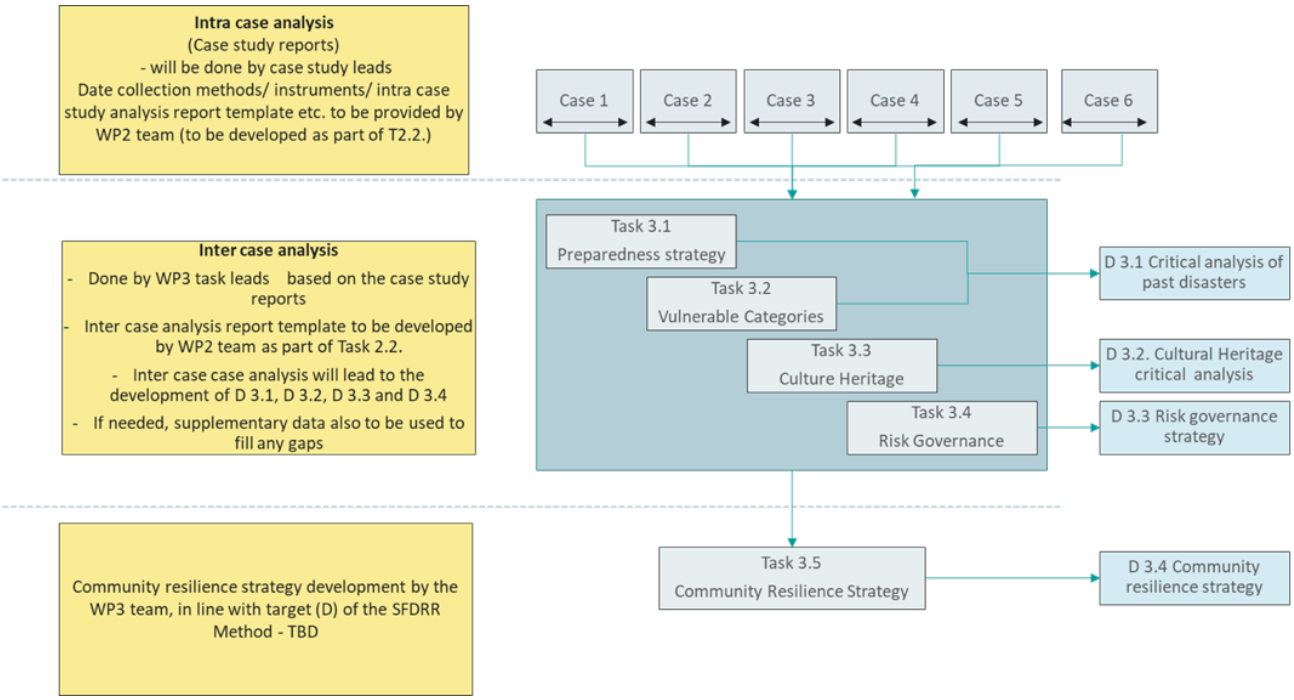

Figure 3: Overview of WP3 activities

Within WP3, each disaster scenario use case is assigned with a case study lead who will be carrying out the intra case analysis. The intra case analysis reports will be used to carry out the inter case analysis and achieve the expected deliverables under the WP3 programme of work. The intra case analysis reports will be used by the respective task leaders in WP3 to perform their respective tasks and produce the expected four deliverables to be completed under WP3.

WP3 has the main objective to develop a community resilience strategy. To achieve the mentioned objective the WP3 tasks are consisted of the data and information in the respective stages as illustrated below in ***Errore. L'origine riferimento non è stata trovata.****: WP3 link to data and information*.

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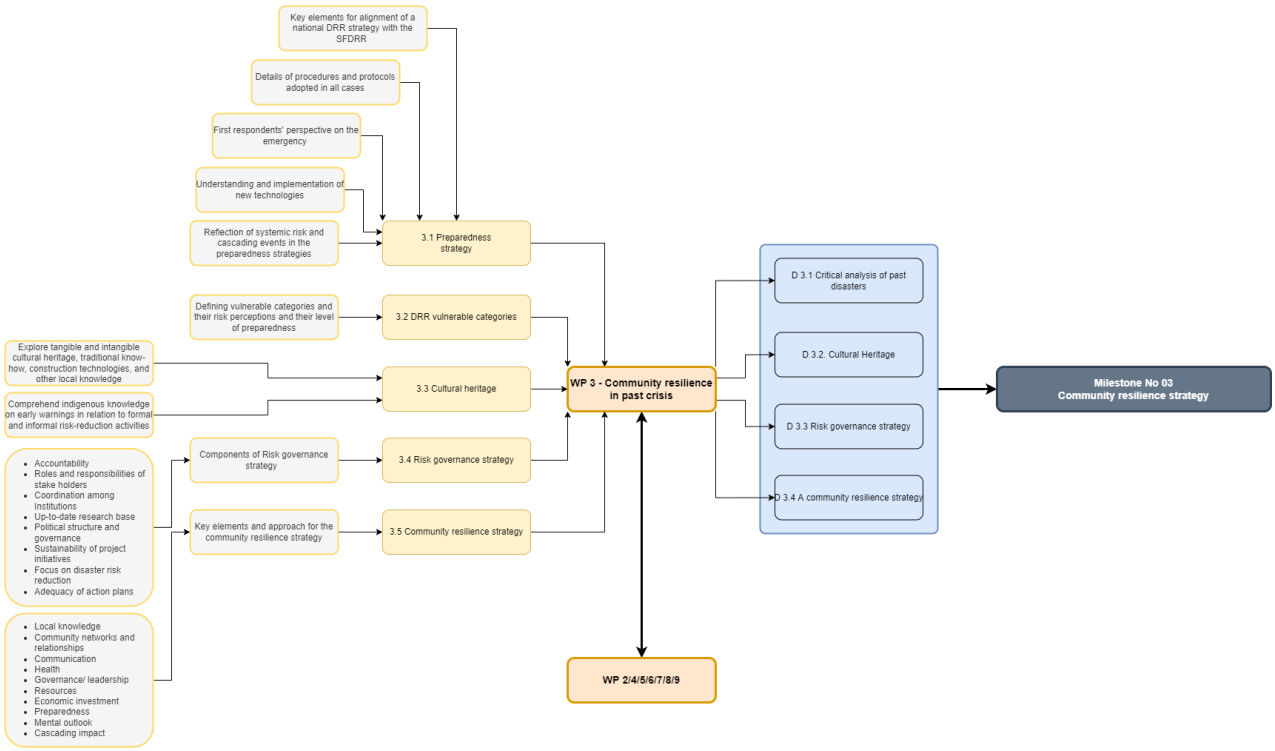

Figure 4: WP3 link to data and information

The data and information in WP3 are linked in this way to gain a better understanding and implementation of new technologies, media and tools, and their capacity to raise disaster risk awareness, to improve citizen understanding of risks, and thereby to build a culture of risks in society for different disaster scenarios (natural hazards, industrial disasters, terrorist threats) involving different actors, including first responders, city authorities and citizens, in the identified disaster use case scenarios. Moreover, WP3 will further explore the cultural diversity, tangible and intangible cultural heritage, traditional know-how, land use, construction technologies, and other local knowledge as a valuable source of information for the local communities that can help prevent the creation of new risks, to reduce existing risks, to prepare for and to respond to disasters and to build back better. The data can help better understand how governments and civil society organisations implement policies for mitigating risks, preparing for, reacting to, overcoming, and learning from disasters at the community level. Finally, the mentioned linkages within WP3 will play a key role to propose new approaches and strategies for community awareness, for leadership, and for disaster readiness and management with a particular emphasis on the use of new technologies.

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The inclusion of WP3 research activities in the template were considered essential. The examination of the following tasks was undertaken to produce a set of research questions for WP3:

Task 3.1: Critical analysis of past disasters via the identified case studies on their disaster preparedness strategies.
The task will analyse in depth procedures and protocols adopted in all the past cases by policy makers on preparedness planning, and first responder's perspective during the emergency to understand population response. Analysis of past disasters via the identified case studies (listed in the methodology section) on their disaster preparedness strategies.
The focus will be on preparedness strategies (i.e., National level, community level etc.). Accordingly, the preparedness strategies of the identified past events/case studies to be identified with reference to the Sendai Framework priority targets (**Errore. L'origine riferimento non è stata trovata.**).
Data and information: Disaster preparedness policies and plans in the case study identified countries or other EU countries.

Task 3.1 introduces essential existing preparedness strategies to CORE research, and none more so than disaster preparedness strategies in line with Sendai Framework for DRR. The Words into Action guidelines offer practical guidance and good practice examples for aligning a national disaster risk reduction strategy with the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNDRR, 2019b). Key principles and overarching considerations for developing disaster risk reduction (DRR) strategies in the spirit of the Sendai Framework for Disaster Risk Reduction are (UNDRR, 2015):

- Establishing a strong disaster risk governance system
- Adopting a multi-hazard approach
- Promoting inclusion and a whole-of-society approach
- Fostering coherence between disaster risk reduction, climate change and sustainable development
- Mainstreaming disaster risk reduction within and across sectors
- Linking national and local disaster risk reduction strategies
- Customizing approaches to fit the country context
- Building capacities

To contribute to the expected outcome of the Sendai Framework, national disaster risk reduction strategies should contain the 10 key targets elements shown below in *Figure 3: Policy targets of the Sendai Framework* which is essential components for all CORE activities and outcomes.

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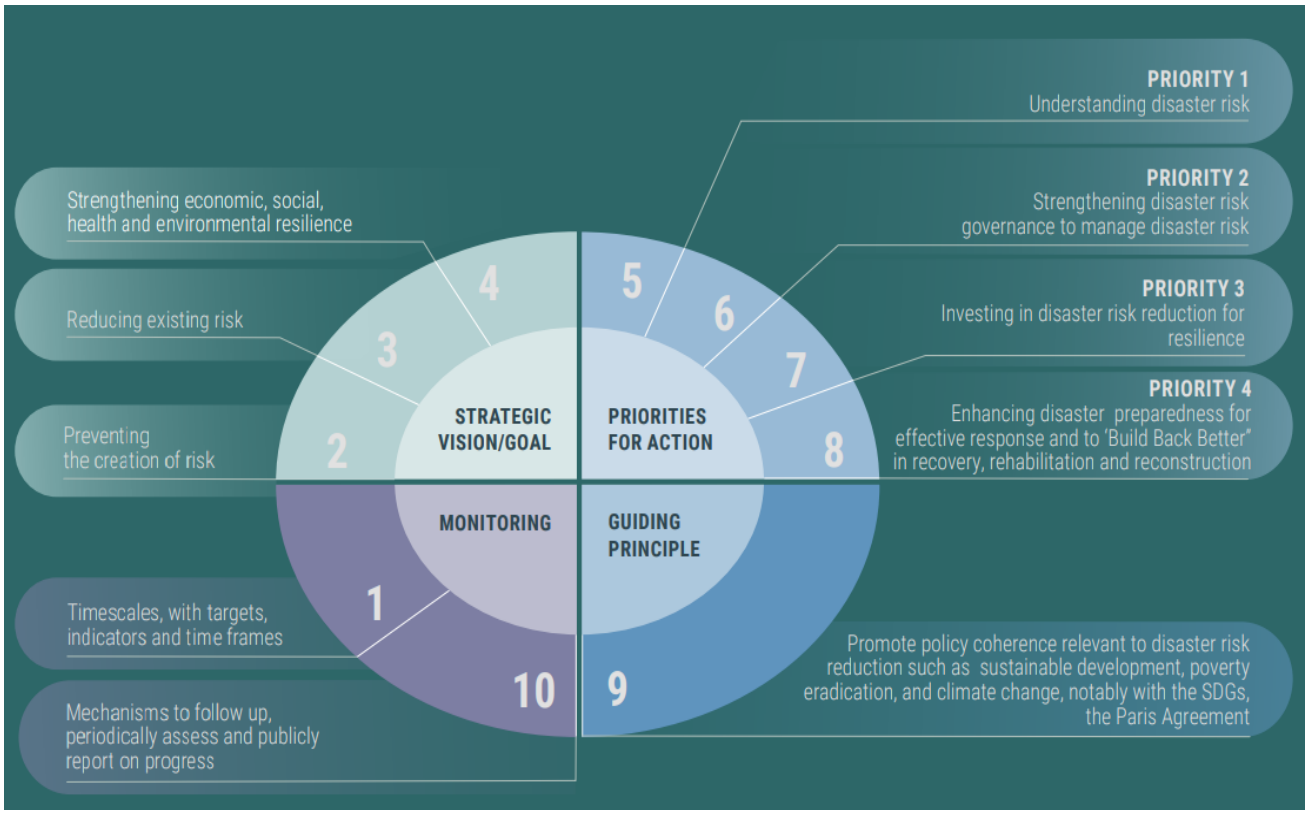

