

# LINKS

Strengthening links between technologies and society  
for European disaster resilience

## D2.3 FIRST DRPV-METHODOLOGY FOR THE LINKS FRAMEWORK AND THE CASE ASSESSMENTS

Research Report

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SEPTEMBER 2021



This project has received funding from the European Union's Horizon 2020  
Research and Innovation Programme under Grant Agreement No. 883490



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## DOCUMENT INFORMATION

|                              |                         |                             |                   |
|------------------------------|-------------------------|-----------------------------|-------------------|
| <b>Grant Agreement</b>       | No. 883490              | <b>Deliverable Due Date</b> | 31 May 2021       |
| <b>Project Starting Date</b> | 1 June 2020 (42 months) | <b>Actual Submission</b>    | 10 September 2021 |
| <b>Deliverable Number</b>    | D2.3 (WP2)              | <b>Leading Partner</b>      | UNIFI             |

### KEYWORDS

DRPV Methodology, Interviews, Workshops, Focus Groups, Survey, Vulnerable Groups, Perception, Multi-age approach

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| VERSION HISTORY |                                   |                   |
|-----------------|-----------------------------------|-------------------|
| Release         | Status                            | Date              |
| 0.1             | Initial Draft                     | 30 April 2021     |
| 0.1.1           | Internal Review                   | 04 May 2021       |
| 0.2             | Second Draft                      | 08 May 2021       |
| 0.2.1           | External Review                   | 17 May 2021       |
| 0.3             | Third Draft                       | 27 May 2021       |
| 0.4             | Internal Final Review             | 31 May 2021       |
| 1.0             | Final Version - Submitted to EC   | 01 June 2021      |
| 1.1             | Fourth Version                    | 31 August 2021    |
| 1.2             | Internal Review                   | 06 September 2021 |
| 2.0             | Final Version – Resubmitted to EC | 10 September 2021 |

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## CITATION

Bonati, S., Pazzi, V., & Graziani, F. (2021). First DRPV-Methodology for the LINKS Framework and the Case Assessment. *Deliverable 2.3 of LINKS: Strengthening links between technologies and society for European disaster resilience*, funded by the European Union's Horizon 2020 Research and Innovation Programme (No. 883490). Retrieved [date] from <http://links-project.eu/deliverables/>

## EXECUTIVE SUMMARY

### About the project

LINKS “Strengthening links between technologies and society for European disaster resilience” is a comprehensive study on disaster governance in Europe. In recent years, social media and crowdsourcing (SMCS) have been integrated into crisis management for improved information gathering and collaboration across European communities. The effectiveness of SMCS on European disaster resilience, however, remains unclear, the use of SMCS in disasters in different ways and under diverse conditions. In this context, the overall objective of LINKS is to strengthen links between technologies and society for improved European disaster resilience, by producing sustainable advanced learning on the use of SMCS in disasters. This is done across three complementary knowledge domains:

- Disaster Risk Perception and Vulnerability (DRPV)
- Disaster Management Processes (DMP)
- Disaster Community Technologies (DCT)

Bringing together 15 partners and 2 associated partners across Europe (Belgium, Denmark, Germany, Italy, Luxembourg, the Netherlands) and beyond (Bosnia & Herzegovina, Japan), the project will develop a framework to understand, measure and govern SMCS for disasters. The LINKS Framework consists of learning materials, such as scientific methods, practical tools, and guidelines, addressing different groups of stakeholders (e.g., researchers, practitioners, and policy makers). It will be developed and evaluated through five practitioner-driven European cases, representing different disaster scenarios (earthquakes, flooding, industrial hazards, terrorism, drought), cutting across disaster management phases and diverse socio-economic and cultural settings in four countries (Denmark, Germany, Italy, the Netherlands). Furthermore, LINKS sets out to create the LINKS Community, which brings together a wide variety of stakeholders, including first-responders, public authorities, civil society organisations, business communities, citizens, and researchers across Europe, dedicated to improving European disaster resilience through the use of SMCS.

### About this deliverable

This deliverable provides the Disaster Risk Perception and Vulnerability methodology to be applied in the LINKS case-based assessments for the evaluation of the LINKS Framework. It is directly related to the state of the art produced in Deliverables 2.1 (D2.1: Bonati, 2020) and 2.2 (D2.2: Pazzi et al., 2020), which have provided a social sciences perspective for addressing the knowledge gaps on vulnerability and disaster risk perception (DRP) concepts in relation to social media and crowdsourcing in disasters. The two deliverables represent the theoretical pillars of the DRPV knowledge domain. For this reason, this deliverable includes an update of the literature studies on vulnerability, DRP and SMCS, with a specific focus on the research methods applied to investigate

these concepts. The deliverable presents the following key components of the DRPV methodology that will go to inform the LINKS Framework:

- A DRPV literature update
- DRPV research questions
- Research design
- Research methods to be used in the LINKS cases.

From the analyses in D2.1 and D2.2, we determined that vulnerability and DRP are two strongly interconnected and interdependent concepts, and that further dimensions of interaction emerge when also considering the digital environment.

Building from D2.1 and D2.2, the research workplan is here defined. In particular, during the first year of the project, the main DRPV research objective has been to understand how DRPV knowledge base can contribute to strengthening societal resilience, exploring how the use of SMCS can be improved in all the phases of the disaster management cycle (DMC). To answer this objective, four main research questions have been identified for the first round of case-assessments:

- **DRPV\_RQ1:** How do disaster management organizations (DMOs) identify vulnerable groups and how is vulnerability perceived at the case-level?
- **DRPV\_RQ2:** How SMCS are used and what are their main characteristics, limits and potentialities in terms of DRPV?
- **DRPV\_RQ3:** What is missing in the communication process? What are the limitations of the information flow in terms of accessibility, connectivity, and trust?
- **DRPV\_RQ4:** How does volunteerism work today at the digital level and which social groups are usually more active on SMCS?

These DRPV research questions allow us to understand how an approach to vulnerability and DRP can help research provide useful information to improve the application of SMCS in DMPs. DMP (D3.1) and DCT (D4.1) are seen as associated institutional and technical knowledge domains, and DRPV contributes by providing a specific social perspective for both. The answer/s to the DRPV research questions can be achieved by addressing more specific research questions that will be defined with the collaboration of case-assessments teams (CATs) at the local level.

The research design for the DRPV methodology is based on two main pillars: the comparative components (cross-case assessments) and the explorative and grounded component (deep dive assessments). The cross-case components of this deliverable have been developed in consultation with Work Packages 3 (WP3) and 4 (WP4). The main research methods have been selected as applicable to all the case-based assessments (i.e., the cross-case dimension) and to the deep dive analysis. The deep dive level has been planned to provide an opportunity for in-depth, contextual analysis on DRPV in the local cases in the first round of assessments.

Finally, the methodology provides a description of the concrete research methods which are applied to the cross-case assessments, and which are mandatory for all case-assessments teams (CATs) to implement in the upcoming activities under WP6. These research methods are surveys and qualitative research interviews.

This deliverable must be read in combination with D3.2 and D4.2. D3.2 focuses on how disaster management processes are further assessed within the LINKS project, and D4.2 presents the methodology on DCT providing us with a research design and research methods for exploring existing tools and technologies for disaster risk management (DRM).

This deliverable is for both the LINKS partners and a broader audience. The research methods defined are for the partners involved in the LINKS Framework design (Work Package 5, WP5) and for those involved in the five case-based assessments (WP6). And the sections on the DRPV methodology design, the DRPV theoretical basis, and the DRPV research questions can be useful for the scientific community interested in reusing the proposed methodology in different contexts.

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## LIST OF ACRONYMS

| Acronym / Abbreviation | Description                                |
|------------------------|--|
| CAT                    | Case Assessment Team                       |
| DCT                    | Disaster Community Technologies            |
| DMC                    | Disaster Management Cycle                  |
| DMP                    | Disaster Management Processes              |
| DRM                    | Disaster Risk Management                   |
| DRR                    | Disaster Risk Reduction                    |
| DMO                    | Disaster Management Organizations          |
| DRPV                   | Disaster Risk Perception and Vulnerability |
| LCC                    | LINKS Community Center                     |
| LCW                    | LINKS Community Workshop                   |
| SMCS                   | Social Media and Crowdsourcing             |
| WP                     | Work Package                               |
| WPL                    | Work Package Leaders                       |

## DEFINITION OF KEY TERMS<sup>1</sup>

| Term                                | Definition   |
|-------------------------------------|--|
| Case                                | Context-based study, realised through fieldwork, to assess the LINKS Framework. A case implies an empirical inquiry that investigates a real-life hazard scenario.   |
| Case-based assessment               | The assessment of the LINKS Framework in local cases.  |
| Citizens                            | Citizens can be considered via the same levels as the other stakeholders, and for LINKS, particular relevance should be given to local citizens who are likely to be impacted by the case studies. LINKS identifies two key sub-categories of citizen stakeholders: Civil Society and Vulnerable Populations (LINKS Glossary and D8.1).  |
| Cross-case assessment               | The cross-case assessments are joint efforts between WP2-4 and investigate the specific knowledge domains across different contexts while exploring interacting themes. The cross-case assessments are thus both an attempt to explore domain-specific questions through a comparative lens and an attempt to explore the interdependent questions cutting across knowledge domains. |
| Crowdsourcing                       | Describes a distributed problem-solving model where the task of solving a challenge or developing an idea is 'outsourced' to a cloud. It implies tapping into 'the wisdom of the crowd' (definition builds on Howe, 2006; see also LINKS Glossary).  |
| Deep dive-case assessment           | A particular approach to the case-based assessments that take the local specificities of each LINKS case-countries as their departure point. The deep dive-case assessment can be associated exclusively with the DMP knowledge domain or investigate a theme that cuts across more than one of the LINKS knowledge domains  |
| Disaster Community Technology (DCT) | A software(-function) for interaction with, within or among groups of people who have similar interests or have common attributes (communities) in case of a disaster as well as performing analysis of these interactions (LINKS Glossary and D4.1).  |
| Disaster management cycle           | A set of phases related to disasters and their management (UNDRR, 2016).   |

<sup>1</sup> Definitions are retrieved from the LINKS Glossary (forthcoming).

|   |   |
|---|---|
| Disaster Management Processes (DMP)           | A collective term encompassing a systematic series of actions or steps taken to reduce and manage disaster risk. Disaster management processes are often associated directly with the phases of the DMC. In the context of LINKS, we specifically refer to DMP as the policy frameworks, tools and guidelines developed to govern disasters across all phases of the DMC (LINKS Glossary).  |
| (Disaster) risk perception                    | The way individuals and groups appropriate, subjectivise and perceive risks that might or might not be calculated in an objective manner during risk assessments. The importance of studying risk perception more seriously is obvious: risk perception directly influences people's ability and level of preparedness. Risk perception covers what is also referred to as "risk awareness" (UNDRR, 2016).  |
| Disaster risk management                      | Disaster risk management is the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses (UNDRR, 2016).  |
| Disaster risk management organisations (DMOs) | Organisations that operate to support disaster risk management activities at different levels.  |
| Diversity                                     | Recognize diversity, the difference between people, including (but not limited to) gender, age, sexual orientation, economic status, religion, race, culture, ethnic background, political position and all the characteristics that make an individual unique. Beyond tolerance; demystifying, understanding, and supporting.<br>However, the LINKS project conceptualizes diversity in a broader manner, as the diverse processes, hazards, and technologies that are involved in the disaster risk management cycle (LINKS Glossary and D2.1). |
| Institutions                                  | Institutions are social structures that are composed of regulative, normative and cultural-cognitive elements that provide stability and meaning to social life. Institutions provide the 'rules of the game' and define the available ways to operate by discouraging, constraining or encouraging given behavioural patterns (Scott, 2001).   |
| LINKS Framework                               | A set of learning materials, such as methods, tools and guidelines for enhancing the governance of diversity among the understanding of   |

|                         |  |
|-------------------------|--|
|                         | <p>SMCS in disasters for relevant stakeholders. Methods in LINKS refer to approaches that will enable researchers and practitioners to assess the effects of SMCS for disaster resilience under diverse conditions. Tools are practical instruments supporting first-responders, public authorities and citizens with the implementation of SMCS in disaster and security contexts. Guidelines are recommendations for improving national and regional governance strategies on SMCS as well as introductions and explanations of how to apply the methods and tools under diverse conditions (LINKS Glossary).</p>                          |
| LINKS Knowledge Bases   | <p>The outputs and knowledge obtained from the assessment of three knowledge domains. This knowledge is used to develop the LINKS Framework (LINKS Glossary).</p>  |
| LINKS Knowledge Domains | <p>The three crucial domains of analysis for studying European disaster resilience and SMCS. These include: Disaster Risk Perception and Vulnerability (DRPV), for assessing changes in the citizens' perception of disaster risks induced by SMCS, as well as assessing the changes in the vulnerability of practitioners and citizens. Disaster Management Processes (DMP) for analysis of how SMCS changes the procedures and processes within the crisis and disaster management. Disaster Community Technologies (DCT), for assessing SMCS related technologies used by practitioners (and citizens) in disasters (LINKS Glossary).</p> |
| Resilience              | <p>The ability of individuals, institutions, and systems to recover from disturbance and to develop and adopt alternative strategies in response to changing conditions (definition builds on Tyler &amp; Moench, 2012; see also LINKS Glossary).</p>  |
| Risk communication      | <p>The process of exchanging or sharing risk-related data, information and knowledge between and among different groups such as scientists, regulators, industry, consumers or the general public (IRGC, 2017:27).</p>   |
| Scenarios               | <p>In LINKS the scenarios are the hazards, contextualized in each case (case 1, earthquake, Italy; case 2, industrial, the Netherlands; case 3, drought, Germany; case 4, flooding, Denmark; case 5, terrorism, Germany). They are informed by methodological choices and are instrumental for the case-based assessments of the Framework as</p>  |

|                               |   |
|-------------------------------|---|
|                               | they are the real-life scenarios through which the LINKS Framework is assessed.   |
| Social media                  | A group of Internet-based applications that build on the ideological and technological foundations of the Web 2.0 and that allow the creation and exchange of user-generated content (UGC). Forms of media that allow people to communicate and share information using the internet or mobile phones. Web 2.0 is the Internet we are familiar with today in which people are not just consumers of information but producers of knowledge through social networking sites and services like Facebook, Twitter, and Instagram (definition builds on Kaplan & Haenlein, 2010).   |
| Sustainable Advanced Learning | A maintainable and evolving collection of knowledge and best practices produced for and by relevant stakeholders. Sustainable Advanced Learning entails a cognitive dimension (the capability to gain in-depth knowledge of e.g., crises and crisis management), a social dimension (the collaborative efforts to implement that knowledge into new practices), and a transformative dimension whereby reflections are made on how knowledge was learned, what has changed in the process, and how and in what ways new knowledge might continue to evolve.   |
| Vulnerability                 | <p>The conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards.</p> <p>The LINKS project focuses on social vulnerability, which is interpreted as a function of exposure, susceptibility and resilience. It is a pre-existing and dynamic condition, result of processes built over time (e.g., social power relations at national and international levels) and all the environmental and social circumstances that allow or limit community's capacity to deal with risks (UNISDR 2004 and D2.1).</p> |

## 1. INTRODUCTION

The increasing availability of the internet worldwide and the associated increase in the number of users has led to the growing availability of large amounts of data. Social media and crowdsourcing (SMCS), in particular, have become an important part of people's daily lives, enabling us to communicate and collaborate in unprecedented ways. The recent worldwide crisis generated by the pandemic has made the role of digital technologies even more central: smartphones, tablets, PCs, and video game consoles have allowed everyone (including younger children) to continue to satisfy the need for relationships, participation, and belonging to a community, as well as the need for work, study, information, and education. However, the move towards these digital environments has also increased the isolation and marginalization of some groups, especially those with limited access to technologies who could be left behind in disasters (see Deliverable D2.1: Bonati, 2020).

The availability of information on and through SMCS networks is becoming increasingly important for a wide range of applications – including disaster situations - since they inherently raise issues associated with safety and social behaviour. This makes SMCS processes and technologies increasingly relevant for disaster management processes (DMP), but local practitioners and communities also face major challenges in using them (see Deliverable D3.1: Nielsen & Raju, 2020 and Deliverable D4.1: Habig et al., 2020). Online environments may also configure 'new' dynamic relationships between vulnerability and resilience in disasters, which must be read by understanding the factors linking the online and offline environments, including considerations for individual and background factors which influence the risk perception of different individuals and groups.

To better understand these dynamics, deliverables D2.1 (Bonati, 2020) and D2.2 (Pazzi et al., 2020) provided an overview of the current state of the art of SMCS in relation to vulnerability and disaster risk perception (DRP). The deliverables aimed to provide a common understanding of DRPV in relation to SMCS and during all phases of a disaster and established the DRPV knowledge base for the LINKS project. This was done through a structured literature review of the scientific publications and the evaluation of European research project results. The research findings within D2.1 and D2.2 revealed that there are very few works that consider the role of SMCS in DRPV. As a result, the following main challenges were identified:

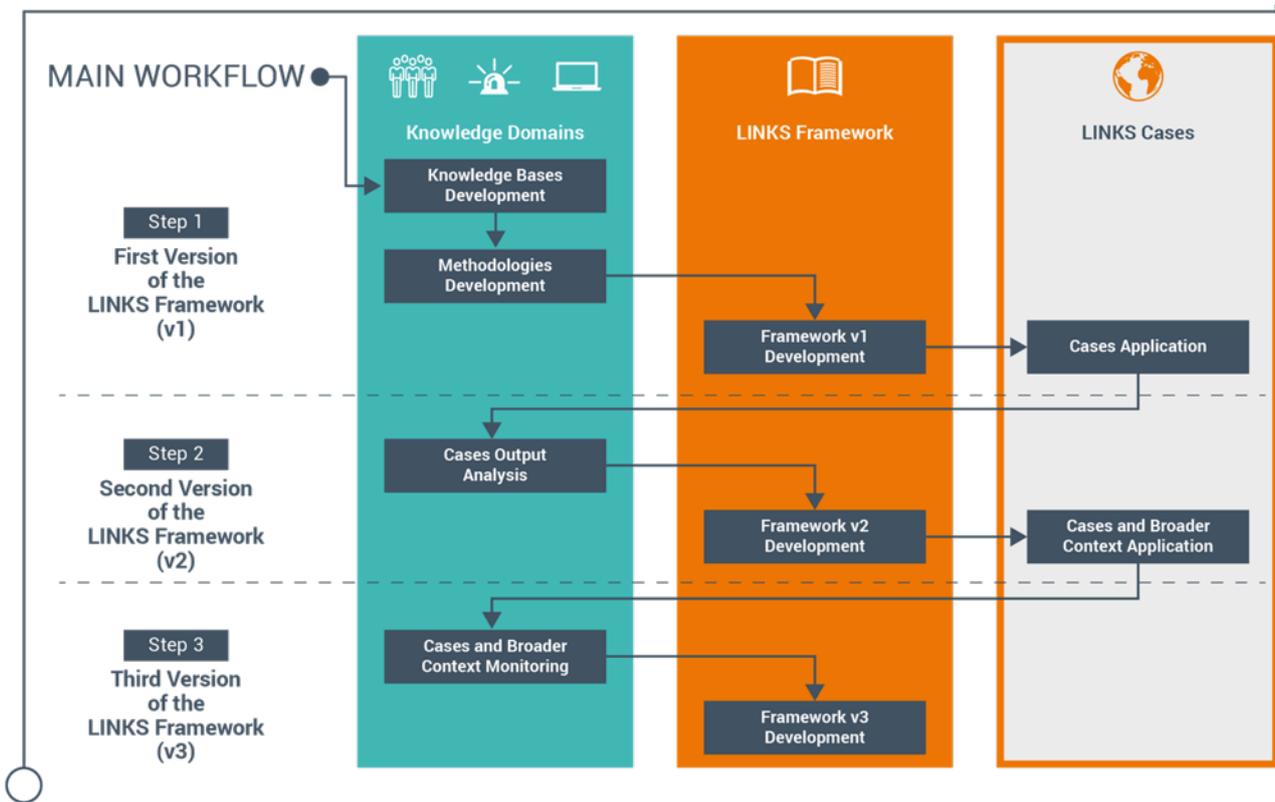
- The need to promote a 'diversity approach' in DRPV;
- The need to strengthen 'trust' in communication channels and official organizations;
- The need to consider vulnerability a dynamic concept for DMP and in the Disaster Risk Management (DRM) since vulnerability and resilience are not just linked by an inverse relationship.

What emerged from the literature review provided in D2.1 and D2.2, was that further work is required to investigate the interdependency between vulnerability and DRP. Indeed, few works investigate this topic, especially in relation to SMCS and disasters. This deliverable extends and

builds from the findings in D2.1 and D2.2 to provide a DRPV methodology. It will be used to help WP2 understand how the vulnerability and DRP research areas intersect, how they affect one another, and to define domain specific research questions to further address this intersect. In particular, the results of the research that are obtained applying this methodology, will help us understand how to reach vulnerable groups, how disaster management organizations (DMOs) identify them and communicate with them (key aspects also of interest for the DMP knowledge base), and how to improve the risk perception of vulnerable groups through the use of SMCS (key aspects also of interest for both the DMP and DCT knowledge bases). The DRPV methodology is developed on the basis of domain specific research questions as well as those which overlap with the DMP and DCT methodologies developed under WP3 and WP4. Together, the three methodologies will be applied to evaluate the first version of the LINKS Framework.

The main workflow planned for the LINKS project is shown in Figure 1.

**Figure 1: The LINKS Project Workflow**



Source: LINKS

The overall aim of DRPV methodology, together with DMP methodology (D3.2: Nielsen et al., 2021) and DCT methodology (D4.2: Gehlhar et al., 2021), is to guide and support the development and evaluation of the LINKS Framework (WP5) that is to be applied in the five case-based assessments (WP6). We recall here that the first version of the LINKS Framework will mainly consist of a consolidated version of the research design developed in WP2-4, including the knowledge bases and

DRPV, DMP, and DCT methodologies (Deliverable 5.1: Fonio & Clark, 2021). This entails the provision of a consistent research design to be applied in each of the five different hazard scenarios based on D2.1, D2.2, D2.3, D3.1, D3.2, D4.1 and D4.2, supported by the case assessment guidelines developed in WP6. When applied to the cases, these combined elements will feed into the creation and development of the learning materials in the second version of the Framework.

Accordingly, the main objectives of this deliverable are:

- To provide the research questions at the basis of the DRPV methodology that will also help to respond to the main gaps identified in D2.1 and D2.2 (Section 3 and Section 4);
- To identify the research methods and guide the selection of the participants in the cross-case assessments (Section 6);
- To suggest a research method to produce a case-specific, in-depth analysis of DRPV in a deep dive assessment (Section 6.4).

In particular, the first case-assessments, as highlighted in this deliverable, will focus more to investigate the perspective of institutions, practitioners, and representatives of civil society, especially NGOs. Work with local communities is also suggested but not mandatory at this level and it will be implemented mainly in the second case-assessments phase. This is also a mitigation strategy adopted to respond the limitations imposed by COVID-19 emergency (see Section 7).

## 1.1 Reading Guide

The process of identification of the subject of research has been already discussed in D2.1 and D2.2 where a literature review has been provided to identify the main gaps in the scientific literature. Thus, this document aims to provide a guide on how to answer these gaps.