Figure 5: Priority targets in the Sendai Framework

Accordingly, the critical analysis of past disasters on the disaster preparedness strategies should contain the following key considerations (UNDRR, 2015):

- Contain different timescales, with targets, indicators, and time frames
- Contain aims at preventing the creation of risk
- Contain aims at reducing existing risk
- Contain aims at strengthening economic, social, health and environmental resilience
- Address the recommendations of Priority 1, Understanding disaster risk: Based on risk knowledge and assessments to identify risks at the local and national levels of the technical, financial, and administrative DRM capacity
- Address the recommendations of Priority 2, Strengthening disaster risk governance to manage disaster risk: Mainstream and integrate DRR within and across all sectors with defining roles and responsibilities
- Address the recommendations of Priority 3, Investing in DRR for resilience: Guide to allocation of the necessary resources at all levels of administration for the development and the implementation of DRR strategies in all relevant sectors

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- Address the recommendations of Priority 4, Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation, and reconstruction: Strengthen disaster preparedness for response and integrate DRR response preparedness and development measures to make nations and communities resilient to disasters
- Promote policy coherence relevant to DRR such as sustainable development, poverty eradication and climate change, notably with Sustainable Development Goals (SDGs) and the Paris Agreement
- Contain mechanisms to follow-up, periodically assess and publicly report on progress

Considering the integration and alignment of existing preparedness strategies to CORE research, an assessment of Task 3.1 was undertaken, and the following areas identified as critical for the analysis of past disasters on the disaster preparedness strategies and inclusion in the *Disaster Scenarios Analysis Framework Template*:

- Policies and legislation that integrate disaster preparedness
- National and local preparedness systems
- Support from government and political structure for implementing disaster management and preparedness plans
- Plans for emergency preparedness, response, and recovery
- Organizational structure and coordination mechanisms for disaster response and communication
- Organizational capacities and human resources for emergency management
- Assessments of risks and capacities to determine priorities for emergency preparedness
- Surveillance, early warning, and information management systems
- Access to diagnostic services for emergencies
- Emergency preparedness and continuity of basic services, emergency services, health, and relief facilities
- Risk communications with all stakeholders for emergency preparedness
- Research, development, and evaluation to inform and accelerate emergency preparedness
- Financial resources for emergency preparedness and contingency funding for emergency response
- Dedicated, trained, and equipped human resources for emergencies
- Logistics mechanisms and essential supplies for health and relief services

In addition to the examination of the inclusion of Task 3.1 research activities in the *Disaster Scenarios Analysis Framework Template*, an analysis of Task 3.4 was also undertaken to produce a set of research questions for WP3:

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Task 3.4 Risk governance strategy - The resilience of societies heavily depends on how governments and civil society organisations design and implement policies for mitigating risks, preparing for, reacting to, overcoming, and learning from disasters. Accordingly, this task will investigate the existing governance structures associated with the interface of identified hazards within the identified case scenarios, and how the information is shared, and decisions are coordinated from national to local level (vertically), and across local governance level (horizontally). Accordingly, gaps in the governance of mitigating risks, preparing for, reacting to, overcoming, and learning from disasters will be identified and also the factors on how local governments can be empowered, and governance can be reformed to ensure successful implementation at the local level. A risk governance strategy with the aim to engage all society will then be developed. The task will provide direct input towards enhancing preparedness for possible future disasters taking particular attention to the decision-making to be inclusive and risk-informed for potential affected populations.

This task will help to understand how governments and civil society organizations implement policies (investigate the existing governance structures associated with the interface of identified hazards within the identified case scenarios) for mitigating risks, preparing for, reacting to, overcoming, and learning from disasters at the community level. The disaster risk governance can be classified into national level governance components and local level governance components. The following factors can be studied in detail to explore the governance aspects with reference to the risk management associated with the CORE project case studies.

Considering the integration and alignment of existing risk governance policy, practice and procedures to CORE research, the following areas were highlighted identified as critical for the analysis of past disasters on the disaster preparedness strategies and inclusion in the *Disaster Scenarios Analysis Framework Template*:

Risk governance considerations at the NATIONAL level

- Political and governance structure among and within the institutions for DRR decision making.
- Efforts by the government agencies to promote DRR at the national level.
- Coordination and collaboration among relevant institutions for mainstreaming DRR into national policies.
- Roles and responsibilities of the stake holders in the institutional structure.

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- Financing mechanisms (e.g., from public sources) for the DRR implementation.
- Availability and transparency of information gathered by the official institutions.
- Appropriate mobilization and use of resources for planning and implementing DRR strategies.
- Efficiency of service provided to the safety and security of vulnerable communities.
- Monitoring accountability across different hierarchy levels in the institutions.
- Disaster contingency planning for accountability under uncertain conditions.
- Availability of expertise knowledge in the field of DRR.
- Up-to-date research and information base and linkage with DRR policies.

Risk governance considerations at the LOCAL and COMMUNITY level

- Available governance structures that enable participation in the DRR decision making and resilience building.
- Local level access to information about disaster risk and risk reduction mechanisms.
- Capacities of communities to influence DRR plans and actions.
- Inclusion of vulnerable groups in decision-making, participatory monitoring, and evaluation systems.
- Level of volunteerism for DRR planning implementation.
- Mechanisms to maintain communication and awareness through community leaders.
- Sustainability of project initiatives in the DRR and community resilience.
- Adequacy of action plans and alternative options for local level disaster risk management.
- Efficiency of service to the vulnerable communities.

From the analysis and identification of WP2 and WP3 interdependences, *Figure 4: Summary of key suggestions for WP2 and WP3* illustrates areas for further integration and greater collaboration to maximise efforts and project outputs and impacts.

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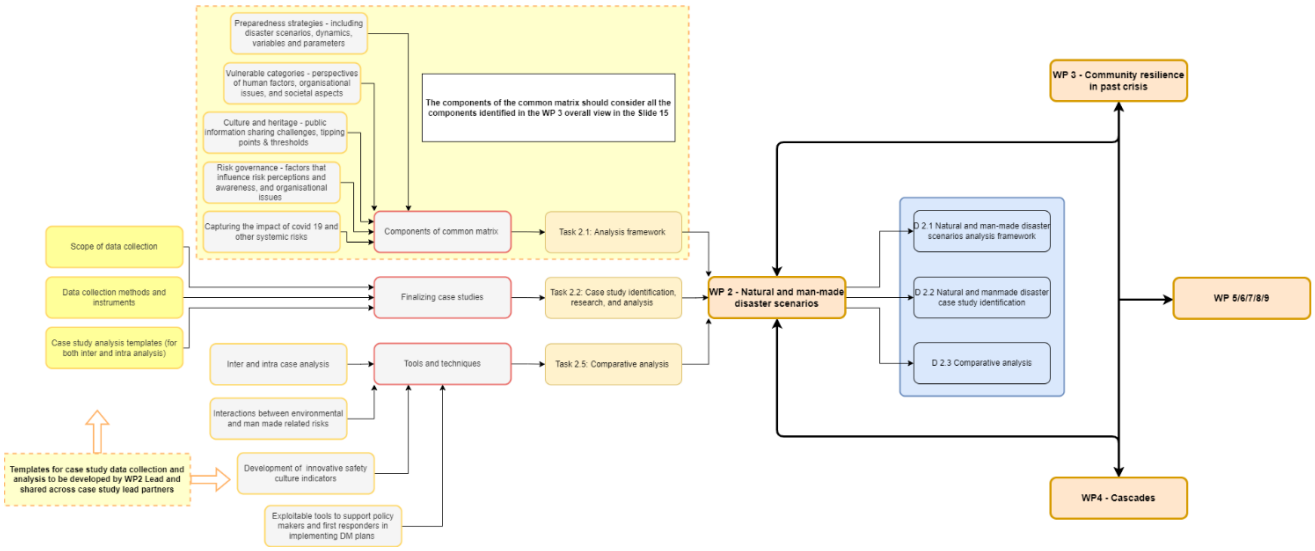

Figure 4: Summary of key suggestions for WP2 from WP3

Table 2: WP3 Task 3.1 & Task 3.4 Disaster Scenario Analysis Framework Questions shown below, provides the set of WP3 questions which were confirmed following analysis and assessment, for inclusion in the *Disaster Scenarios Analysis Framework Template*.

Table 3: WP3 Task 3.1 & Task 3.4 Disaster Scenario Analysis Framework Questions

WP3	Task 3.1 - Critical analysis of past disasters via the identified case studies on their disaster preparedness strategies
3.1.1	Type of hazards – Understanding the disaster risk
a.	What type of hazards were commonly identified in the region (Slow-onset and rapid onset hazards)?
b.	What hazards have resulted in disasters during the past 20 years?
c.	What risk assessment mechanism(s) were used by the relevant institutions for encompassing risk awareness, multi-hazard analysis, vulnerability/capacity analysis and cascading effects?
d.	What risk modelling and scenarios have been carried out to consider disaster risk and/or any other future threats and cascading effects?
e.	How the knowledge of indigenous communities and information in social media had been captured for disaster risk perception?