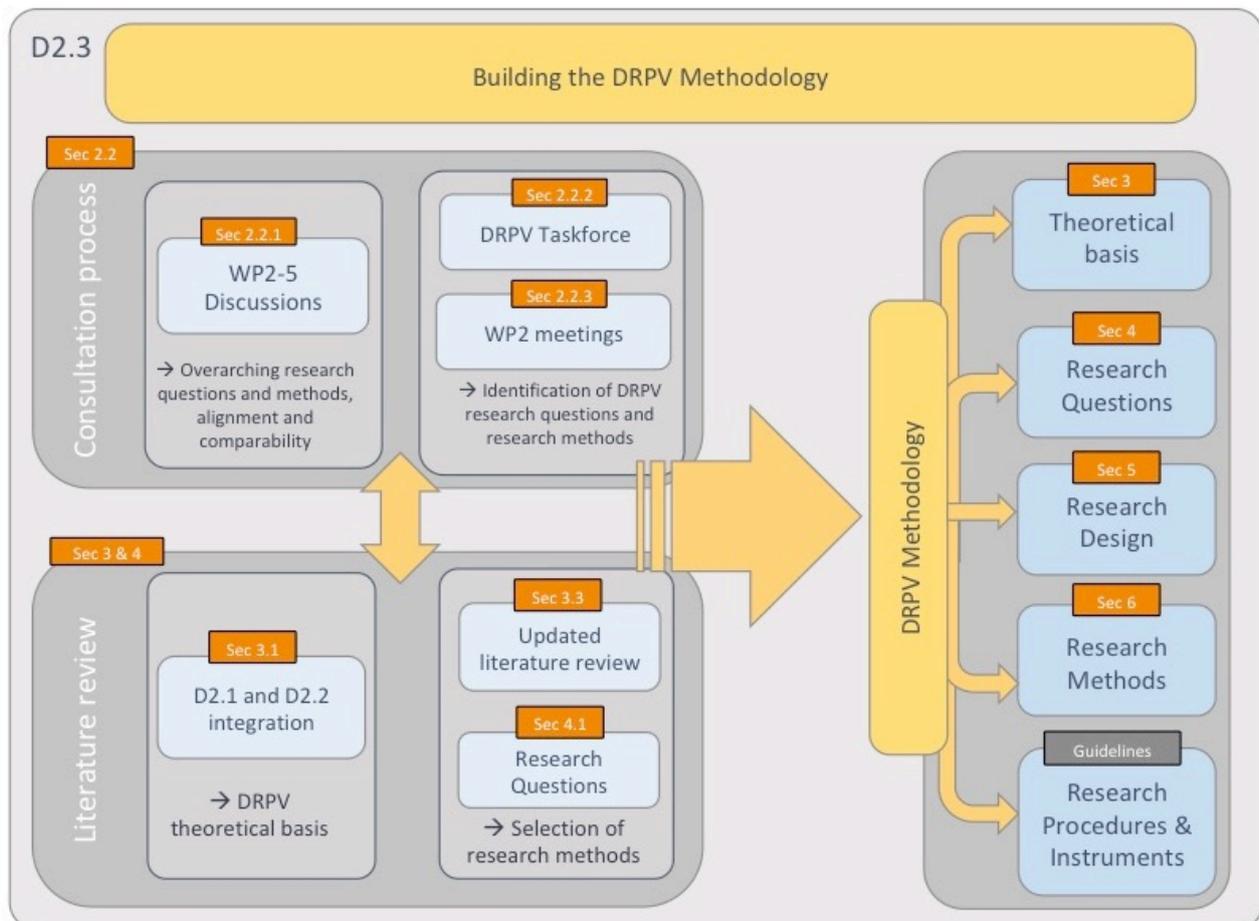
In particular, this deliverable presents the DRPV methodology for the LINKS project. With the term 'methodology' we mean an approach on how to connect theories, hypothesis and research questions with research methods. Thus, in this deliverable we describe the process followed to formulate our research questions and to answer them (selection of the most adequate methods, description of the methods, research participants' selection, etc.). Accordingly, we provide information about what data to collect, who to collect it from, and how to collect it. Attention has been also given to the ethical issues of the research.

The DRPV methodology is made up of five elements: the theoretical basis, that includes the hypothesis and theories at the basis of the research; the research questions that will be answered through the research; the research design, that describes the kind of research and the strategy that will be followed at different levels to ensure the results; the research methods that can be defined as the 'set of techniques recognised as being appropriate for the creation, collection, coding, organization and analysis of data' (Bellamy, 2011, p. 9); and the research procedures and

instruments, that are the sets of materials and tools useful to do research as a result of the research design.

Following the structure of the methodology, this document is organized in 6 core sections, that follow the Introduction and are represented in Figure 2.

**Figure 2: The DRPV methodology**



**Source:** Authors' contribution

Section 2 describes the phases and steps of the work to produce the DRPV methodology, focusing on the literature review and the consultation processes.

Section 3 presents the theoretical basis and the hypothesis at the basis of the research, and in particular how the gaps identified in D2.1 and D2.2 will be dealt with the DRPV methodology. It connects the DRPV knowledge base directly with the DRPV methodology to further analyse and assess the research designs that characterize existing literature on SMCS and DRPV. Furthermore, the criteria applied to select the research methods are described in this section.

Section 4 presents the research questions and especially how they have been operationalized for the first round of case-based assessments, as well as the state of the art on DRPV research methods.

The Section provides the overall research questions for the DRPV knowledge base, and their interactions with the DMP and DCT.

Section 5 describes the research design which includes two levels, the comparative component (cross-case assessments) and the explorative and grounded components (deep dive).

Section 6 details the proposed research methods as well as the research participant selection process.

Section 7 provides indications on the main limitations identified during DRPV methodology development and on the ethical considerations at the basis of the DRPV research.

The content of this deliverable ends in Section 8, with a conclusion and future steps for the DRPV knowledge base and methodology, as well as for the next steps in the LINKS project.

This deliverable, and in particular Section 6 (Research methods), is first of all, a product for the partners involved in the LINKS Framework design (WP5) and for those involved in the five case-based assessments (WP6), and especially for the partners responsible for the local case research (see Deliverable D6.1 (D6.1: Fonio & Clark, 2021). WP5 and WP6 will be responsible for 'translating' this document into guidelines for Case Assessment Teams (CATs) as set out for D6.2. Nevertheless, the whole deliverable (and in particular Section 2 (Towards a DRPV Methodology), Section 3 (Integration of D2.1 and D2.2: The DRPV Theoretical Basis), and Section 4 (Research Questions and Operationalization)) is also a useful product for the scientific community interested in reusing the proposed methodology in different contexts. Regarding the application of the DRPV methodology, potential beneficiaries from the results will be practitioners and policymakers working in disaster risk management. In addition, local communities and vulnerable groups are expected to be indirect beneficiaries of this work.

## 2. TOWARDS A DRPV METHODOLOGY

This section contains information on the phases followed to produce the work in D2.3. It briefly introduces the actions taken which are then detailed in subsequent sections. This includes:

- Integrating the results coming from D2.1 and D2.2 (Section 3.1);
- Updating the literature review with a specific focus on research methods applied in DRPV and SMCS studies (Section 3.3);
- Establishing and operationalizing the research questions (Section 4.1);
- Defining the research design (Section 5);
- Identifying and defining the research methods (Section 6).

In the following sections, the workflow implemented to produce the above-mentioned results is specified, and in particular text analysis and consultation processes among the partners. Figure 2 (in Section 1.1), in particular, shows the interaction between the two main processes that have been implemented to build this deliverable: the consultation process and the literature review, through which research questions and methods have been defined and that will go to inform the DRPV knowledge base, the LINKS Framework and the case-based assessments.

### 2.1 Text Analysis

Considering the increasing production of scientific literature on SMCS in disaster studies, the WP2 team has updated the literature review already provided in D2.1 and D2.2. This update has been included in this deliverable and is presented in Section 3 explaining how the literature feeds into the DRPV methodology design. This integration has been carried out from November 2020 to March 2021: in that period 9 new papers have been identified.

The key words used for the research were the same used in D2.1 and D2.2 literature review (see Section 2 of D2.1 and D2.2). The research was carried out considering both theoretical and empirical work on social vulnerability and DRP in SMCS environments. Papers were selected using the main online systems for scientific documents (see details in D2.1 and D2.2). The papers analysed are listed in the Annex I (Section 10.1). Then, a further selection analysis, based on the research methods used in the papers, was applied (presented in Section 3.3 of this deliverable).

### 2.2 Consultation Process

To ensure that the research is practice-oriented, research questions and instruments must be contextualized at the local level. To this end, four different levels of consultation processes have been initiated, which helped the authors to give direction to the DRPV methodology. The steps followed are described below and include:

- Consortium level:

- WP2-4 discussions
- DRPV methodological taskforce
- Case level:
  - WP2 internal meetings

### 2.2.1 WP2-4 Discussions

Meetings among WP2, 3, and 4 Work Package Leaders (WPLs) have been planned weekly. Additionally, the meetings include the participation of the three WPs' research teams and, when needed, also of WP5 and WP6 and the project coordinator.

In some periods, the weekly meetings have been increased according to the needs of the WPLs. The meetings were chaired by the three WPLs according to rotation. The purpose of the discussions was to align as much as possible the methodological deliverables carried out by the three WPs. In particular, the meetings were finalized to:

- Identify research questions across the three knowledge bases;
- Identify and align research methods;
- Coordinate the deliverable writing process.

Accordingly, this deliverable has been created with the additional collaboration of WP3 and WP4, such as the WP2 team has collaborated on D3.2 and D4.2. The reciprocal dialogue and exchange of ideas have helped to define common research questions (see Section 4) and cross-case research methods as presented in Section 5. This process has also benefited from the results of the Practitioner Task force meetings (PTF) and workshops (Cross WP5-6) to which WPLs attended.

### 2.2.2 The DRPV Methodological Taskforce

The DRPV Methodological Taskforce is composed by one representative from every LINKS case assessment team (CAT) (see Annex II, Section 10.2) and it is coordinated by a WP2 representative. As described in D6.1 this taskforce is 'complementary to the consultation process carried out by WP6. The discussions on the methodological implications for the assessments should go hand-in-hand with the engagement in the methodological discussions (WP2-4)'. The main purpose of the DRPV Methodology Taskforce is to develop the methodologies for the case-based assessments of the LINKS Framework and to foster a reciprocal support between the WP2 team and the representatives of the case assessment teams according to a participatory approach and in particular to:

- Provide the case-specific perspective during the building of the DRPV Methodology, in particular to identify the research questions and select the research methods;
- Support the local methodological teams in 'transposing' the DRPV methodology into the local case research plan;

- Support the methodological teams during the research phases of the project on how to carry out the research activities that are linked with DRPV methodology.

The taskforce is planned to meet monthly or when needed starting from March 2021. This could change in the different phases of the project. In particular, in the research phase (November 2021 – March 2022), the meetings will be scheduled as needed. Additionally, bilateral meetings could be organized at the request of the DRPV methodological taskforce members. The participation of these meetings is not limited to the taskforce participants: other LINKS members can be called to participate when needed or can voluntarily participate in meetings that are of interest for them. At this stage, the main results from the meetings are used to:

- Create an environment of listening and collaboration that was useful to develop this deliverable
- Guide the mapping of DRPV research questions in a participatory way
- Inform the research questions (Section 4) and Annexes III and IV (Sections 10.3 and 10.4).

### 2.2.3 WP2 Internal Meetings

WP2 internal meetings have been scheduled periodically. The purpose of these meetings has been to provide the DRPV Methodology and ensure its applicability according to a participatory approach. The meetings have seen the participation of two partners which are responsible for the DRPV knowledge base development and the Italian case assessment: University of Florence (UNIFI) and Save the Children Italy (SCIT). From January 2021 the taskforce meetings have been scheduled weekly between UNIFI and Save the Children Italy. Some meetings have been extended to also include, when needed, the Province of Terni, in particular with the purpose to obtain a local perspective and to address the purposes according to the inputs coming from the territories. The Province of Terni has also worked as a bridge to identify and include the needs of local practitioners in the research plan. This deliverable is the result of the joint work done by this team. Although both of the teams have worked on the document, the Save the Children Italy has, in particular, contributed on developing a methodology for the deep dive, and specifically the activities with minors, while UNIFI has had more responsibility in supervising the entire process as well as defining research for cross-case assessments and adults.

### 3. INTEGRATION OF D2.1 AND D2.2: THE DRPV THEORETICAL BASIS

This section presents the first part of the DRPV methodology and in particular its theoretical basis with the integration between D2.1 and D2.2 models of analysis. Thus, one of the purposes of the DRPV methodology is to address the gaps identified in D2.1 and D2.2, and in particular the conceptual gaps, linked to the limited number of studies that address together vulnerability and DRP, the need to adopt a dynamic and operational perspective on vulnerability and perception, and, finally, to address DRPV across the different phases of disaster management cycle. Lastly, we expand on the work from D2.1 and D2.2 on the main research methods used in vulnerability and SMCS studies and in DRP and SMCS studies, respectively. This work has been useful to select the research methods to be part of the methodology. To conclude, Section 3 is important to provide the background on which the DRPV methodology has been developed.

#### 3.1 Implications of D2.1 and D2.2 for the DRPV Methodology

The main gaps identified in D2.1 and D2.2 and addressed in this deliverable are methodological and conceptual gaps. Regarding the methodological gaps, the main considerations are provided in Section 3.3. Concerning the conceptual gaps, this deliverable provides a methodology to study the dynamicity of the vulnerability concept and how it relates to DRP, focusing in particular on vulnerable people's DRP.

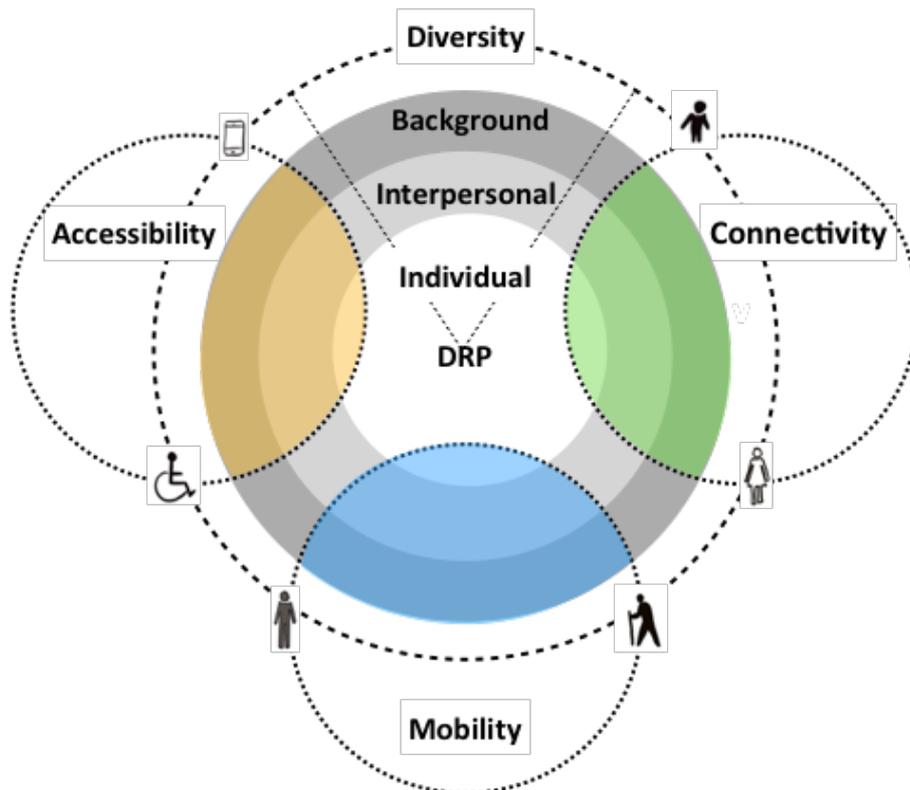
The starting point at the basis of the methodology, is the consideration that perception is one of the factors that have great consequences on people's vulnerability and that SMCS can have a relevant role in shaping perceptions. Issues like fake news, misinformation, and disinformation are blown up by social media platforms, becoming an alternative source of 'information', parallel to the official news. The role that especially social media are assuming is also the result of the difficulties faced by disaster management organizations in contacting some social groups, especially the most marginalized in the debate on disasters. As discussed in D2.1, for example, migrants and LGBTQ+ movements, whose needs are not usually considered in DMPs, frequently use social media channels to give visibility to the topics affecting them or to obtain targeted information (e.g., due to difficulties in accessing institutional information only provided in local language). Thus, variables like culture, trust, emotions, and experience have a relevant impact on the way people 'read' situations and decide to act. The way in which DRP dimensions interact, produces a high number of different responses.

Attention to the pull-and-play among different cultural aspects is essential for effective disaster management and risk reduction. Studies on the subject, to the contrary, report that often, in emergency planning, the affected communities are considered only as a homogeneous group and as victims, and almost never as resources considering the cultural diversity that characterizes them. In this regard, Figure 4 shows diversity is the overarching transversal dimension to vulnerability and

DRP and the starting point to build a conceptual bridge between the two concepts. It has been defined in both D2.1 and D2.2 as the individual factors (like socio-economic characteristics and human capital) but also interpersonal and background aspects that help to interpret situations and react appropriately, so 'the varying experiences of vulnerability and resilience within a disaster are due to social differences within a community or country, making certain individuals and groups more vulnerable and resilient (Finch et al., 2010)' (Dominey-Howes et al., 2014: 909); thus it is, first of all, the diversity at the individual level, but also at the situation and context level.'

What emerges from this perspective is that vulnerability and DRP are two strongly interconnected and interdependent concepts, and further dimensions of interaction arise when considering the digital environment. This is also in line with the purpose of the LINKS project that is to provide a DRPV methodology, as a way to discuss a joint perspective on vulnerability and DRP, focusing on their interconnections and how to investigate them. The overlapping sections between social vulnerability and DRP have been identified with the three colours in Figure 3 (orange, green and blue). These overlapping dimensions between DRP levels (background, interpersonal and individual levels) and vulnerability variables (accessibility, connectivity, mobility) represent the points to investigate through the DRPV methodology.

**Figure 3: Diversity Approach to Integration of Vulnerability Paradigm and DRP Multi-Level Model**

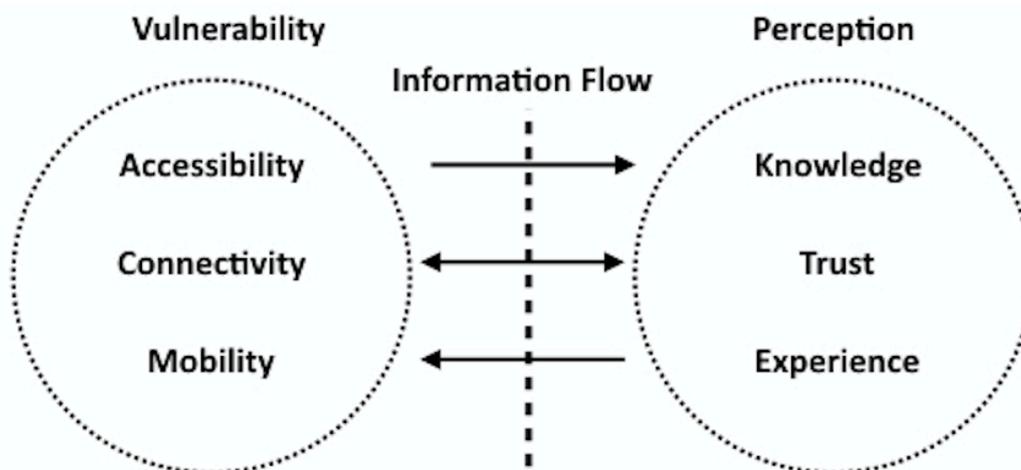


Source: Authors' contribution

Thus, the DRPV methodology has been built taking in mind the need to investigate (according to the gaps identified) the interaction on the two concepts and especially the way DRP affects vulnerability and what are the dimensions of DRP that can increase/reduce vulnerability. This does not mean that DRP is only within the limits of vulnerability but that it has a role in defining and characterizing it.

Communication and information provided through SMCS have both relevant potential consequences on vulnerability and perception. For instance (see Figure 4), the capacity to access information has implications on the way events are perceived and, in particular, on the level and quality of the knowledge acquired about hazards. Thus, trust in institutions can facilitate the information flow maintaining people 'connected' with institutions. On the other hand, a low trust in official communication channels can affect the interaction (connectivity) between people and institutions and the exchange of information between them during emergencies with potential increase of exposure for the first group. Moreover, people with past experience of disasters might be less likely to 'stay informed' (to constantly check information on the situation) trusting more on their personal past experience of disasters, with the potential risk of not properly reacting to the situation (mobility). However, it also depends on the level of information provided, the accessibility, and trust in information. Obviously, what is represented in Figure 4 is only an example of the potential ways in which vulnerability and perception, and their variables, are related.

**Figure 4: Information Flow between Vulnerability and Perception**



Source: Authors' contribution

From this point of departure, the DRPV methodology builds from the integration between D2.1 and D2.2 which provided social sciences-based perspectives on the vulnerability and DRP concepts in relation to SMCS in disasters. The two deliverables represent the theoretical pillars of the DRPV knowledge base and contributed to defining the borders for the research design under the DRPV methodology.

The findings in D2.1 and D2.2 also exposed that DRPV is strictly related to the other two domains defined in the LINKS project: DMP and DCT. In other words, the integration between the

vulnerability paradigm and the DRP multi-level model (i.e., the DRPV theoretical basis shown in Figure 3) is also a lens for DRP and vulnerability intersections (i.e., the coloured portion of Figure 3) in relation with digital spaces (especially DCT) and DMPs. The DRPV theoretical framework shown in Figure 3 has also been used to define the interconnections between DRPV and the two other LINKS methodologies (DMP Methodology presented in D3.2 and DCT Methodology presented in D4.2), to build the DRPV methodology and overlapping research questions across the three domains (see Section 4), and finally to build the research design as presented in the following sections.

### 3.2 Implication of the DRPV Theoretical Basis in the DMC

In order to address the gaps identified in the D2.1 and D2.2, the DRPV methodology has also been designed to have impact in all the different DMC phases.

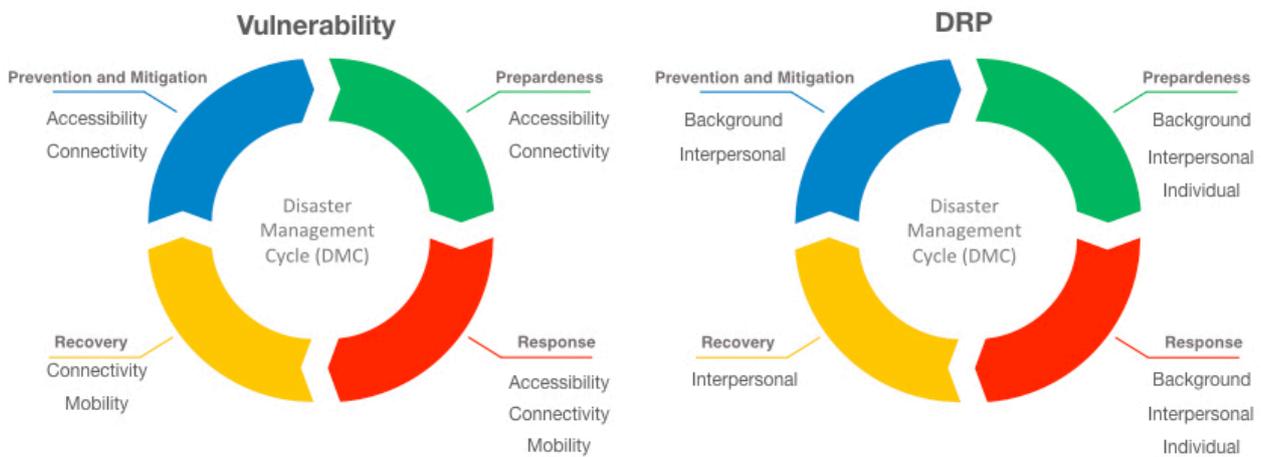
Both D2.1 and D2.2 have highlighted that until now studies on SMCS and disasters consider vulnerability and DRP concepts in relation to specific phases of the DMC. For example, vulnerability is mainly taken into account during the response phase (see D2.1), while DRP during preparedness (see D2.2). Nevertheless, the DRPV theoretical framework presented in the previous section demonstrates that the concept of vulnerability and DRP, and their different variables/factors (diversity, accessibility, connectivity, mobility, and the background, interpersonal, and individual factors) are transversal to all the DMC phases (as shown in Figure 5) considering how they can change throughout them. However, in Figure 5, for each phase of the DMC (the four different coloured portions of each circle), the vulnerability and the DRP dimensions were mentioned in relation with the phase they appeared as most relevant in the literature review provided. This does not mean that e.g., accessibility is not an issue for recovery, however, this did not emerge among the most relevant in the literature we considered. Since diversity has no sub-variables/factors, and it has been defined as a transversal concept, it is not shown in Figure 5.

This work has three implications for the DRPV methodology:

- The DRPV knowledge base may have implications and be analysed taking into account all the phases of the DMC;
- The validity of these assumptions here provided needs to be tested through the case-assessments. Thus, this is a first attempt to represent the transversality of the concepts in the different phases. Further updates on this will be provided throughout the project as a result of the research that will be carried out and used to validate or modify these first considerations;
- The research questions on which this deliverable is based have been defined taking in account all the phases of DMC.

Accordingly, the research questions and methods described in Sections 4 and 5 have been selected with the purpose to discuss/reflect the DRPV in the different phases.