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3.1.2	Disaster resilience and preparedness strategies
a.	What were the available national and local disaster management plans and systems under following categories? o Individual-level activities (e.g., first aid training and response) o Household actions (e.g., stockpiling of equipment and supplies, retrofitting) o Community efforts (e.g., socially responsible mitigation, training, and awareness campaigns for first respondents and responders, and field exercises) o Governmental strategies (e.g., multi-organisational planning and public private partnerships, early warning systems, contingency plans, evacuation routes, and public information dissemination, allocation of resources)
b.	What provisions were in place for research, education, science, and technology (ex: geospatial, remote sensing) for informed disaster preparedness?
c.	What special provisions were undertaken to ensure pandemic preparedness in disaster preparedness measures?
3.1.3	Mitigation
a.	What policies and legislation were available that mainstreamed DRR in the national planning policy? o Land use planning and building codes (Ex: Avoid settlement expansion towards hazard prone areas) o Critical infrastructure protection and structural design improvements o Landscape and environmental arrangement around essential services and infrastructure o Resilience strategies including planning and partnership building between sectors
b.	What support were provided by media platforms including social media during disaster operations?
c.	What special measures were undertaken to ensure a COVID-19 safe environment during disaster operations?
3.1.4	Response
a.	What were the available surveillance, early warning, and information management systems for activating response operations under the following conditions? o Support or coordinate disaster operations being conducted by a designated lead agency

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○ Logistics mechanisms and essential supplies for health and relief services	
b. What support were provided by media platforms including social media during disaster operations?	
c. What special measures were undertaken to ensure a COVID-19 safe environment during disaster operations?	
3.1.5	Recovery
a. What were the long-term and short-term recovery actions undertaken during each post disaster recovery period including 'build back better' practices? ○ Response endeavours such as needs and damage assessments ○ Community-level involvement and capacity building for disaster recovery ○ Local administration and coordination for resource mobilisation ○ Building redundancy into a DRR plan	
b. How the post disaster infrastructure recovery including rebuilding, restoration, or reconstruction had taken place?	
c. What plans or provisions were available to minimise the economic impact following a disaster?	
d. What environmental recovery plans were available to manage the impact for eco-systems and related services?	
e. How have the mitigation and resilience-building activities of preparedness been adopted for the next disaster, and the development and implementation of legislation, policies, and practices to avoid similar situations in the future?	
3.1.6	Monitoring and evaluation
How frequent are plans being reviewed and revised for emergency preparedness, response, and recovery?	
WP3	Task 3.4 – Risk governance strategy
3.4.1	Disaster risk governance mechanisms
What were the disaster risk governance mechanisms identified in the relevant authorities to manage disaster risk under following categories? ○ Knowledge sharing and inclusion of science and technology ○ Harmonizing capacities and resources to the needs in risk assessment ○ Institutionalizing partnerships, coordination, and responsibilities	

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○ Participatory decision-making mechanisms, inclusive of vulnerable communities, indigenous communities, and volunteers ○ Leveraging investments in DRR	
3.4.2	International DDR frameworks
What international DDR frameworks (SENDAI, SDG, Paris Agreement) were adopted in DRR projects?	
3.4.3	Accountability in disaster governance
What were the provisions to ensure accountability in disaster governance? ○ Consider accountability aspects in the Sendai Framework for Disaster Risk Reduction 2015-2030 ○ Innovative elements of accountability ○ Enabling legislations ○ Regular monitoring, evaluation, and review	

3.1.3 Data source capture

An important element that arose during WP2 and WP3 template design discussions was the need to capture a record of data sources accessed and analysed for each disaster scenario use case study. Recording of the data source used, including a weblink, reference or brief description was considered essential to provide an evidence base for the responses to template questions and to provide all consortium partners progressing research on other use cases and different aspects of CORE research to be sighted on available sets of data which may be of value to their specific research activities. *Table 4: Disaster Scenarios Analysis Framework Record of Data Sources* shown below, provides a list of data sources which were categorised and confirmed to be included in the template for all WP2 and WP3 questions.

Table 4: Disaster Scenarios Analysis Framework Record of Data Sources

1	Government/Official reports
2	NGO reports
3	Community interviews/reports
4	Eyewitness/first-hand accounts

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5	News/media reports
6	Documentaries
7	Social Media (especially Twitter)
8	Satellite/other imagery
9	Academic Papers/Reports (Peer Reviewed)
10	Academic Papers/Reports (Non-Peer Reviewed)
11	Public Enquiry Reports/Findings
12	Journal/Magazine articles
13	Online podcasts, blogs, forums & chat rooms
14	Official policy recommendations & findings
15	Other (Please specify)

The identified elements for inclusion in the *Disaster Scenarios Analysis Framework Template* following analysis of WP2 and WP3 tasks were brought together in the initial iteration of the *Disaster Scenarios Analysis Framework Template Version 1* shown in ANNEX 1.

3.2 Development of Case Study Template Version 2

3.2.1 WP4 integration

The inclusion of WP4 research activities in the template were considered essential to provide uniformity of presentation of findings to support comparative analysis. The examination of the following key tasks was undertaken to produce a set of research questions for WP4:

Task 4.1 Downward counterfactual risk analysis - For each of the historical disaster scenarios studied in WP2, a methodical downward counterfactual search will be conducted to identify plausible pathways leading to greater human and economic losses as well as extensive societal disruption. These

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pathways define sequences of potential cascading effects, some of which may not have been previously appreciated as threats to societal resilience.

Task 4.3 Cascades across events, sectors, and supply chain disruptions - Whilst cascading disasters have been studied in the past, cascades across sectors (e.g. in the health-energy-food-water nexus) have been less in focus. More recently, the COVID-19 pandemic has highlighted societal vulnerabilities to supply chain disruptions, in health but also in the retail sector.

Task 4.4 Risk framework of cascades - Further analyses the causal links between cascades in T4.3 for estimating the risks associated with these cascades and their related decisions. This task highlights the societal risks associated with these cascades and raises awareness for the importance of security of supply in mitigating them.

Task 4.5 Multi-risk analysis - The multi-risk (MR) approach is an extension of conventional risk assessments: it assesses the consequences considering different hazard sources, providing a framework for (1) harmonizing risk assessments for different typologies of phenomena, and (2) taking into account possible interactions.

From the analysis and identification of WP2 and WP4 interdependences, Table 5: WP4 Disaster Scenario Analysis Framework Questions shown below, provides the set of WP4 questions which were confirmed for inclusion in the Disaster Scenario Analysis Framework Template.

Table 5: WP4 Disaster Scenario Analysis Framework Questions

WP4	Cascades
1. What is the EU country, covered by CORE partners, preparing for (crisis, war and crisis, disruption)?	
2. What types of disasters is each EU country, covered by CORE partners, preparing for?	
3. Who is involved in the preparation process? a. What kind of approach is adopted in disaster preparedness: e.g., is disaster preparedness centralized (national level) or decentralized (local level); who (which agency) has the leading role in preparedness; guiding policy frameworks and/or strategies and principles; coordination/cooperation mechanisms (and sectors involved)? b. Other stakeholders for preparedness? c. EU/UN/INGO?	

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4. Training and communication preparedness a. What kinds of trainings (including drills and crisis exercises) are done to prepare for a disaster? Who provides training, for whom and what competencies are covered? b. What kind of approach is adopted in crisis communication preparedness: e.g., what is communicated to the general public about preparedness, how (means and channels: e.g., preparedness brochure, crisis portals/websites, campaigns, formal/civic/professional education, social media mobilisation) and by whom (leading agency + other partners and stakeholders involved + partnerships with news media)? c. How are the needs of vulnerable groups taken into account?
5. Prepositioning, framework contract and supplier management a. What types of goods are pre-positioned and how are locations selected? b. Which organization is responsible for management of pre-positioned stock? c. What are the framework contracts for disaster preparedness, who manages them? d. How are suppliers who secure the supply for preparedness selected and managed?
6. How was the preparedness and response mechanism activated for different types of risks?
7. How the event influenced flow, access to and availability (length of shortage, scale, shortage by social group) of: o Drinking water; o Energy supply (electricity, coal, fuel etc.); o Food (retail sales, catering, etc.); o Health (emergency and long-term provision, psychological health); o Access to information.
8. How the event influenced preparedness mechanisms (in terms of training, information flow, communication, prepositioning, supplier management). What were the lessons learned from the case?

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9. Have there been any studies conducted on the long-term impact (five or ten years) of this disaster/crisis?
    - Was there any long-term health or societal impact?
    - Any local supply chain impact?
    - How long did it take for the communities to get back to the original state?
    - Any studies on the long-term resilience of the affected region?

3.2.2 WP7 integration

The inclusion of WP4 research activities in the template were considered essential to provide uniformity of presentation of findings to support comparative analysis. The examination of the following key tasks was undertaken to produce a set of research questions for WP4:

Task 7.1: Communication patterns - This task will map communication patterns, including social media, mobile applications, web sites etc., in EU countries during routine and crisis periods.

Task 7.2: Impacts of misinformation in social media on risks perceptions in a multi-risk environment - In this task we aim to identify how mis- and disinformation in social media influences risk perception and attitude (by individuals and communities), risk communication and risk management in particular in a multi-risk environment.

Task 7.3: Communication in social media and ethical values - The aim of this task is to identify what are the main ethical challenges in social media use related to misinformation/disinformation such as potential economic gain, the intention to deceive the public, the risk of public harm or the threats to democratic political and policymaking processes.

Task 7.4: Preferences on tools to deal with misinformation - The aim of this task is to analyse preferences, perceptions and views of various disaster risk reduction stakeholders and also of general public on features of tools to deal with misinformation and how these preferences are shaped by cultural backgrounds.

Task 7.5: Tools to fight misinformation in social media on earthquakes - The aim of this task is to develop an artificial intelligence (AI) tool to fight misinformation about earthquakes on Twitter and to prevent fake predictions from circulation.

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From further the analysis during the development of the second iteration of the Disaster Scenario Analysis Framework Template and identification of additional WP2 and WP7 interdependences it was decided that only a summary and outline would be needed to capture the required data in the form of a quality assessment. *Table 6: WP7 Disaster Scenario Analysis Framework Questions* shown below, provides the confirmed content from WP7 to be included in the Disaster Scenario Analysis Framework Template.

Table 6: WP7 Disaster Scenario Analysis Framework Questions

WP7	Social media information/misinformation and risk communication
Please provide a quality assessment for the accuracy and veracity of information and data used to inform this case study.	

The identified elements for inclusion in the *Disaster Scenarios Analysis Framework Template* following analysis of WP4 and WP7 tasks were brought together in the second iteration of the *Disaster Scenarios Analysis Framework Template Version 2* shown in ANNEX 2.

3.3 Development of Case Study Template Version 3

3.3.1 WP3 Task 3.2 and Task 3.3 integrations

The inclusion of WP3 research activities in the template were considered essential to provide uniformity of presentation of findings to support comparative analysis. Further examination of WP3 tasks from the first iteration of the template development identified the requirement to include the following key tasks in WP3 to produce a set of additional research questions for WP3:

Task 3.2 DRR & vulnerable categories - Analysis of vulnerable categories based on the experiences of past cases will be performed. The analysis will be made in the following countries: Italy, Germany, Israel & Japan and the risk perception of those categories and their level of preparedness will be analysed.

Task 3.3 Cultural Heritage – This task will study tangible and intangible cultural heritage, traditional know-how, land use, construction technologies, and other local knowledge which is a valuable source of information for the local communities that can help prevent the creation of new risks, to reduce

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existing risks, to prepare for and to respond to disasters and to build back better, in all the identified/selected cases.

From the analysis and identification of WP2 and WP3 interdependences, *Table 7: WP3 Task 3.2 & Task 3.3 Disaster Scenario Analysis Framework Questions* shown below, provides the set of questions which were confirmed for WP3.

Table 7: WP3 Task 3.2 & Task 3.3 Disaster Scenario Analysis Framework Questions

WP3	Task 3.2 – Vulnerable categories
3.2.1	Identify people vulnerable categories in the different phases of disaster management
a. In the analysed context, what were the consequences (death or injury) with respect to the following age groups and gender? o New-born (ages 0-4 week) o Infant (ages 4 week - 1 year) o Toddler (ages 1-3 years) - M/F o Pre-schooler (ages 3-5 years) - M/F o School aged child (ages 6-13 years) - M/F o Adolescent (ages 14-18 years) - M/F o Young adult (ages 19-29) - M/F o Adult (ages 30-64 years) - M/F o youngest-old (ages 64-74 years) - M/F o middle-old (ages 75-84 years) - M/F o Oldest-old (ages more than 85 years)	
b. During the rescue phase what were the categories of disabilities, or specific needs, that arose? o Movement disabilities * o Sensorial disabilities (deafness, blindness) * o Cognitive disabilities (autism, Down syndrome, Alzheimer, dementia) * o Pregnant women	

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- New-born
- Infant
- Other that emerged during the analysis of the available documentation or specific investigations conducted

*Indicate age class (see 3.2.1.a) and gender; ** indicate class age

c. Which of the following categories of disabilities, or specific needs, were managed in the post-emergency phases to give an initial response to people involved?