**Figure 5: DRPV in DMC**



**Source:** Authors' contribution

### 3.3 DRPV Research Methods: Update of the State-of-the-Art

To select the most suitable research instrument/s in the DRPV, a literature review about the most employed methods was carried out. This analysis has been already anticipated in both D2.1 and D2.2 as a first overview of the main research methods used in vulnerability and SMCS studies and in DRP and SMCS studies, respectively. Here, below, the results will be briefly integrated to present the state-of-the-art on research methods in DRPV, while in Annex I and V (Sections 10.1 and 10.5) the updated list of the different methods and papers is provided. In Section 6, those research methods selected to collect the answers to the research questions will be presented in detail. It was a preliminary work to inform the DRPV methodology.

Both the literature reviews provided in D2.1 and D2.2 have shown that the number of the papers that link together DRP and SMCS or SMCS and vulnerability in disaster contexts are very few, showing that this is a quite new field of research. Moreover, it is important to recall the assumption stated in D2.2, i.e., that to our knowledge, there are no works on SMCS that specifically design and apply an ad hoc methodology to survey DRP in vulnerable groups.

The literature reviews, provided in D2.1 and D2.2, provide a list of the research methods that are most employed to investigate both DRP and vulnerability. Moreover, a brief list of the main aims/application is provided. We underline that questionnaires and interviews are among the most employed methods to assess DRP (Bandecchi et al., 2019; Caponecchia, 2012; Salvati et al., 2014; Walking & Haworth, 2020), while vulnerability assessments are mainly used with target groups such as children (Fisher et al., 2012; Fisher et al., 2013; Sofronoff et al., 2011). According to this literature review, a selection of the methods has been done to identify the research methods to be used in DRPV Methodology (see Table 1).

**Table 1: Most employed research methods in DRPV and their main applications.**

| Research method                           | Aim of the research  |
|---|--|
| Questionnaires<br>Interviews              | <ul style="list-style-type: none"> <li>Identify variables/attitudes of interest</li> <li>Understand the role/usefulness of the different platform</li> <li>Do not influence participants by the others' responses</li> <li>Investigate a wider number of people</li> <li>Perform quantitative and/or qualitative analyses</li> </ul> |
| Workshop<br>Focus groups                  | <ul style="list-style-type: none"> <li>Identify variables/attitudes of interest</li> <li>Provide a more contextual analysis</li> <li>Investigate a selected target of people</li> <li>Perform qualitative analyses</li> </ul>  |
| SMCS data analysis<br>Geospatial analysis | <ul style="list-style-type: none"> <li>Socio/demographic analysis</li> <li>Use of SMCS during disasters</li> <li>Perception of SMCS information vs social factors and platforms</li> <li>Model of relief supplied demand</li> <li>Perform quantitative analyses</li> </ul>   |
| Computer-mediated<br>role-play            | <ul style="list-style-type: none"> <li>Go better inside the analysed problem</li> <li>Use naturalistic marker developed experimentally (prior to the actual game)</li> <li>Control individuals' differences</li> </ul>   |
| Literature review                         | <ul style="list-style-type: none"> <li>State of the art</li> <li>Comparative analysis</li> </ul>   |

**Source:** See D2.1 and D2.2

To discuss vulnerability and SMCS three other methods are usually employed as discussed in D2.1: vulnerability indexes, participatory processes, and qualitative analysis (e.g., (n)ethnography) (see D2.1 for limits linked to these methods).

The literature reviews carried out in D2.1 and D2.2 have also shown that all the above-mentioned methods have some limitations and challenges (detailed information has been provided in D2.1 and D2.2 in terms of methodological gaps) and in particular that:

- Few cross-cases studies in Europe were provided on the two topics in relation to SMCS and disasters;
- Few studies considered the entire DMC (see next section);
- The selection of research methods to investigate vulnerability is usually finalised to 'measure' it without moving from the perspective of a static condition.

Thus, in order to address the identified methodological gaps, methods that adopt a static approach to vulnerability and DRP have been excluded. This is the case, e.g., of vulnerability indexes, that are

really useful in specific approaches to research but that do not provide the best solution to answer the research questions at the basis of this project. Then, SMCS data analysis and geospatial analysis have been excluded considering the diversity of hazard scenarios. This method could be useful in specific cases, where there are seasonal hazards, but not in others where hazards, like earthquakes, do not frequently take place making it difficult to obtain useful information. Other methods, like (n)ethnography and participatory approaches have been considered at the moment in a limited measure due to COVID-19 emergency and potential limitations in movement. Moreover, these methods require an in-depth analysis and specific skills in using them; skills that are not owned by all the CATs. Thus, considering the diversity in CATs, the imposition of these methods at a cross-level could produce invalid results. These approaches will be considered in the second-assessment, as long as the situation allows to improve collaborations among the different CATs. On the basis of this literature review, the research methods selection has been done and it is presented in Section 6.

## 4. RESEARCH QUESTIONS AND OPERATIONALIZATION

This section presents the research questions that derive from the DRPV theoretical basis presented in Section 3 and that should be answered through the DRPV methodology. The research questions are also linked to the DMP and DCT knowledge bases and will be used to guide the development of the first version of the LINKS Framework and the first round of the case-based assessments (Section 4.1). As already mentioned in Section 3, the research methods identified in both the cross-case assessments (the comparative component of the methodology, see Section 6.1) and the deep dive (the explorative and grounded component of the methodology, see Section 6.4) are described in Section 6.

### 4.1 Research Question for the DRPV Methodology

Based on the project objectives, the findings from 2.1 and 2.2, and the conceptual basis provided in Section 3, the overall DRPV research objective is to understand **how DRPV knowledge base can contribute to strengthen societal resilience, exploring how the use of SMCS can be improved in all the phases of the DMC**. The development of the DRPV methodology should work with this purpose.

Accordingly, a first set of DRPV research questions derived by the literature review were arranged in relation to the three LINKS knowledge domains (people DRPV, technologies DCT, and institutions DMP). This answers to the request at a project level that the research questions emerging from the LINKS project should try to consider the interconnections among the three domains identified in the project. The outputs of this first work were discussed with the DRPV methodological taskforce and integrated according to their suggestion (the result of this mapping process is shown in Annex III in Section 10.3); then they were further refined by the WP2 team. This last step was done adopting some parameters:

- The DRPV methodology should focus on the intersectionality between DRP and vulnerability to ensure a dialogue between the two knowledge bases (as defined in the DRPV conceptual framework, see Section 3.1).
- The DRPV methodology has to provide inputs for the DMC at the cross-case level (see Section 3.2).

Accordingly, the most frequent research questions identified at the case-level following a participatory approach have been selected and interconnections between the DRP and vulnerability have been traced. This process has led to identify four DRPV research questions<sup>2</sup>:

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<sup>2</sup> The original questions are presented in Annex IV (Section 10.4). The original research questions were re-worked in collaboration with the DRPV methodological taskforce with the purpose to operationalize them according the needs and challenges identified in the cases.

- **DRPV\_RQ1:** How do DMOs identify vulnerable groups and how is vulnerability perceived at the case-level?
- **DRPV\_RQ2:** How SMCS are used and what are their main characteristics, limits and potentialities in terms of DRPV?
- **DRPV\_RQ3:** What is missing in the communication process? What are the limitations of the information flow in terms of accessibility, connectivity, and trust?
- **DRPV\_RQ4:** How does volunteerism work today at the digital level and which social groups are usually more active on SMCS?

**RQ1** aims of identifying commonalities and differences in the way vulnerabilities and vulnerable groups are identified and described in the different countries. Answering to this question will be useful to understand what are the criteria usually applied in doing this and who is usually identified as vulnerable also in relation to the different scenarios and the digital environment. In particular, it will be useful to understand if vulnerability is usually identified as a static or dynamic condition and eventually how countries/ authorities manage it in the different situations.

**RQ2** aims of identifying what are the SMCS platforms usually used especially by DMOs in providing or collecting information, in which DMC phases and with which purposes. In particular, the purpose is to understand what are the social groups DMOs expect to reach through these channels and who cannot be reached through them. This question is related in particular to DCT knowledge base, with the purpose of understanding how the technological characteristics impact on the way information is provided and what are potential benefits and limitations in using SMCS platforms.

**RQ3** is mainly focused on the information flow and it is in particular related to DMP knowledge base. The purpose is to understand how information is usually provided and what are the criticalities in accessing it in terms, e.g., of linguistic choices or barriers produced in the way the communication strategy is defined. Accordingly, the question will be useful to understand when a communication campaign can be considered efficient and when not and why, taking in consideration issues of accessibility, connectivity and trust.

**RQ4**, the last question is related to the mobility issue, identified as one of the main dimensions of vulnerability (see D2.1). The purpose is to understand how activism and especially volunteerism, as forms of mobility, have been shaped by the digital environment and with which potential consequences on the DMPs. Is digital activism considered in the DMC and what is its role today? What is the contribution it can provide and who are the social groups that are more active in the digital environment? This question will provide some first information that will be used to define what are the potential implications of digital volunteerism in reducing vulnerabilities and which forms of digital activism can contribute to the information flow and reduce or increase situations of misinformation.

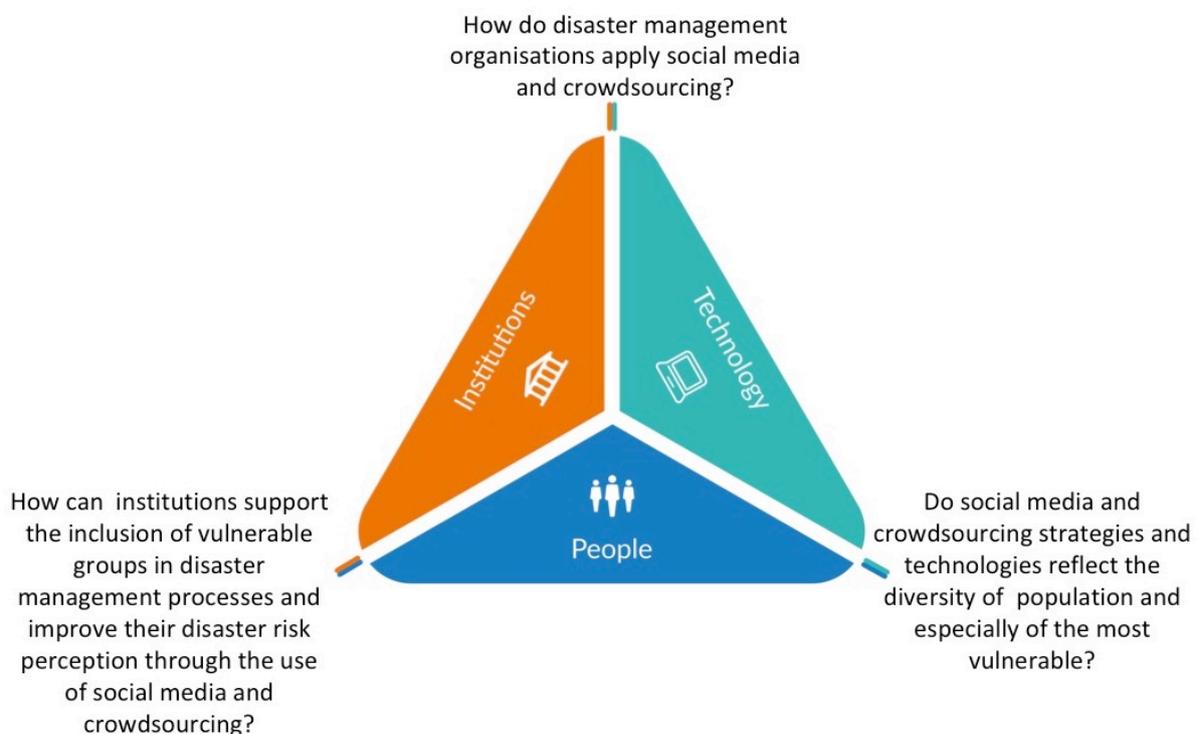
The four DRPV\_RQs above have been used in building the first version of the DRPV methodology, and in particular to build the research design (including selection of research methods and

participants) for the case-assessments. The result was again discussed with the DRPV methodological taskforce following a participatory process. During this process, the DRPV\_RQs, connections, and dependencies were identified with the result that a research question flow for the cross-cases assessments was established (see details in Sections 5 and 6).