- Movement disabilities *
- Sensorial disabilities (deafness, blindness) *
- Cognitive disabilities (autism, Down syndrome, Alzheimer, dementia) *
- Pregnant women **
- New-born
- Infant
- Other that emerged during the analysis of the available documentation or specific investigations conducted

*Indicate age class (see 3.2.1.a) and gender; ** indicate class age

3.2.2	Post event management

a. About point 3.2.1b, were the rescuers prepared to manage the situation?

- The rescuers were involved in specific training activities in this field
- Specific documentation has been made available
- Simulations were conducted also considering the issue of inclusive emergency management

b. About point 3.2.1c, were the operators prepared to manage the situation considering people with specific needs?

- The rescuers were involved in specific training activities in this field
- Specific documentation has been made available
- Simulations were conducted also considering the issue of inclusive emergency management

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c. Were people with specific needs and their family members or caregivers prepared to manage that emergency? ○ Specific information activities were carried out on these topics with the involvement of family members, caregivers, and the surrounding community ○ Specific documentation has been made available ○ Simulations were conducted also considering the issue of inclusive emergency management	
WP3	Task 3.3 Culture & heritage
3.3.1	What was the extent of the damage with respect to the type of disaster?
3.3.2	What was the extent of the damage with respect to the size of the disaster?
3.3.3	How was the human and environmental adaptive response/reaction to the damage?
3.3.4	How long did it take to recover/retrieve after the disaster in the following categories? ○ Land use ○ Repopulation ○ Everyday life condition ○ Social life ○ Lesson for the mitigation of other disasters
3.3.5	Was there any quantitative correspondence between reaction/effort and damage?
3.3.6	What was the timescale of such correspondence (short-term vs. long-term)?

Section 3.3.2 WP7 integration

From further analysis and identification of WP2 and WP7 interdependencies and following advice and guidance from UNISA to differentiate between the forms of information and misinformation, *Table 8: WP7 Disaster Scenario Analysis Framework Questions Amendment* shown below, provides the set of categories and questions which were confirmed for WP7. In addition, a set of new questions were also highlighted to specify the types of misinformation

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and disinformation also shown in *Table 8: WP7 Disaster Scenario Analysis Framework Questions Amendment.*

Table 8: WP7 Disaster Scenario Analysis Framework Questions Amendment

WP7	Social media information/misinformation and risk communication
1. Please provide a quality assessment for the accuracy and veracity of information and data used to inform this case study in the following three categories:	
a). Media information	
b). Misinformation	
c). Risk communication	
2. What type of mis- and disinformation was spread and how was it spread (i.e. specific patterns, dynamics on the social media platforms)?	
3. What were the sources of the mis- and disinformation?	
4. Were measures taken to prevent/fight the spread of and belief in mis- and disinformation? If yes, what strategies were used and by whom?	
5. What was the role of authorities/governments to fight mis- and disinformation?	
6. Can debunking messages help to avoid the spread of and belief in mis- and disinformation?	

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Section 3.3.3 Guidance notes

From the analysis and identification of all WP2, WP3, WP4 and WP7 interdependences, and the agreement to include a set of clear and concise guidance notes for all question fields in the template, *Table 9: WP2 Disaster Scenario Analysis Framework Questions Guidance Notes* and *Table 10: Disaster Scenario Analysis Framework Record of Data Sources & Guidance Notes* shown below, provides an example of the guidance notes confirmed.

Table 9: WP2 Disaster Scenario Analysis Framework Questions Guidance Notes

Incident	**Guidance Notes:** Provide a brief title to best describe the disaster
Location	**Guidance Notes:** Provide details of the specific location of the disaster, including name of the building, premises, street, village, town, city, area, region, and country
Time & Date	**Guidance Notes:** Provide the time and date the disaster occurred
Description and timeline of the incident	
Guidance Notes: Provide a detailed description of the disaster (minimum of 1k words), including a narrative which describes the context of the disaster, including times and dates of key events, issues and incidents that occurred as the disaster unfolded. Describe the nature of the disaster, the response, the damage, and disruption caused, together with information concerning loss of life, casualties, and the wider economic, environmental, and other associated impacts. The description of the incident should provide an informative account of the disaster.	
WP2	Task 2.2: Natural & manmade disaster case study identification, research & analysis
What were the public information sharing challenges?	
Guidance Notes: Provide a detailed analysis of identified issues, concerns and challenges when sharing public information about the disaster. Include perspectives from citizens engaged in the disaster, emergency first-responder agencies and public authorities.	
What were the ethical issues?	
Guidance Notes: Provide a detailed analysis of any identified ethical issues, concerns or challenges that impacted upon the disaster, the emergency and public authority response or other aspect of the disaster.	

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What lessons have been learned?
Guidance Notes: Provide a detailed analysis of any lessons that have been learned following the disaster by public authorities, NGO's, emergency service responders, community groups or other body, group, network, or association.
What were the cascading effects across events, sectors, and supply chain disruptions? Including the inevitability or unforeseen chain of events affecting the response to the disaster? What were the societal vulnerabilities in health and retail sectors?
Guidance Notes: Provide a detailed analysis of any cascading effects following the disaster, including impacts following unfolding events on different sectors and supply chains. Include any unforeseen chain of events or unintended consequences of actions taken that impacted upon the disaster. Also describe the specific societal vulnerabilities in health and retail sectors within the jurisdiction, regional, locality, community and/or neighbourhood where the disaster occurred.
What was preparedness before and after the event with regards to prepositioning, training, framework contracts and supplier management.
Guidance Notes: Please note disaster preparedness planning includes the fundamental identification of risks, vulnerabilities, the possibilities of influence, organizational resources and capacity, division of responsibilities, developing and agreeing practices and processes as well as implementing an action plan to have the best possible preparedness in case of a disaster. Provide a detailed analysis of preparedness for the disaster in line with the disaster preparedness description.

WP2	Task 2.3: Natural and manmade case study social media analysis
What was the role, influence, and impact of social media communications during this incident?	
Guidance Notes: Provide a detailed analysis of the role of social media communications during the disaster. Also include a description of how social media communications influenced and impacted on the disaster.	
What patterns of interactions between opinion makers and recurring topics in the Twitter debate following the disaster have been identified?	
Guidance Notes: Provide evidence and detailed analysis of the patterns of interactions between opinion makers, informers, influencers, and credible voices on Twitter following the disaster. In addition, identify, describe, and analyse recurring topics of discussion on Twitter following the incident.	

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Table 10: Disaster Scenario Analysis Framework Record of Data Sources & Guidance Notes

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1	Government/Official reports	**Guidance Notes:** Reports, papers, and statements made by governments, their departments, and officials
2	NGO reports	**Guidance Notes:** *Reports, papers and statements made by NGOs and their officials*
3	Community interviews/reports	**Guidance Notes:** *Reports and interviews with citizens, community leaders and local representatives*
4	Eyewitness/first-hand accounts	**Guidance Notes:** Reports, accounts and statements made by witnesses providing best evidence
5	News/media reports	**Guidance Notes:** *Reports and articles from journalist and commentators published by news and media*
6	Documentaries	**Guidance Notes:** *Investigative film, interviews, comments and witness accounts*
7	Social Media	**Guidance Notes:** *Online social media platform posts and comments from users*
8	Satellite/other imagery	**Guidance Notes:** *Images captured by satellite or other aerial unmanned drone or manned aircraft*
9	Academic Papers/Reports (Peer Reviewed)	**Guidance Notes:** *Assessed, evaluated, and qualified evidence-based research and analysis published in recognised academic journals and books*
10	Academic Papers/Reports (Non-Peer Reviewed)	**Guidance Notes:** *Research and analysis published in recognised academic journals and books*
11	Public Enquiry Reports/Findings	**Guidance Notes:** *Official reports, findings, and recommendations of government-led or independent public reviews and inquiries including formal judicial, legal and coroners review and investigations*
12	Journal/Magazine articles	**Guidance Notes:** *Articles, papers, comments and interviews in journals and magazines*
13	Online podcasts, blogs, forums & chat rooms	**Guidance Notes:** Written or recorded content for online podcasts, blogs, forums, and chat rooms including radio shows, community groups, interest groups and professional bodies
14	Official policy recommendations & findings	**Guidance Notes:** Recommendations and findings arising from formal government, independent body

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		or other official investigative commission, association or group including lessons learned
15	Other (Please specify)	**Guidance Notes:** Any other data sources not falling within any of the above categories

The identified elements for inclusion in the *Disaster Scenarios Analysis Framework Template* following analysis of WP3, WP7 tasks and template guidance notes tasks were brought together in the final iteration of the *Disaster Scenarios Analysis Framework Template* Version 3 (Final) shown in ANNEX 3.

4. DISASTER SCENARIO ANALYSIS MODEL FRAMEWORK

The development of the *Disaster Scenarios Analysis Framework* was considered incomplete without being moulded into a single model, providing a visual representation of the framework architecture for strategic oversight. The *Disaster Scenarios Analysis Framework Model* is shown below in *Figure 5: Disaster Scenarios Analysis Framework Model,* which fuses the component parts of the *Disaster Scenarios Analysis Framework* with the disaster scenario research requirements detailed in the CORE programme of work.

The development of the *Disaster Scenarios Analysis Framework* has been designed with due cognisance of the 5 building block methodological approach, serving to frame and provide the parameters within which the appropriate scale and scope of disaster analysis should be delivered. The 5 building blocks of the CORE methodological approach are integrated and visible within the model shown in *Figure 5* below, reflected by the inclusion of *safety culture*, *social media*, *disaster scenarios, cascading effects,* and *governance*. The model illustrates the central importance of comparative analysis to CORE research while signposting the key areas for analysis across disaster preparedness, cascading effects, and response and recovery factors critical to DRR development.

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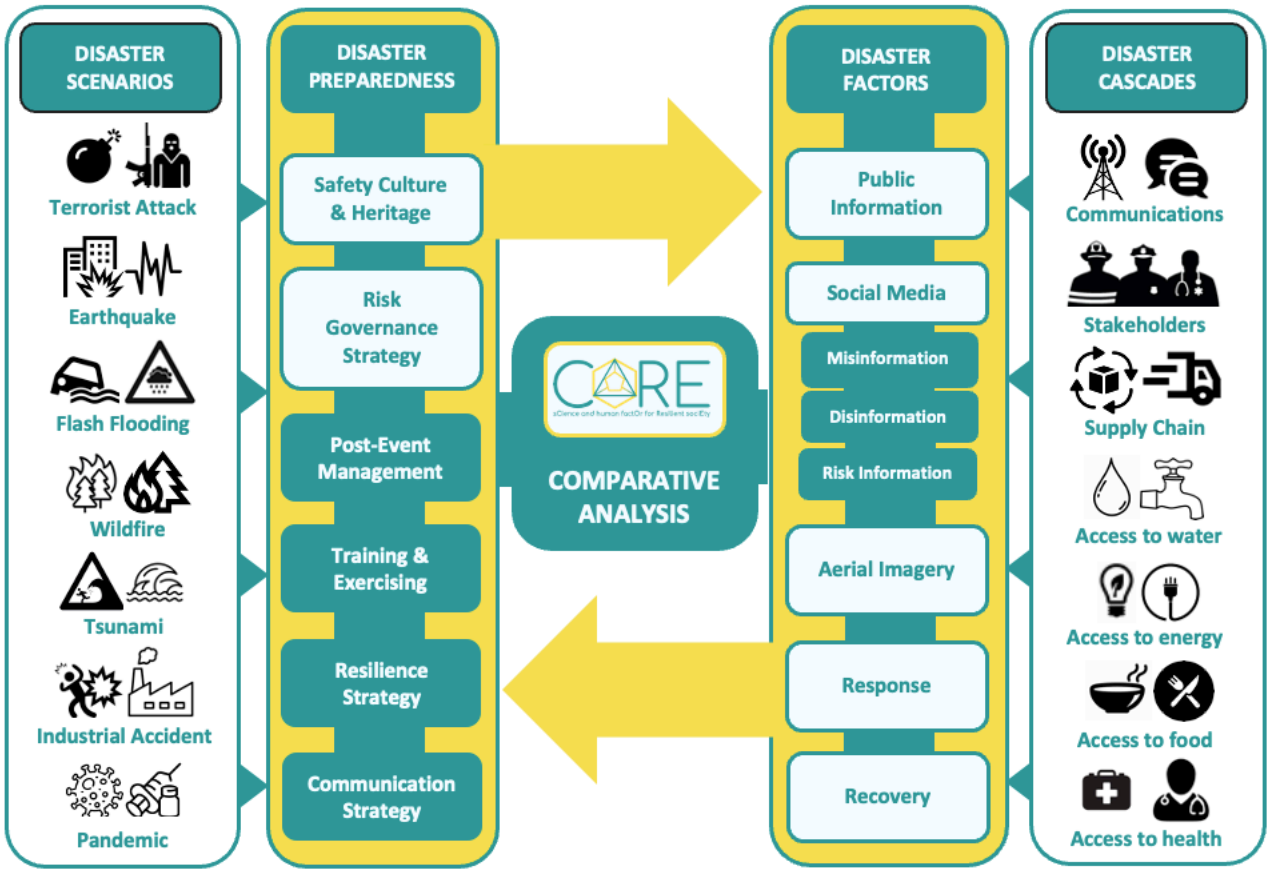

Figure 5 - Disaster Scenario Analysis Framework Model

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5. CONCLUSIONS

The *Disaster Scenarios Analysis Framework* delivers both a structured programme of work to ensure timely completion of research, together with a comprehensive template supported by clear and concise guidance notes, shown in *ANNEX 4 - Case Study Template Version 3*, providing the necessary support and direction for consortium partner researchers to fulfil their tasks. The combined effect of the programme framework, template, guidance notes and model, provides a consistent, coherent, and standardised approach, enabling the effective collection and examination of data to capture best practices and lessons learned.

The delivery of the *Disaster Scenarios Analysis Framework* component parts including the ***programme***, ***template,*** and ***model***, ensures that CORE has every opportunity to achieve the intended positive impacts of project outputs including advances in approaches to adapt to, and be prepared for risks in different countries (both within and outside the European Union), and among communities in precarious socio-economic conditions. The completion of the *Disaster Scenarios Analysis Framework* also allows for the delivery of positive impacts upon the comparative analysis of the European diversity in terms of risk-perception amongst citizens.

The delivery of the *Disaster Scenarios Analysis Framework* meets the aim and objectives of *WP2 Natural and man-made disaster scenarios*, including important comparative analysis tasks in which the examination of findings and data across all disaster scenarios is essential, requiring the comparative analysis of consistent sets of data, themes, and findings. Beyond the needs of WP2, the methodological approach of delivering the *Disaster Scenarios Analysis Framework* highlighted the significant impact of this work upon several key activities throughout the CORE project programme. The development of the *Disaster Scenarios Analysis Framework* served to expose a series of interdependencies of activities within tasks across the CORE programme of work that were not previously identified. Exposing and further examining these interdependencies has significantly enriched the *Disaster Scenarios Analysis Framework,* with important inputs from consortium partners progressing research in WP3, WP4 and WP7. Moreover, the exposure and examination of these interdependencies has avoided areas of duplication, serving to increase the efficacy of project delivery, maximising time and research resource.

A positive unintended consequence of the discovery of interdependencies during the development of the *Disaster Scenarios Analysis Framework* has accelerated and amplified the cooperation and collaboration between multiple CORE consortium partners, encouraging engagement and advancing the understanding of consortium partners research roles,

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responsibilities, and unique areas of expertise. The completion of the *Disaster Scenarios Analysis Framework* marks an important phase of the delivery of CORE strategic objectives, serving to drive the analysis of the identified case studies within a structure developed by contributions from all CORE partners. The *Disaster Scenarios Analysis Framework* provides a robust and rigorous framework to forensically analyse all manner of disaster scenarios to identify best practices and lessons learned.

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ANNEX 1 - CASE STUDY TEMPLATE VERSION 1

CASE STUDY TEMPLATE – VERSION 1	
Incident	
Location	
Time & Date	
Description and timeline of the incident	
WP2	Task 2.2: Natural & manmade disaster case study identification, research, & analysis
What were the public information sharing challenges?	
What were the ethical issues?	
What lessons have been learned?	
What were the cascading effects across events, sectors and supply chain disruptions? Including the inevitability or unforeseen chain of events affecting the response to the disaster? What were the societal vulnerabilities in health and retail sectors?	
What was preparedness[1] before and after the event with regards to prepositioning, training, framework contracts and supplier management.	

[1] Disaster preparedness planning includes the fundamental ident

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Please provide a list with links of data sources used in the following categories	
Government/Official reports	
NGO reports	
Community interviews/reports	
Eyewitness/first-hand accounts	
News/media reports	
Documentaries	
Social Media	
Satellite/other imagery	
Academic Papers/Reports (Peer Reviewed)	
Academic Papers/Reports (Non-Peer Reviewed)	
Public Enquiry Reports/Findings	
Journal/Magazine articles	
Online podcasts, blogs, forums & chat rooms	
Official policy recommendations & findings	
Other (Please specify)	

ification of risks, vulnerabilities, the possibilities of influence, organisational resources and capacity, division of responsibilities, developing and agreeing practices and processes as well as implementing an action plan to have the best possible preparedness in case of a disaster

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WP2	Task 2.3: Natural and manmade case study social media analysis
What was the role, influence, and impact of social media communications during this incident?	
What patterns of interactions between opinion makers and recurring topics in the Twitter debate following the disaster have been identified?	
Please provide a list with links of data sources used in the following categories	
Government/Official reports	
Community interviews/reports	
Eyewitness/first-hand accounts	
News/media reports	
Documentaries	
Social Media	
Satellite/other imagery	
Academic Papers/Reports (Peer Reviewed)	
Academic Papers/Reports (Non-Peer Reviewed)	
Public Enquiry Reports/Findings	
Journal/Magazine articles	
Online podcasts, blogs, forums & chat rooms	

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Official policy recommendations & findings	
Other (Please specify)	

WP2	Task 2.4: Natural and manmade case study aerial imagery analysis

What positive benefits can be derived from the use of satellite images and Unmanned Aerial Vehicle data during this disaster to inform decision-making?
What positive benefits can be derived from the use of satellite images and Unmanned Aerial Vehicle data during this disaster to inform the sharing of public information?
Please provide a list with links of data sources used in the following categories

Government/Official reports	
NGO reports	
Community interviews/reports	
Eyewitness/first-hand accounts	
News/media reports	
Documentaries	
Social Media	
Satellite/other imagery	
Academic Papers/Reports (Peer Reviewed)	

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Academic Papers/Reports (Non-Peer Reviewed)	
Public Enquiry Reports/Findings	
Journal/Magazine articles	
Online podcasts, blogs, forums & chat rooms	
Official policy recommendations & findings	
Other (Please specify)	

WP3	Task 3.1 - Critical analysis of past disasters via the identified case studies on their disaster preparedness strategies	
Type of data		Data/ information/ sources/ reference material
3.1.1	Type of hazards – Understanding the disaster risk	
a.	What type of hazards were commonly identified in the region (Slow-onset and rapid onset hazards)?	
b.	What hazards have resulted in disasters during the past 20 years?	
c.	What risk assessment mechanism(s) were used by the relevant institutions for encompassing risk awareness, multi-hazard analysis, vulnerability/capacity analysis and cascading effects?	
d.	What risk modelling and scenarios have been carried out to consider disaster risk and/or any other future threats and cascading effects?	
e.	How the knowledge of indigenous communities and information in social	

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	media had been captured for disaster risk perception?	
3.1.2	Disaster resilience and preparedness strategies	
a.	What were the available national and local disaster management plans and systems under following categories?	
	○ Individual-level activities (e.g., first aid training and response)	
	○ Household actions (e.g., stockpiling of equipment and supplies, retrofitting)	
	○ Community efforts (e.g., socially responsible mitigation, training, and awareness campaigns for first respondents and responders, and field exercises)	
	○ Governmental strategies (e.g., multi-organisational planning and public private partnerships, early warning systems, contingency plans, evacuation routes, and public information dissemination, allocation of resources)	

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b.	What provisions were in place for research, education, science, and technology (ex: geospatial, remote sensing) for informed disaster preparedness?	
c.	What special provisions were undertaken to ensure pandemic preparedness in disaster preparedness measures?	
3.1.3	Mitigation	
a.	What policies and legislation were available that mainstreamed DRR in the national planning policy?	
	○ Land use planning and building codes (Ex: Avoid settlement expansion towards hazard prone areas)	
	○ Critical infrastructure protection and structural design improvements	
	○ Landscape and environmental arrangement around essential services and infrastructure	
	○ Resilience strategies including planning and partnership building between sectors	
b.	What support were provided by media platforms including social media during disaster operations?	
c.	What special measures were undertaken to ensure a COVID-19 safe environment during disaster operations?	
3.1.4	Response	
a.	What were the available surveillance, early warning, and information management systems for activating response operations under the following conditions?	

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	○ Support or coordinate disaster operations being conducted by a designated lead agency	
	○ Logistics mechanisms and essential supplies for health and relief services	
b.	What support were provided by media platforms including social media during disaster operations?	
c.	What special measures were undertaken to ensure a COVID-19 safe environment during disaster operations?	
3.1.5	Recovery	
a.	What were the long-term and short-term recovery actions undertaken during each post disaster recovery period including 'build back better' practices?	
	○ Response endeavours such as needs and damage assessments	
	○ Community-level involvement and capacity building for disaster recovery	
	○ Local administration and coordination for resource mobilisation	
	○ Building redundancy into a DRR plan	
b.	How the post disaster infrastructure recovery including rebuilding, restoration, or reconstruction had taken place?	
c.	What plans or provisions were available to minimise the economic impact following a disaster?	
d.	What environmental recovery plans were available to manage the impact for eco-systems and related services?	

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e.	How have the mitigation and resilience-building activities of preparedness been adopted for the next disaster, and the development and implementation of legislation, policies, and practices to avoid similar situations in the future?	
3.1.6	Monitoring and evaluation	
How frequent are plans being reviewed and revised for emergency preparedness, response, and recovery?		
WP3	Task 3.4 – Risk governance strategy	
Type of data		Data/ information/ sources/ reference material
3.4.1	Disaster risk governance mechanisms	
What were the disaster risk governance mechanisms identified in the relevant authorities to manage disaster risk under following categories?		
○ Knowledge sharing and inclusion of science and technology		
○ Harmonizing capacities and resources to the needs in risk assessment		
○ Institutionalizing partnerships, coordination, and responsibilities		
○ Participatory decision-making mechanisms, inclusive of vulnerable communities, indigenous communities, and volunteers		
○ Leveraging investments in DRR		
3.4.2	International DDR frameworks	
What international DDR frameworks (SENDAI, SDG, Paris Agreement) were adopted in DRR projects?		
3.4.3	Accountability in disaster governance	
What were the provisions to ensure accountability in disaster governance?		