Furthermore, this process of research questions selection was useful to define how the DRPV methodology can answer to the main issues identified at the case level. Furthermore, some overarching questions that connect the DRPV methodology with respectively the DMP and DCT methodologies (shown Figure 6) for the research taking place across the cases have been identified. The inter linking questions in Figure 6 have been identified starting with the analysis of the gaps emerged through the literature review in D2.1 and D2.2 and through a participatory process opened in the DRPV methodological taskforce as described above. On the basis of the gaps and the discussion with the CATs, a further discussion with WP3 and WP4 teams was opened to identify the transversal questions to the three knowledge domains. Accordingly, the following questions have been formulated:

- DRPV/DMP: How can institutions support the inclusion of vulnerable groups in DMP and improve their DRP through the use of SMCS?
- DRPV/DCT: Do SMCS strategies and technologies reflect the diversity of the population and especially the most vulnerable?

**Figure 6: The Inter Linking Questions**

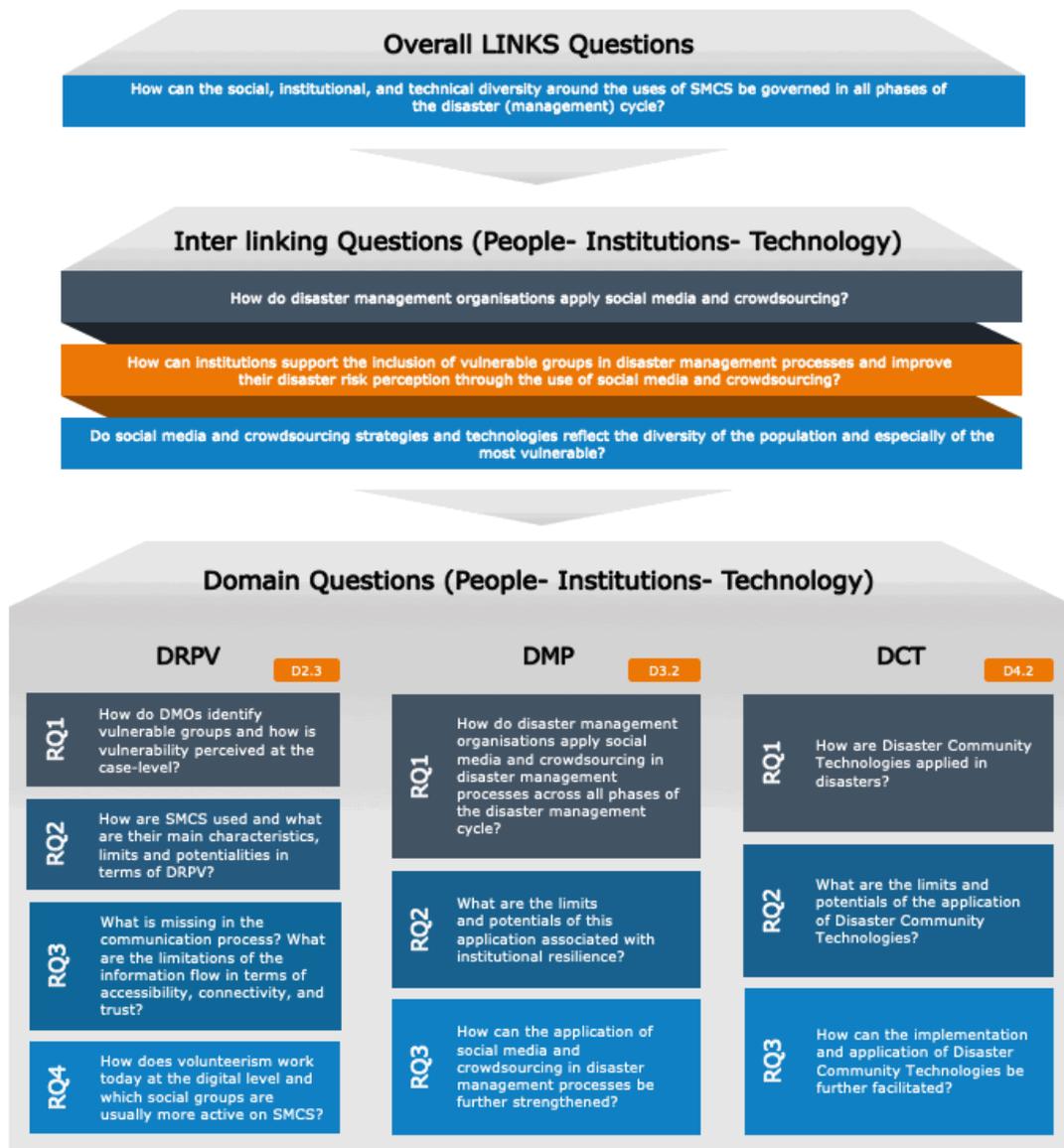


**Source:** WP3 authors' contribution in collaboration with WP2 and WP4

On the basis of these research questions, a list of priorities have been defined in the DRPV methodology and in particular, in the first case assessment phase, the focus will be on the limits in accessibility and connectivity, namely which people cannot access the information or cannot connect to the SMCS, as well as who can facilitate this process. Then, a second version of the DRPV methodology will be provided in Month 28 to work in the direction of understanding how to act within the digital environment in order to promote more inclusiveness and facilitate targeted communication, interaction, and mobility, as well as how to improve trust between disaster management organisations and civil society, especially vulnerable groups.

To conclude, Figure 7 provides an overview of how different layers of research questions feeds into achieving the overall objective of the LINKS project. While these are not strict hierarchies, there are a number of cross-cutting questions which will be approached from the respective domains. The figure also includes the overarching, domain specific research questions from the other two methodologies for reference.

**Figure 7: Overview of Research Questions for the First Case-Based Assessments**



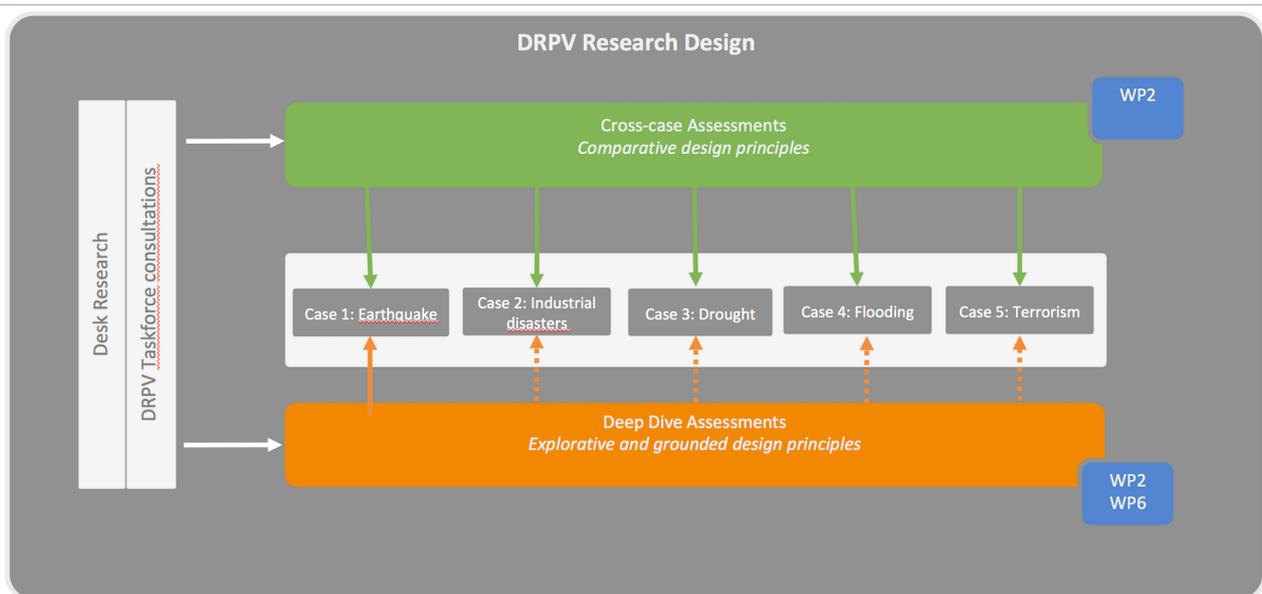
Source: WP3 authors' contribution in collaboration with WP2 and WP4

## 5. RESEARCH DESIGN FOR THE DRPV METHODOLOGY

This section aims to present the research design and phases that are at the basis of the first assessment phase in the LINKS project (Figure 8). Further details about procedures will be provided in D6.2. According to Gorard (2013), research design is something more than techniques and procedures; it is ‘about convincing a wider audience of sceptical people that the conclusions of the research underlying important decisions are as safe as possible’ (p. 4). This means not only to select methods and build instruments but to have a vision about how to obtain data that will effectively provide useful results for the purposes of the research. Thus, the purpose of this section is first of all to describe the two-levels approach to the research that has been selected to ensure results in the LINKS project. This has been built to produce an effective multi-disciplinary and multi-national research.

Thus, the research design in LINKS is based on two different research levels that correspond to different approaches and methods: the cross-case assessments and the DRPV deep dive assessments.

**Figure 8: Research Design**



**Source:** Authors' adaptation from D3.2

The first level, the cross-case assessments, is thought to ensure research in different European countries and hazardous scenarios (see Section 6.1). This level describes the approach that has been identified as crossing the three methodologies of the LINKS project and that will be applied in all the five cases. The WP2-3-4 transversal research questions presented in Section 3 and that have guided the process of integration among the three methodologies (see Figure 6) are at the basis of this research level and are expected to be answered adopting the research methods introduced in

Section 6. During the preparatory phase as planned in D6.1, research assessment guidelines and protocols have been established and provided to the CATs (see Section 6.2).

The second level, the deep dive assessments, is also included to ensure that the DRPV questions presented in this deliverable are contextualized, and to investigate the differences and peculiarities of the considered contexts (Section 5.2).

Both cross-case and deep dive assessments will enrich the DRPV knowledge base and the LINKS Framework.

## 5.1 The Cross-case Assessments

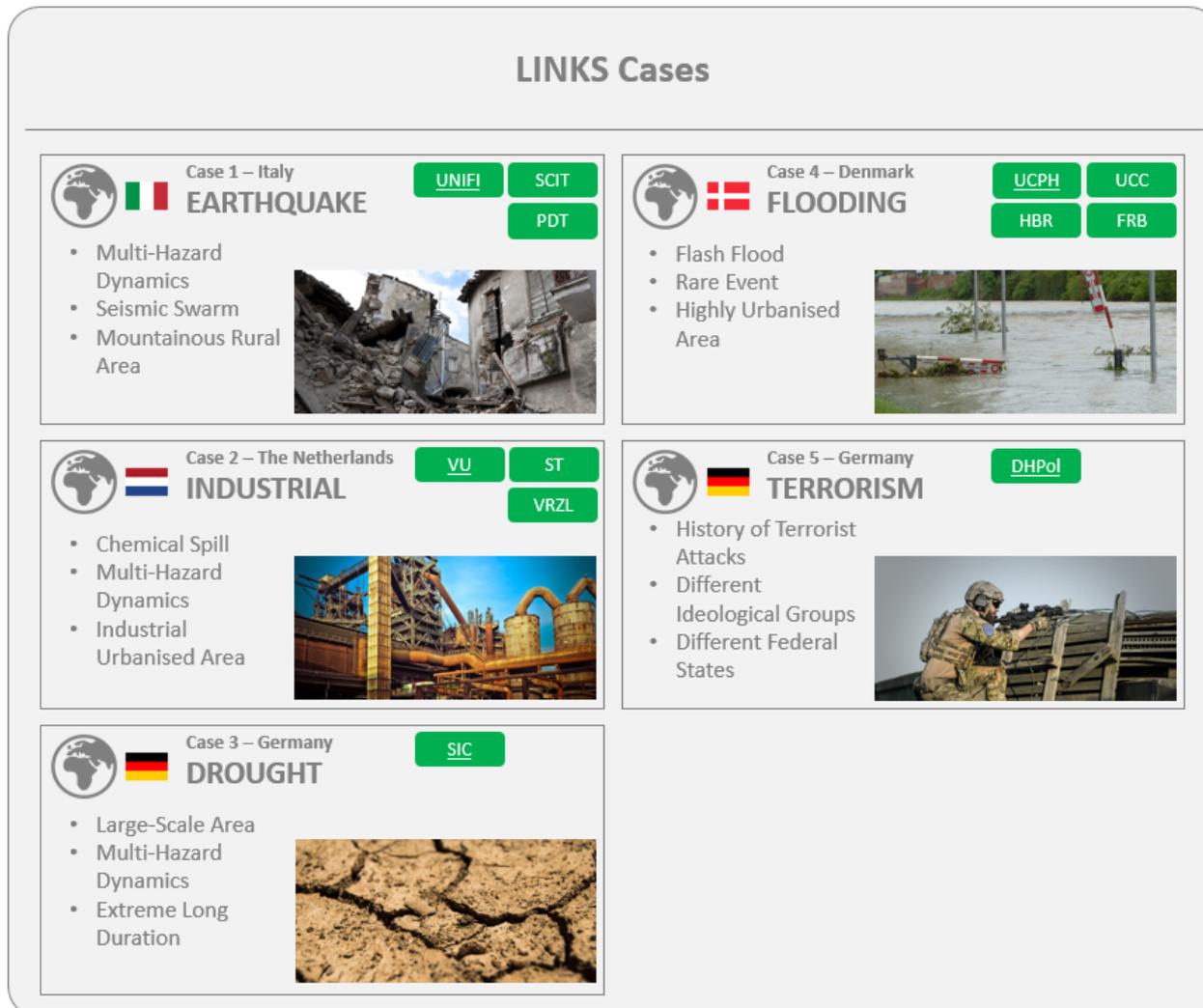
The cross-case assessments are joint efforts between WP2-4 and investigate the three knowledge domains across different contexts while exploring interacting themes. The cross-case assessments are, thus, both an attempt to explore domain-specific questions through a comparative lens and the interdependent questions cutting across knowledge domains.