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○ Consider accountability aspects in the Sendai Framework for Disaster Risk Reduction 2015-2030	
○ Innovative elements of accountability	
○ Enabling legislations	
○ Regular monitoring, evaluation, and review	

ANNEX 2 - CASE STUDY TEMPLATE VERSION 2

CASE STUDY X: Disaster Scenario Y	
Incident	
Location	
Time & Date	
Description and timeline of the incident	
Insert max 1k word description of the disaster scenario	
WP2	Task 2.2: Natural & manmade disaster case study identification, research & analysis
What were the public information sharing challenges?	
What were the ethical issues?	
What lessons have been learned?	

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What were the cascading effects across events, sectors and supply chain disruptions? Including the inevitability or unforeseen chain of events affecting the response to the disaster? What were the societal vulnerabilities in health and retail sectors?	
What was preparedness[2] before and after the event with regards to prepositioning, training, framework contracts and supplier management.	
Please provide a list with links of data sources used in the following categories	
Government/Official reports	
NGO reports	
Community interviews/reports	
Eyewitness/first-hand accounts	
News/media reports	
Documentaries	
Social Media	
Satellite/other imagery	
Academic Papers/Reports (Peer Reviewed)	
Academic Papers/Reports (Non-Peer Reviewed)	
Public Enquiry Reports/Findings	

[2] Disaster preparedness planning includes the fundamental identification of risks, vulnerabilities, the possibilities of influence, organisational resources and capacity, division of responsibilities, developing and agreeing practices and processes as well as implementing an action plan to have the best possible preparedness in case of a disaster

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Journal/Magazine articles	
Online podcasts, blogs, forums & chat rooms	
Official policy recommendations & findings	
Other (Please specify)	
WP2	Task 2.3: Natural and manmade case study social media analysis
What was the role, influence, and impact of social media communications during this incident?	
What patterns of interactions between opinion makers and recurring topics in the Twitter debate following the disaster have been identified?	
Please provide a list with links of data sources used in the following categories	
Government/Official reports	
Community interviews/reports	
Eyewitness/first-hand accounts	
News/media reports	
Documentaries	
Social Media	
Satellite/other imagery	
Academic Papers/Reports (Peer Reviewed)	

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Academic Papers/Reports (Non-Peer Reviewed)	
Public Enquiry Reports/Findings	
Journal/Magazine articles	
Online podcasts, blogs, forums & chat rooms	
Official policy recommendations & findings	
Other (Please specify)	
WP2	Task 2.4: Natural and manmade case study aerial imagery analysis
What positive benefits can be derived from the use of satellite images and Unmanned Aerial Vehicle data during this disaster to inform decision-making?	
What positive benefits can be derived from the use of satellite images and Unmanned Aerial Vehicle data during this disaster to inform the sharing of public information?	
Please provide a list with links of data sources used in the following categories	
Government/Official reports	
NGO reports	
Community interviews/reports	

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Eyewitness/first-hand accounts	
News/media reports	
Documentaries	
Social Media	
Satellite/other imagery	
Academic Papers/Reports (Peer Reviewed)	
Academic Papers/Reports (Non-Peer Reviewed)	
Public Enquiry Reports/Findings	
Journal/Magazine articles	
Online podcasts, blogs, forums & chat rooms	
Official policy recommendations & findings	
Other (Please specify)	

WP3	Task 3.1 - Critical analysis of past disasters via the identified case studies on their disaster preparedness strategies	
Type of data		Data/ information/ sources/ reference material
3.1.1	Type of hazards – Understanding the disaster risk	
a.	What type of hazards were commonly identified in the region (Slow-onset and rapid onset hazards)?	
b.	What hazards have resulted in disasters during the past 20 years?	

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c.	What risk assessment mechanism(s) were used by the relevant institutions for encompassing risk awareness, multi-hazard analysis, vulnerability/capacity analysis and cascading effects?	
d.	What risk modelling and scenarios have been carried out to consider disaster risk and/or any other future threats and cascading effects?	
e.	How the knowledge of indigenous communities and information in social media had been captured for disaster risk perception?	
3.1.2	Disaster resilience and preparedness strategies	
a.	What were the available national and local disaster management plans and systems under following categories?	
	○ Individual-level activities (e.g., first aid training and response)	
	○ Household actions (e.g., stockpiling of equipment and supplies, retrofitting)	
	○ Community efforts (e.g., socially responsible mitigation, training, and awareness campaigns for first respondents and responders, and field exercises)	
	○ Governmental strategies (e.g., multi-organisational planning and	

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	public private partnerships, early warning systems, contingency plans, evacuation routes, and public information dissemination, allocation of resources)	
b.	What provisions were in place for research, education, science, and technology (ex: geospatial, remote sensing) for informed disaster preparedness?	
c.	What special provisions were undertaken to ensure pandemic preparedness in disaster preparedness measures?	
3.1.3	Mitigation	
a.	What policies and legislation were available that mainstreamed DRR in the national planning policy?	
	○ Land use planning and building codes (Ex: Avoid settlement expansion towards hazard prone areas)	
	○ Critical infrastructure protection and structural design improvements	
	○ Landscape and environmental arrangement around essential services and infrastructure	
	○ Resilience strategies including planning and partnership building between sectors	
b.	What support were provided by media platforms including social media during disaster operations?	

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c.	What special measures were undertaken to ensure a COVID-19 safe environment during disaster operations?	
3.1.4	Response	
a.	What were the available surveillance, early warning, and information management systems for activating response operations under the following conditions?	
	○ Support or coordinate disaster operations being conducted by a designated lead agency	
	○ Logistics mechanisms and essential supplies for health and relief services	
b.	What support were provided by media platforms including social media during disaster operations?	
c.	What special measures were undertaken to ensure a COVID-19 safe environment during disaster operations?	
3.1.5	Recovery	
a.	What were the long-term and short-term recovery actions undertaken during each post disaster recovery period including 'build back better' practices?	
	○ Response endeavours such as needs and damage assessments	
	○ Community-level involvement and capacity building for disaster recovery	
	○ Local administration and coordination for resource mobilisation	
	○ Building redundancy into a DRR plan	

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b.	How the post disaster infrastructure recovery including rebuilding, restoration, or reconstruction had taken place?	
c.	What plans or provisions were available to minimise the economic impact following a disaster?	
d.	What environmental recovery plans were available to manage the impact for eco-systems and related services?	
e.	How have the mitigation and resilience-building activities of preparedness been adopted for the next disaster, and the development and implementation of legislation, policies, and practices to avoid similar situations in the future?	
3.1.6	Monitoring and evaluation	
How frequent are plans being reviewed and revised for emergency preparedness, response, and recovery?		
WP3	Task 3.4 – Risk governance strategy	
Type of data		Data/ information/ sources/ reference material
3.4.1	Disaster risk governance mechanisms	
What were the disaster risk governance mechanisms identified in the relevant authorities to manage disaster risk under following categories?		
○ Knowledge sharing and inclusion of science and technology		
○ Harmonizing capacities and resources to the needs in risk assessment		
○ Institutionalizing partnerships, coordination, and responsibilities		
○ Participatory decision-making mechanisms, inclusive of vulnerable communities, indigenous communities, and volunteers		
○ Leveraging investments in DRR		

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3.4.2	International DDR frameworks	
What international DDR frameworks (SENDAI, SDG, Paris Agreement) were adopted in DRR projects?		
3.4.3	Accountability in disaster governance	
What were the provisions to ensure accountability in disaster governance?		
o Consider accountability aspects in the Sendai Framework for Disaster Risk Reduction 2015-2030		
o Innovative elements of accountability		
o Enabling legislations		
o Regular monitoring, evaluation, and review		
WP4	Cascades	
1.	What is the EU country, covered by CORE partners, preparing for (crisis, war and crisis, disruption)?	
2.	What types of disasters is each EU country, covered by CORE partners, preparing for?	
3.	Who is involved in the preparation process?	
a.	What kind of approach is adopted in disaster preparedness: e.g., is disaster preparedness centralized (national level) or decentralized (local level); who (which agency) has the leading role in preparedness; guiding policy frameworks and/or strategies and principles; coordination/cooperation	

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	mechanisms (and sectors involved)?	
b.	Other stakeholders for preparedness?	
c.	EU/UN/INGO?	
4	Training and communication preparedness	
a.	What kinds of trainings (including drills and crisis exercises) are done to prepare for a disaster?	
b.	Who provides training, for whom and what competencies are covered?	
c.	What kind of approach is adopted in crisis communication preparedness: e.g., what is communicated to the general public about preparedness, how (means and channels: e.g., preparedness brochure, crisis portals/websites, campaigns, formal/civic/professional education, social media mobilisation) and by whom (leading agency + other partners and stakeholders involved + partnerships with news media)? How are the needs of vulnerable groups taken into account?	
5.	Prepositioning, framework contract and supplier management	
a.	What types of goods are pre-positioned and how are locations selected?	

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b.	Which organization is responsible for management of pre-positioned stock?	
c.	What are the framework contracts for disaster preparedness, who manages them?	
d.	How are suppliers who secure the supply for preparedness selected and managed	
6.	How was the preparedness and response mechanism activated for different types of risks?	
7.	How the event influenced flow, access to and availability (length of shortage, scale, shortage by social group) of:	
	o Drinking water;	
	o Energy supply (electricity, coal, fuel etc.);	
	o Food (retail sales, catering, etc.);	
	o Health (emergency and long-term provision, psychological health);	
	o Access to information.	
8.	How the event influenced preparedness mechanisms (in terms of training, information flow, communication, prepositioning, supplier management). What were the lessons learned from the case?	
9.	Have there been any studies conducted on the long-term impact (five or ten years) of this disaster/crisis?	

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a.	Was there any long-term health or societal impact?	
b.	Any local supply chain impact?	
c.	How long did it take for the communities to get back to the original state?	
d.	Any studies on the long-term resilience of the affected region?	
WP7	Social media information/misinformation and risk communication	
Please provide a quality assessment for the accuracy and veracity of information and data used to inform this case study.		

ANNEX 3 - CASE STUDY TEMPLATE VERSION 3 (FINAL)

CASE STUDY X: Disaster Scenario Y	
Guidance notes are provided in red text offering additional description and direction of the response/s required in each field.	
Incident	Provide a brief title to best describe the disaster

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Location	Provide details of the specific location of the disaster, including name of the building, premises, street, village, town, city, area, region, and country
Time & Date	Provide the time and date the disaster occurred
Description and timeline of the incident	
Provide a detailed description of the disaster (minimum of 1k words), including a narrative which describes the context of the disaster, including times and dates of key events, issues and incidents that occurred as the disaster unfolded. Describe the nature of the disaster, the response, the damage, and disruption caused, together with information concerning loss of life, casualties, and the wider economic, environmental, and other associated impacts. The description of the incident should provide an informative account of the disaster.	
WP2	Task 2.2: Natural & manmade disaster case study identification, research & analysis
What were the public information sharing challenges?	
Provide a detailed analysis of identified issues, concerns and challenges when sharing public information about the disaster. Include perspectives from citizens engaged in the disaster, emergency first-responder agencies and public authorities.	
What were the ethical issues?	
Provide a detailed analysis of any identified ethical issues, concerns or challenges that impacted upon the disaster, the emergency and public authority response or other aspect of the disaster.	
What lessons have been learned?	
Provide a detailed analysis of any lessons that have been learned following the disaster by public authorities, NGO's, emergency service responders, community groups or other body, group, network, or association.	
What were the cascading effects across events, sectors and supply chain disruptions? Including the inevitability or unforeseen chain of events affecting the response to the disaster? What were the societal vulnerabilities in health and retail sectors?	

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Provide a detailed analysis of any cascading effects following the disaster, including impacts following unfolding events on different sectors and supply chains. Include any unforeseen chain of events or unintended consequences of actions taken that impacted upon the disaster. Also describe the specific societal vulnerabilities in health and retail sectors within the jurisdiction, regional, locality, community and/or neighbourhood where the disaster occurred.
What was preparedness before and after the event with regards to prepositioning, training, framework contracts and supplier management.
Please note disaster preparedness planning includes the fundamental identification of risks, vulnerabilities, the possibilities of influence, organizational resources and capacity, division of responsibilities, developing and agreeing practices and processes as well as implementing an action plan to have the best possible preparedness in case of a disaster. Provide a detailed analysis of preparedness for the disaster in line with the disaster preparedness description.
Please provide a list with links of data sources used in the following categories

Government/Official reports	Reports, papers, and statements made by governments, their departments and officials
NGO reports	*Reports, papers and statements made by NGOs and their officials*
Community interviews/reports	*Reports and interviews with citizens, community leaders and local representatives*
Eyewitness/first-hand accounts	Reports, accounts and statements made by witnesses providing best evidence
News/media reports	*Reports and articles from journalist and commentators published by news and media*
Documentaries	*Investigative film, interviews, comments and witness accounts*
Social Media	*Online social media platform posts and comments from users*
Satellite/other aerial imagery	*Images captured by satellite or other aerial unmanned drone or manned aircraft*
Academic Papers/Reports (Peer Reviewed)	*Assessed, evaluated, and qualified evidence-based research and analysis published in recognised academic journals and books*

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Academic Papers/Reports (Non-Peer Reviewed)	*Research and analysis published in recognised academic journals and books*
Public Enquiry Reports/Findings	*Official reports, findings, and recommendations of government-led or independent public reviews and inquiries including formal judicial, legal and coroners review and investigations*
Journal/Magazine articles	*Articles, papers, comments and interviews in journals and magazines*
Online podcasts, blogs, forums & chat rooms	Written or recorded content for online podcasts, blogs, forums, and chat rooms including radio shows, community groups, interest groups and professional bodies
Official policy recommendations & findings	Recommendations and findings arising from formal government, independent body or other official investigative commission, association or group including lessons learned
Other (Please specify)	Any other data source snot falling within any of the above categories

WP2	Task 2.3: Natural and manmade case study social media analysis
What was the role, influence, and impact of social media communications during this incident?	
Provide a detailed analysis of the role of social media communications during the disaster. Also include a description of how social media communications influenced and impacted on the disaster.	
What patterns of interactions between opinion makers and recurring topics in the Twitter debate following the disaster have been identified?	
Provide evidence and detailed analysis of the patterns of interactions between opinion makers, informers, influencers, and credible voices on Twitter following the disaster. In addition, identify, describe, and analyse recurring topics of discussion on Twitter following the incident.	
Please provide a list with links of data sources used in the following categories	
Government/Official reports	Reports, papers, and statements made by governments, their departments and officials
Community interviews/reports	*Reports, papers and statements made by NGOs and their officials*

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Eyewitness/first-hand accounts	*Reports and interviews with citizens, community leaders and local representatives*
News/media reports	Reports, accounts and statements made by witnesses providing best evidence
Documentaries	*Reports and articles from journalist and commentators published by news and media*
Social Media	*Investigative film, interviews, comments and witness accounts*
Satellite/other imagery	*Online social media platform posts and comments from users*
Academic Papers/Reports (Peer Reviewed)	*Images captured by satellite or other aerial unmanned drone or manned aircraft*
Academic Papers/Reports (Non-Peer Reviewed)	*Assessed, evaluated, and qualified evidence-based research and analysis published in recognised academic journals and books*
Public Enquiry Reports/Findings	*Research and analysis published in recognised academic journals and books*
Journal/Magazine articles	*Official reports, findings, and recommendations of government-led or independent public reviews and inquiries including formal judicial, legal and coroners review and investigations*
Online podcasts, blogs, forums & chat rooms	*Articles, papers, comments and interviews in journals and magazines*
Official policy recommendations & findings	Written or recorded content for online podcasts, blogs, forums, and chat rooms including radio shows, community groups, interest groups and professional bodies
Other (Please specify)	Recommendations and findings arising from formal government, independent body or other official investigative commission, association or group including lessons learned

WP2	Task 2.4: Natural and manmade case study aerial imagery analysis
What positive benefits can be derived from the use of satellite images and Unmanned Aerial Vehicle data during this disaster to inform decision-making?	
Provide a detailed analysis of the positive benefits to informing decision-making during a disaster from the use of satellite and aerial imagery captured by drones.	

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What positive benefits can be derived from the use of satellite images and Unmanned Aerial Vehicle data during this disaster to inform the sharing of public information?	
Provide a detailed analysis of the positive benefits to inform the sharing of public information during a disaster from satellite and aerial imagery captured by drones.	
Please provide a list with links of data sources used in the following categories	
Government/Official reports	Reports, papers, and statements made by governments, their departments and officials
NGO reports	*Reports, papers and statements made by NGOs and their officials*
Community interviews/reports	*Reports and interviews with citizens, community leaders and local representatives*
Eyewitness/first-hand accounts	Reports, accounts and statements made by witnesses providing best evidence
News/media reports	*Reports and articles from journalist and commentators published by news and media*
Documentaries	*Investigative film, interviews, comments and witness accounts*
Social Media	*Online social media platform posts and comments from users*
Satellite/other imagery	*Images captured by satellite or other aerial unmanned drone or manned aircraft*
Academic Papers/Reports (Peer Reviewed)	*Assessed, evaluated, and qualified evidence-based research and analysis published in recognised academic journals and books*
Academic Papers/Reports (Non-Peer Reviewed)	*Research and analysis published in recognised academic journals and books*
Public Enquiry Reports/Findings	*Official reports, findings, and recommendations of government-led or independent public reviews and inquiries including formal judicial, legal and coroners review and investigations*
Journal/Magazine articles	*Articles, papers, comments and interviews in journals and magazines*
Online podcasts, blogs, forums & chat rooms	Written or recorded content for online podcasts, blogs, forums, and chat rooms including radio shows, community groups, interest groups and professional bodies

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Official policy recommendations & findings	Recommendations and findings arising from formal government, independent body or other official investigative commission, association or group including lessons learned	
Other (Please specify)	Any other data sources not falling within any of the above categories	
WP3	Task 3.1 - Critical analysis of past disasters via the identified case studies on their disaster preparedness strategies	
Type of data		Data/ information/ sources/ reference material
3.1.1	Type of hazards – Understanding the disaster risk	
a.	What type of hazards were commonly identified in the region (Slow-onset and rapid onset hazards)?	Briefly describe the type of hazards and provide evidence via a description, link, or reference to the information source
b.	What hazards have resulted in disasters during the past 20 years?	Provide a list of the disasters and provide evidence via a description, link, or reference to the information source
c.	What risk assessment mechanism(s) were used by the relevant institutions for encompassing risk awareness, multi-hazard analysis, vulnerability/capacity analysis and cascading effects?	Provide a list and description of the risk assessment mechanisms and cascading effects, providing evidence via a description, link, or reference to the information source
d.	What risk modelling and scenarios have been carried out to consider disaster risk and/or any other future threats and cascading effects?	Provide a list and description of risk modelling and scenarios, providing evidence via a description, link, or reference to the information source
e.	How the knowledge of indigenous communities and information in social media had been captured for disaster risk perception?	Provide a list and description of how social media has been captured for disaster risk perception, providing evidence via a description, link, or reference to the information source
3.1.2	Disaster resilience and preparedness strategies	
a.	What were the available national and local disaster management plans and systems under following categories?	

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	○ Individual-level activities (e.g., first aid training and response)	Provide a list and include evidence via a description, link, or reference to the information source
	○ Household actions (e.g., stockpiling of equipment and supplies, retrofitting)	Provide a list and include evidence via a description, link or reference to the information source
	○ Community efforts (e.g., socially responsible mitigation, training, and awareness campaigns for first respondents and responders, and field exercises)	Provide a list and include evidence via a description, link, or reference to the information source
	○ Governmental strategies (e.g., multi-organisational planning and public private partnerships, early warning systems, contingency plans, evacuation routes, and public information dissemination, allocation of resources)	Provide a list and include evidence via a description, link or reference to the information source
b.	○ What provisions were in place for research, education, science, and technology (ex: geospatial, remote sensing) for informed disaster preparedness?	Provide a list and brief description of the provisions, together with supporting evidence via a description, link, or reference to the information source
c.	○ What special provisions were undertaken to ensure pandemic preparedness in disaster preparedness measures?	Provide a list and brief description of the provisions, together with supporting evidence via a description, link, or reference to the information source
3.1.3	Mitigation	
a.	What policies and legislation were available that mainstreamed DRR in the national planning policy?	
	○ Land use planning and building codes (Ex: Avoid settlement expansion towards hazard prone areas)	Provide a list and include evidence via a description, link, or reference to the information source
	○ Critical infrastructure protection and structural design improvements	Provide a list and include evidence via a description, link, or reference to the information source

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	○ Landscape and environmental arrangement around essential services and infrastructure	Provide a list and include evidence via a description, link, or reference to the information source
	○ Resilience strategies including planning and partnership building between sectors	Provide a list and include evidence via a description, link, or reference to the information source
b.	What support were provided by media platforms including social media during disaster operations?	Provide a list and brief description of support provided by media platforms, together with supporting evidence via a description, link or reference to the information source
c.	What special measures were undertaken to ensure a COVID-19 safe environment during disaster operations?	Provide a list and brief description of any special measures, together with supporting evidence via a description, link or reference to the information source
3.1.4	Response	
a.	What were the available surveillance, early warning, and information management systems for activating response operations under the following conditions?	
	○ Support or coordinate disaster operations being conducted by a designated lead agency	Provide a list and include evidence via a description, link, or reference to the information source
	○ Logistics mechanisms and essential supplies for health and relief services	Provide a list and include evidence via a description, link, or reference to the information source
b.	What support was provided by media platforms including social media during disaster operations?	Provide a list and brief description of any support provided social media platforms, together with supporting evidence via a description, link, or reference to the information source
c.	What special measures were undertaken to ensure a COVID-19 safe environment during disaster operations?	Provide a list and brief description of any special measures, together with supporting evidence via a description, link or reference to the information source
3.1.5	Recovery	
a.	What were the long-term and short-term recovery actions undertaken during each post disaster recovery period including 'build back better' practices?	