Five cases in four different countries were selected as the testing ground for the LINKS project, thus this deliverable refers to all of them (see Figure 9). The scenarios refer to the hazards in each case:

- Case 1: earthquakes, Italy;
- Case 2: industrial hazards, the Netherlands;
- Case 3: droughts, Germany;
- Case 4: flooding, Denmark;
- Case 5: terrorism, Germany.

In LINKS the five cases are intended to assess the practical value of the LINKS Framework. As specified in D5.1 and D6.1, the learning materials, and other components (such as the methodologies related to the knowledge bases) included in the Framework, will be adjusted, applied, and assessed in diverse socio-cultural contexts and in the frame of five different hazard scenarios. The scenarios are instrumental to the case-based assessment of the Framework as they are, together with the knowledge bases, the starting point to explore gaps, needs and challenges in the first iteration of case-based assessments. In the second iteration, learning materials and other components based on both the results from the first round and on the scenarios will be assessed (e.g. guidelines on the uses of social media in the preparedness phase of flooding).

**Figure 9: The Five LINKS Cases and Scenarios**



**Source:** adapted from LINKS (D3.2)

The cross-case assessments are done to provide levels of comparability across the findings in the LINKS project. To do this the DRPV, DMP, and DCT methodologies are developed to define the research that will be conducted in all cases through a set of common research questions and methods. The inter linking research questions across the three LINKS knowledge bases as well as the DRPV research questions were considered with the purpose to identify the topics that could be discussed at a cross-case level. In particular, DRPV methodology is interested to discuss the accessibility to DMP and DCT, focusing especially on information flow and what are the consequences on the DRP and vulnerability. Thus, the cross-case approach is useful to DRPV knowledge base because it gives the possibility to explore how disaster management operators use social media and crowdsourcing in different geographical and cultural contexts, especially how information on vulnerability is provided and collected and what are the limits of these processes. The cross-case approach will help to understand how the different countries consider vulnerability

and try to solve issues connected to it and DRP through the use of the social platforms object of this study. Positive and negative experiences will be collected such as commonalities and differences, with the aim of implementing the DRPV knowledge base. The results will be also used to assess and implement the operationalization of the DRPV knowledge base that is also the purpose of WP2.

It must be noted that LINKS uses an exploratory research approach across five diverse socio-cultural cases. The findings from the case-assessments are context-specific, meaning that the outcomes will be analysed and framed within specific socio-cultural, technical, and institutional contexts (and constraints) and in relation to the hazard scenarios in each case. For this reason, the methodologies are not designed to provide a strict comparative analysis across the cases but rather to allow for an interpretive research approach. Such approaches are well documented in grounded and exploratory research (see inter alia Gioia et al., 2013; Grodal et al., 2020). Here the objective is not to generalize the findings across the cases, but rather to create a discussion around potential connections, similarities, and differences considered in the diverse contexts in which the research has taken place.

## 5.2 Deep Dive-Case Assessments

The deep dive in WP2 refers to how a DRPV perspective could be adopted in the local case assessments. The difference between cross-case assessment and deep dive is that the second is not mandatory and will be applied in those countries where the respective CAT identifies as relevant to adopt a DRPV perspective in their research. This means that the starting point is to understand how local case research plans can include an analysis on DRPV and how this could have positive impacts on the DRPV assessment process.

Thus, the deep dive assessment is a really important level because it gives the possibility to enrich the specific scenario research plan adopting a DRPV analysis. At this point, the main question could be how this research level could contribute to the DRPV methodology and knowledge base. The answer is that the deep dive will contribute to provide data that could inform the DRPV knowledge base, providing a local case specific perspective. The differences in cultural, social, political and hazard contexts are an important potential resource for LINKS. Thus, some specific issues could be discussed and identified only if the research adopts a context-related perspective. The deep dive will be planned in agreement with CATs and WP2 with the aim of focusing on aspects of the DRPV knowledge base that could satisfy both the local case teams' expectations and the LINKS project.

The choice for deep dive assessments is the result of three considerations (see also limitations in Section 7.1):

- The interdisciplinarity of the project is also represented in the CATs. The methodological groups come from different field of research, therefore, not everyone has the same experience in applying, e.g., participatory methods; however, a DRPV perspective could be

also investigated adopting different methods that are not listed in this deliverable but that could be CAT's interest to apply; in this case the role of WP2 team will be to guide the local teams to understand how to incorporate the DRPV perspective in their research plans;

- Due to the COVID-19 emergency, WP2 team has not planned to carry out research out of Italy during the first assessment phase; this will be taken in consideration in the second-assessment if it is possible; thus, the research methods identified have to be easily applicable also during COVID-19 restrictions and by all the local methodological teams; this means that deep dive has to be implemented by local case teams;
- As a mitigation strategy, to avoid overwhelming the CATs (considering that some of them have also planned independent research work).

The purpose of the deep dive research level is that, although some overarching questions on DRPV will be already answered in the cross-case analysis, some further information could be provided during deep dive research. This could provide unexpected perspectives on DRPV and improve the quality of data collected at the cross-case level.

### 5.2.1 DRPV Mapping for Deep Dive

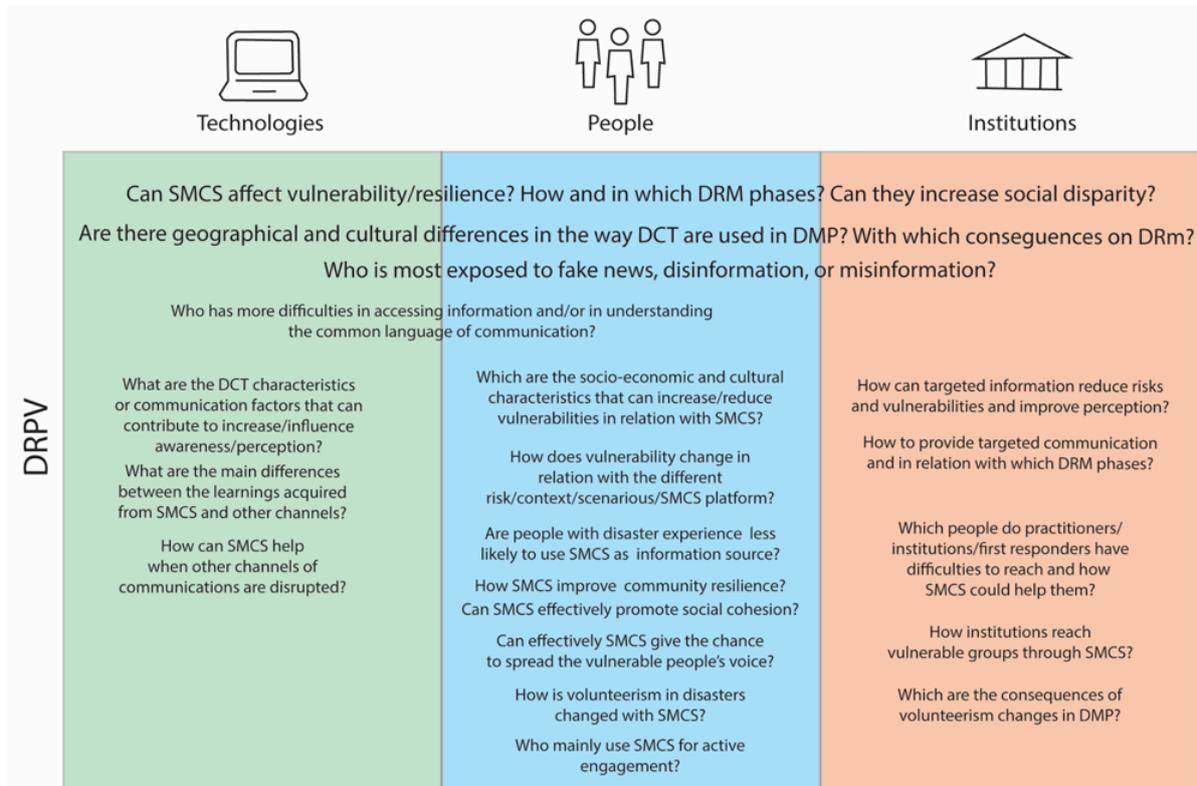
Writing this deliverable, a consultation process with the CATs has been opened (as described in Section 2). This process has been useful both to define the cross-case assessments level and to provide a first map of the issues each scenario would like to discuss in the LINKS project. Thus, this mapping process, as in Annex IV (Section 10.4), has been preparatory also for each deep dive. Thus, in Annex IV a synthetic description for each case/scenario is provided together with the research questions related to the DRPV knowledge base.

An example from the Italian case is also provided below (See Table 2 with an overview of the case and Figure 10 with the main research questions). It is important to remember, in fact, that the methodology proposed in this deliverable aims to investigate both the knowledge bases cross cutting themes (the DRPV research questions) and DRPV related specific research questions (as presented in the above-mentioned annex). Accordingly, every CAT has contributed to defining specific elements of interest in relation to DRPV knowledge base. These results will be used to define eventual deep dive levels of analysis with them. According to this mapping work, what emerged is both the different topics and stakeholders identified by every CAT. This diversity cannot be managed at the cross-case level and need to consider specific DRPV perspectives and research methods.

**Table 2: Case/Scenario: Earthquake, Italy**

|                          | Case/Scenario: Earthquake, Italy   |
|--------------------------|--|
| Disaster phase           | Preparedness (risk communication) and response (crisis communication)  |
| Context                  | Valnerina (Province of Terni, Umbria region), one of the areas hit by last earthquake. It is a mountain area, with small villages; high presence of elderly people.  |
| Main focus               | Building social connections and inclusiveness  |
| Main challenges for DRPV | How to reach most vulnerable groups, especially elderly people, migrants and temporary residents (main challenges in access to information and to be in touch with local authorities)<br>How to promote intergenerational dialogue for DRM<br>How to involve children in DRM |
| Stakeholders             | Province of Terni, Municipalities, Civil Protection, local population, schools, local associations/NGOs  |

**Figure 10: Research Questions: Earthquake, Italy**



Source: Authors' contribution

## 6. RESEARCH METHODS

This section defines the research methods for the DRPV methodology, that will be used to address the methodological gaps identified in D2.1 and D2.2 and according to the different levels of analysis that have been described in Section 5.

First of all, the cross-case level will be used to ensure research in different European countries and hazard-scenarios. At this level, the selection of research methods has also seen the result of a collaboration with WP3 and WP4 with the purpose of ensuring a multi-disciplinary approach to the research. Thus, starting from the literature review (Section 3.3) and having in mind the research questions (Section 4.1), two main research methods (interviews and survey) have been selected as applicable to all the case-based assessments (i.e., the cross cases dimension) in order to address the research questions highlighted in Figure 6.

Focus groups have also been included in this deliverable for complementary cross-case assessments to be carried out directly by WP2 at a cross-national level (see Section 6.3). Thus, WP2 team will conduct some online focus groups, independently, with cross-case participants to ensure results with these research methods.

### 6.1 Cross-Case Assessments

In this Section the selected cross-methodology research methods are presented. For each research method a table that summarizes the main characteristics is included and thereafter detailed information about the method.