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	○ Response endeavours such as needs and damage assessments	Provide a list and include evidence via a description, link, or reference to the information source
	○ Community-level involvement and capacity building for disaster recovery	Provide a list and include evidence via a description, link, or reference to the information source
	○ Local administration and coordination for resource mobilisation	Provide a list and include evidence via a description, link, or reference to the information source
	○ Building redundancy into a DRR plan	Provide a list and include evidence via a description, link, or reference to the information source
b.	How the post disaster infrastructure recovery including rebuilding, restoration, or reconstruction had taken place?	Briefly describe the infrastructure recovery, together with supporting evidence via a description, link, or reference to the information source
c.	What plans or provisions were available to minimise the economic impact following a disaster?	Briefly describe plans or provisions to minimise economic impact, together with supporting evidence via a description, link or reference to the information source
d.	What environmental recovery plans were available to manage the impact for eco-systems and related services?	Briefly describe environmental recovery plans, together with supporting evidence via a description, link, or reference to the information source
e.	How have the mitigation and resilience-building activities of preparedness been adopted for the next disaster, and the development and implementation of legislation, policies, and practices to avoid similar situations in the future?	Briefly describe the mitigation measures adopted, together with supporting evidence via a description, link, or reference to the information source
3.1.6	Monitoring and evaluation	
How frequent are plans being reviewed and revised for emergency preparedness, response, and recovery?		Briefly describe the frequency of review of plans, together with supporting evidence via a description, link, or reference to the information source
WP3	Task 3.2 – Vulnerable categories	
3.2.1	Identify people vulnerable categories in the different phases of disaster management	

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a.	In the analysed context, what were the consequences (death or injury) with respect to the following age groups and gender?	
	○ New-born (ages 0-4 week)	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Infant (ages 4 week - 1 year)	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Toddler (ages 1-3 years) - M/F	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Pre-schooler (ages 3-5 years) - M/F	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ School aged child (ages 6-13 years) - M/F	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Adolescent (ages 14-18 years) - M/F	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Young adult (ages 19-29) - M/F	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Adult (ages 30-64 years) - M/F	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ youngest-old (ages 64-74 years) - M/F	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ middle-old (ages 75-84 years) - M/F	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source

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	○ Oldest-old (ages more than 85 years)	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
b.	During the rescue phase what were the categories of disabilities, or specific needs, that arose?	
	○ Movement disabilities *	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Sensorial disabilities (deafness, blindness) *	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Cognitive disabilities (autism, Down syndrome, Alzheimer, dementia) *	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Pregnant women	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ New-born	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Infant	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Other that emerged during the analysis of the available documentation or specific investigations conducted	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
c.	Which of the following categories of disabilities, or specific needs, were managed in the post-emergency phases to give an initial response to people involved?	
	○ Movement disabilities *	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source

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	○ Sensorial disabilities (deafness, blindness) *	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Cognitive disabilities (autism, Down syndrome, Alzheimer, dementia) *	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Pregnant women **	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ New-born	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Infant	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	○ Other that emerged during the analysis of the available documentation or specific investigations conducted	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
	*Indicate age class (see 3.2.1.a) and gender; ** indicate class age	Briefly describe the consequences for this category with supporting evidence via a description, link, or reference to the information source
3.2.2	Post event management	
a.	About point 3.2.1b, were the rescuers prepared to manage the situation?	
	○ The rescuers were involved in specific training activities in this field	Briefly describe the rescuers preparedness for this category with supporting evidence via a description, link, or reference to the information source
	○ Specific documentation has been made available	Briefly describe the rescuers preparedness for this category with supporting evidence via a description, link, or reference to the information source
	○ Simulations were conducted also considering the issue of	Briefly describe the rescuers preparedness for this category with supporting evidence

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	inclusive emergency management	via a description, link, or reference to the information source
b.	About point 3.2.1c, were the operators prepared to manage the situation considering people with specific needs?	
	○ The rescuers were involved in specific training activities in this field	Briefly describe the operator's preparedness for this category with supporting evidence via a description, link, or reference to the information source
	○ Specific documentation has been made available	Briefly describe the operator's preparedness for this category with supporting evidence via a description, link, or reference to the information source
	○ Simulations were conducted also considering the issue of inclusive emergency management	Briefly describe the operator's preparedness for this category with supporting evidence via a description, link, or reference to the information source
c.	Were people with specific needs and their family members or caregivers prepared to manage that emergency?	
	○ Specific information activities were carried out on these topics with the involvement of family members, caregivers, and the surrounding community	Briefly describe the family members and caregivers' preparedness for this category with supporting evidence via a description, link, or reference to the information source
	○ Specific documentation has been made available	Briefly describe the family members and caregivers' preparedness for this category with supporting evidence via a description, link, or reference to the information source
	○ Simulations were conducted also considering the issue of inclusive emergency management	Briefly describe the family members and caregivers' preparedness for this category with supporting evidence via a description, link, or reference to the information source
WP3	Task 3.3 Culture & heritage	
3.3.1	What was the extent of the damage with respect to the type of disaster?	
Provide a detailed analysis of the extent of the damage with supporting evidence via a description, link, or reference to the information source		
3.3.2	What was the extent of the damage with respect to the size of the disaster?	
Provide a detailed analysis of the extent of the damage with supporting evidence via a description, link, or reference to the information source		

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3.3.3	How was the human and environmental adaptive response/reaction to the damage?	
Provide a detailed analysis of the extent of the damage with supporting evidence via a description, link, or reference to the information source		
3.3.4	How long did it take to recover/retrieve after the disaster in the following categories?	
○ Land use		Briefly describe the family members and caregivers' preparedness for this category with supporting evidence via a description, link, or reference to the information source
○ Repopulation		Briefly describe the family members and caregivers' preparedness for this category with supporting evidence via a description, link, or reference to the information source
○ Everyday life condition		Briefly describe the family members and caregivers' preparedness for this category with supporting evidence via a description, link, or reference to the information source
○ Social life		Briefly describe the family members and caregivers' preparedness for this category with supporting evidence via a description, link, or reference to the information source
○ Lesson for the mitigation of other disasters		Briefly describe the family members and caregivers' preparedness for this category with supporting evidence via a description, link, or reference to the information source
3.3.5	Was there any quantitative correspondence between reaction/effort and damage?	
Provide a detailed analysis of the quantitative correspondence with supporting evidence via a description, link, or reference to the information source		
3.3.6	What was the timescale of such correspondence (short-term vs. long-term)?	
Provide a detailed analysis of the quantitative correspondence with supporting evidence via a description, link, or reference to the information source		
WP3	Task 3.4 – Risk governance strategy	
Type of data		Data/ information/ sources/ reference material
3.4.1	Disaster risk governance mechanisms	

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What were the disaster risk governance mechanisms identified in the relevant authorities to manage disaster risk under following categories?	
○ Knowledge sharing and inclusion of science and technology	Provide a list and include evidence via a description, link or reference to the information source
○ Harmonizing capacities and resources to the needs in risk assessment	Provide a list and include evidence via a description, link or reference to the information source
○ Institutionalizing partnerships, coordination, and responsibilities	Provide a list and include evidence via a description, link or reference to the information source
○ Participatory decision-making mechanisms, inclusive of vulnerable communities, indigenous communities, and volunteers	Provide a list and include evidence via a description, link or reference to the information source
○ Leveraging investments in DRR	Provide a list and include evidence via a description, link or reference to the information source
3.4.2	International DDR frameworks
What international DDR frameworks (SENDAI, SDG, Paris Agreement) were adopted in DRR projects?	Briefly describe the adopted DRR frameworks, together with supporting evidence via a description, link, or reference to the information source
3.4.3	Accountability in disaster governance
What were the provisions to ensure accountability in disaster governance?	
○ Consider accountability aspects in the Sendai Framework for Disaster Risk Reduction 2015-2030	Provide a list and include evidence via a description, link or reference to the information source
○ Innovative elements of accountability	Provide a list and include evidence via a description, link or reference to the information source
○ Enabling legislations	Provide a list and include evidence via a description, link or reference to the information source
○ Regular monitoring, evaluation, and review	Provide a list and include evidence via a description, link or reference to the information source

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WP4	Cascades	
1.	What is the EU country, covered by CORE partners, preparing for (crisis, war and crisis, disruption)?	Briefly describe the preparations, together with supporting evidence via a description, link, or reference to the information source
2.	What types of disasters is each EU country, covered by CORE partners, preparing for?	Briefly describe the types of disasters, together with supporting evidence via a description, link, or reference to the information source
3.	Who is involved in the preparation process?	Provide a list and include evidence via a description, link, or reference to the information source
a.	What kind of approach is adopted in disaster preparedness: e.g., is disaster preparedness centralized (national level) or decentralized (local level); who (which agency) has the leading role in preparedness; guiding policy frameworks and/or strategies and principles; coordination/cooperation mechanisms (and sectors involved)?	Provide a list and include evidence via a description, link, or reference to the information source
b.	Other stakeholders for preparedness?	Provide a list and include evidence via a description, link, or reference to the information source
c.	EU/UN/INGO?	Provide a list and include evidence via a description, link, or reference to the information source
4	Training and communication preparedness	
a.	What kinds of trainings (including drills and crisis exercises) are done to prepare for a disaster?	Provide a list and include evidence via a description, link, or reference to the information source

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b.	Who provides training, for whom and what competencies are covered?	Provide a list and include evidence via a description, link, or reference to the information source
c.	What kind of approach is adopted in crisis communication preparedness: e.g., what is communicated to the general public about preparedness, how (means and channels: e.g., preparedness brochure, crisis portals/websites, campaigns, formal/civic/professional education, social media mobilisation) and by whom (leading agency + other partners and stakeholders involved + partnerships with news media)? How are the needs of vulnerable groups taken into account?	Provide a list and include evidence via a description, link, or reference to the information source
5.	Prepositioning, framework contract and supplier management	
a.	What types of goods are pre-positioned and how are locations selected?	Provide a list and include evidence via a description, link, or reference to the information source
b.	Which organization is responsible for management of pre-positioned stock?	Provide a list and include evidence via a description, link, or reference to the information source
c.	What are the framework contracts for disaster preparedness, who manages them?	Provide a list and include evidence via a description, link, or reference to the information source
d.	How are suppliers who secure the supply for	Provide a list and include evidence via a description, link or reference to the information source

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	preparedness selected and managed	
6.	How was the preparedness and response mechanism activated for different types of risks?	Provide a list and include evidence via a description, link, or reference to the information source
7.	How the event influenced flow, access to and availability (length of shortage, scale, shortage by social group) of:	
	○ Drinking water;	Provide a list and include evidence via a description, link, or reference to the information source
	○ Energy supply (electricity, coal, fuel etc.);	Provide a list and include evidence via a description, link, or reference to the information source
	○ Food (retail sales, catering, etc.);	Provide a list and include evidence via a description, link, or reference to the information source
	○ Health (emergency and long-term provision, psychological health);	Provide a list and include evidence via a description, link, or reference to the information source
	○ Access to information.	Provide a list and include evidence via a description, link, or reference to the information source
8.	How the event influenced preparedness mechanisms (in terms of training, information flow, communication, prepositioning, supplier management). What were the lessons learned from the case?	Provide a list and include evidence via a description, link, or reference to the information source
9.	Have there been any studies conducted on the long-term impact (five or ten years) of this disaster/crisis?	Provide a list and include evidence via a description, link, or reference to the information source

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a.	Was there any long-term health or societal impact?	Provide a list and include evidence via a description, link or reference to the information source
b.	Any local supply chain impact?	Provide a list and include evidence via a description, link, or reference to the information source
c.	How long did it take for the communities to get back to the original state?	Provide a list and include evidence via a description, link, or reference to the information source
d.	Any studies on the long-term resilience of the affected region?	Provide a list and include evidence via a description, link, or reference to the information source
WP7	Social media information/misinformation and risk communication	
1. Please provide a quality assessment for the accuracy and veracity of information and data used to inform this case study in the following three categories:		
a). Media information	Provide a quality assessment for the accuracy and veracity of **media information** used to inform this case study, together with, wherever possible, supporting evidence via a description, link, or reference to the information source	
b). Misinformation	Provide a quality assessment for the accuracy and veracity of **misinformation** used to inform this case study, together with, wherever possible, supporting evidence via a description, link, or reference to the information source	
c). Risk communication	Provide a quality assessment for the accuracy and veracity of **Risk communication** used to inform this case study, together with, wherever possible, supporting evidence via a description, link, or reference to the information source	
2. What type of mis- and disinformation was spread and how was it spread (i.e. specific patterns, dynamics on the social media platforms)?		
3. What were the sources of the mis- and disinformation?		
4. Were measures taken to prevent/fight the spread of and belief in mis- and disinformation? If yes, what strategies were used and by whom?		

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5. What was the role of authorities/governments to fight mis- and disinformation?
6. Can debunking messages help to avoid the spread of and belief in mis- and disinformation?

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