#### 6.1.1 Online Survey and its Role in the DRPV Knowledge Domain

In Table 3, a summary of the main characteristics of the online survey, as cross-methodology research method in the LINKS project, is provided.

**Table 3: Research Method 1: Surveys**

| Online Survey  |   |
|--|---|
| An internet-based data collection method consisting of a set of questions sent to a strategically selected sample. Applied across all LINKS cases to collect a broad level of information on SMCS application in DRPV. |   |
| Targeted Number of Participants  | Research Participants                   |
| 40+ per case<br>200+ overall   | Practitioners                           |
| Case Relevance   | Language                                |
| All case-based assessments   | English, Danish, Dutch, German, Italian |

| Lead   | Data   |
|--|--|
| WP4  | quantitative   |
| Level of Information   | Participants Engagement  |
| broad  | low  |
| Total Questions  | Runtime  |
| (approx.) 30   | 4-6 Weeks  |
| Benefits   |  |
| <ul style="list-style-type: none"> <li>• No interviewer effects</li> <li>• No effects of social desirability</li> <li>• No errors due to manual recording</li> <li>• Highly standardised</li> <li>• Low financial cost</li> <li>• Expansion of the participants only requires minor effort</li> </ul>  |  |
| Research Objective (WP2)   |  |
| <ul style="list-style-type: none"> <li>• To map which SMCS are used across different stakeholders and with which purposes, especially in relation to DRPV purposes</li> <li>• To collect policies, guidelines and best practices that refer to vulnerability and targeted communication provided through SMCS</li> <li>• To map diversity in SMCS use according to the DRPV perspective</li> </ul> |  |
| Risk   | Mitigation   |
| <ul style="list-style-type: none"> <li>• High non-response rate</li> <li>• Problems of intersubjectivity</li> </ul>  | <ul style="list-style-type: none"> <li>• Help by trusted research institutes or umbrella organisations</li> <li>• Pre-testing</li> </ul> |

As described in the D4.2, the primary aim of the online survey is to expand our understanding of the DCT landscape. For the DMP knowledge domain (D3.2), particular attention is given to formal institutions existing in this landscape. The DRPV methodology is then expected to collect information that can help to define and govern diversity (as defined in D2.1 and D2.2) in relation to SMCS.

In particular, D2.2 has provided an analysis of the main questions used in survey research on DRP, SMCS and disasters (see Annex IV of D2.2) that can help to answer to the cross-cutting question between D2.3 and D4.2, i.e., do SMCS strategies and DCT reflect the diversity of the population and especially of most vulnerable? (see Figure 6).

The main topics usually discussed in the analysed literature are related to:

- How SMCS are used by the different stakeholders and with which purposes;
- What kind of information is shared through SMCS platforms;
- What are the main factors that impact on an efficient information flow;
- Recommendations on how to use SMCS in emergencies;
- What can interfere with the use of SMCS during emergencies;
- What are the SMCS platforms most frequently used;

- What is expected from SMCS information flow.

Thus, this method could be useful to address DRP research in the LINKS project. Moreover, these questions are quite aligned with what emerged from the research questions mapping exercise in the Annex IV (Section 10.4). However, as mentioned in Section 3.3, surveys are less frequently used in social vulnerability analysis, especially when the purpose is to discuss vulnerability in a dynamic perspective. Questionnaires are mostly used to collect data that assesses the social vulnerability (e.g., Fisher et al., 2012, Fisher et al., 2013, Sofronoff et al., 2011). In these questionnaires usually basic information (demographic questionnaire) about the individual are asked together with those needed to assess the social vulnerability indicators. However, in this case, surveys are not efficient in returning the dynamicity of the concept, 'freezing' (framing) vulnerable groups under specific socio-economic and cultural characteristics. Thus, the purpose of the survey in this case is not to 'map vulnerability' but rather to work as a preliminary method to provide some first inputs that will further inform the other qualitative research methods.

In particular, survey could be useful to give some preliminary answers to the DRPV RQ2: How SMCS are used and what are their main characteristics, limits and potentialities in terms of DRPV?

The preliminary results obtained with surveys will help to provide some first data that will be combined with the other research methods to inform the second version of DRPV methodology. Thus, vulnerability perspective will be also considered addressing questions about how vulnerability is defined, how vulnerable groups are usually identified by DMOs, and if targeted communication is provided, such as if SMCS are considered to contribute towards reducing vulnerabilities. To conclude, the results will be used, in particular, to inform the focus groups and help in the selection of participants, but also as a starting point for some interview questions.

#### *6.1.1.1 Process for Conducting the Online Survey*

According to the process described in D4.2, the first step will be to select an online platform. The WP4 team led by SIC is responsible for the general design and set-up of the online survey, while the questionnaire is designed in close consultation with WP2 and WP3 to ensure that interconnected thematic areas are thoroughly addressed. The final questionnaire will be shared with partners in charge to do research according to the timeline established for the project (see Section 5.3).

Second, since the survey is conducted in the respective national language of the LINKS cases, the questionnaire will be translated, under the responsibility of WP6 after its completion and given to the CATs. The translations are carried out in cooperation with the CATs to prevent the wrong usage of terms. Following the design and set-up phases, the survey needs to be rolled out across the five different cases in four different countries. CATs are responsible for rolling out the survey locally, however, in close consultation with WP4 who supports the entire process. Results will be discussed in consultation with WP2 and WP3 with the purpose to inform all the knowledge domains according to the assessment guidelines that will be provided to participants (see Section 6.2). The online survey is conducted in all five LINKS cases in four different countries. This means that four different

surveys are conducted - one per language. However, the surveys are identical except for the differences in language. To ensure that the online survey runs smoothly, it will be pre-tested in cooperation with the CATs. This is expected to be the case by the end of July.

### 6.1.1.2 Selection of Research Participants for the Online Survey

It is important to note that this survey is intentionally broad and intends to reach as many organisations as possible. Due to this explorative approach, the online survey is scheduled relatively early for the LINKS project and will run from August-September 2021. The desired participants of this online survey are people in DMOs that work strategically with disaster risk management as well as those in charge of social media communication and digitalization of communication. The CATs are in charge of identifying potential participants based on the questionnaire and a short description of the intended participants. To steer this process, the descriptions will be developed as part of the methods protocol provided by the teams responsible for the three methodologies (WP2-4). The protocol is developed in cooperation with CATs and consists of concrete guidance on how to implement the cross-based assessments. At the same time, it is also important to identify stakeholders who are not participating in the survey, but who could act as distribution networks for the survey. These should lend emphasis to the survey and simultaneously help to identify previously unknown stakeholders.

### 6.1.2 Qualitative Research Interview and its Role in the DRPV Knowledge Domain

In Table 4, a summary of the main characteristics of the interviews, as a cross-methodology research method in the LINKS project, is provided.

**Table 4: Research Method 2: Interviews**

| Qualitative Research Interviews   |  |
|---|--|
| A method based on qualitative questions and responses facilitated by a semi-structured guide. Applied across all LINKS cases to generate in-depth on people's opinions, thoughts, experiences, and feelings towards SMCS use in DRPV perspective. |  |
| Targeted Number of Participants   | Research Participants  |
| 10-20 per case  | Identified by each CAT in collaboration with WP2-4 – see section on selection of research participants 6.1.2.2 |
| Case Relevance  | Language   |
| All case-based assessments  | English, Danish, Dutch, German, Italian  |
| Lead  | Data   |
| WP2/WP3   | Qualitative  |
| Level of Information  | Participants Engagement  |
| Deep  | High   |
| Type of interview   | Time   |
| Semi-structured   | 45-60 minutes  |

| Benefits   |  |
|--|--|
| <ul style="list-style-type: none"> <li>● Generation of rich and contextual knowledge</li> <li>● Flexibility to explore emerging topics</li> <li>● Low financial cost</li> </ul>  |  |
| Research Objective (WP2)   |  |
| <ul style="list-style-type: none"> <li>● To map the definition of vulnerability and the criteria used to identify vulnerable groups, identify commonalities and differences</li> <li>● To identify and understand the mechanisms of information flow between institutions, DMOs and vulnerable groups, challenges and opportunities</li> <li>● To map experiences of targeted communication, difficulties and potentialities</li> <li>● To understand limits and potentialities of SMCS in terms of accessibility, connectivity and mobility</li> <li>● To define volunteerism in DRM and how it is changed in relation with SMCS</li> </ul> |  |
| Risk   | Mitigation   |
| <ul style="list-style-type: none"> <li>● Confirmation bias;</li> <li>● Time demanding in terms of preparing and organizing;</li> <li>● Requires experience and knowledge to go beyond the popular narrative;</li> <li>● Access to experts can be difficult.</li> </ul>   | <ul style="list-style-type: none"> <li>● Open and narrative approach;</li> <li>● Timely and structured planning;</li> <li>● Pilot interviews;</li> <li>● Local knowledge of circumstances and events.</li> <li>● For COVID emergency: online interviews</li> </ul> |

As described in D3.2, qualitative research interviews are a main method for collecting data across the five LINKS cases. In particular, interviews provide a method for explorative endeavours. Through an interview, we get an insight into how people make sense of social phenomena, their experiences, opinions, their memories, and perceptions (Brinkman & Kvale, 2014). Accordingly, this method is really useful to provide in-depth information on specific arguments.

According to the WP2 perspective, interviews should be used to answer, in particular, the DRPV\_RQs1, 3, and 4. The research questions have been split into specific questions that could be used to build the interview guidelines that will be provided according to the timeline presented in Section 6.2.

The comparative ambition of the case-based assessments calls for an approach that allows for both contextual engagement and the exploration of similarities that exist across the different sites (see Annex IV, Section 10.4). Having these benefits of the qualitative research interview in mind, the interview study supports the data-collection done through surveys and deep dive approaches by adding in-depth insights to barriers and opportunities of SMCS use and their implications on DRPV.

### 6.1.2.1 Interview Process and Guide

As described in D3.2, interviews require substantial preparation and processing for the data to be trustworthy. First, this requires an interview structure and a guide that fits the purpose of the

interview. Accordingly, semi-structured interviews have been designed around the themes covered by the three knowledge bases. Semi-structured interviews are here understood as loosely structured conversational interviews that focus on participants' retrospective reflections.

The concrete interview guide needs to be developed whilst having the local context in mind as well as the research participant's relation to the hazard and position in the fields. Demonstrating knowledge about the research participant's context and organizational positioning (organizational, political, and academic context) supports a professional atmosphere as well as a space for sharing views, feelings, and experiences (Brinkmann & Kvale, 2014). As such, interview guides need to be tailored for the particular contexts as well as for the research participant that the guide will address. As argued above, it is also important to allow for surprises and new directions in the interview and to create a space for participants to voice strong opinions, tell anecdotes and reveal insights into the inner workings of the organisations they represent.

Second, because the interview is co-constituted of circumstances around the interview situation (the interviewer, the dynamics between the interviewer and the participant, the place the interview takes place, the recorder, and the topics that end up being explored), it is important to be reflective during the entire research process and to be transparent about the circumstances around the interview.

The WP2 and 3 teams will provide guidelines for the interviews during the preparation phase created in collaboration with 4, which is designed in consultation with the CAT teams. The protocol will provide examples of open-ended questions (i.e., how vulnerability is defined in relation to SMCS and disasters, with which people DMOs have difficulties to connect during emergencies, and what are the main challenges associated to their use in terms of accessibility, connectivity, and trust), that then need to be tailored to the local contexts and to each interview situation. Furthermore, the guidelines will provide a set-up for how each CAT can structure their reflexivity over the interview process.

### *6.1.2.2 Selection of Interviewees*

The qualitative research interviews will be designed as semi-structured conversational interviews with people representing various actors important for understanding SMCS use in DRPV, DMP and DCT. In terms of the number of interviews, no firm rules can be appropriately applied, however, 10-20 interviews are often enough to provide a degree of saturation where similar accounts start to appear in the interviews (see D3.2). That said, the volume of interviews also depends on the time and resources available for the CATs, which need to be balanced with other research activities associated with the survey and the deep dives.

On the DRPV perspective, two are the groups of stakeholders to be interviewed:

- DMOs who have the responsibility to identify vulnerabilities and provide information;

- Civil society, including representatives of vulnerable groups, like NGO representatives or members of local community.

The first group of stakeholders will be especially selected following the process suggested in D3.2; the second group will be defined in collaboration with the CATs, under the responsibility of WP2, considering the diversity of cases involved in the project. To identify this second group, two processes will be followed: first, receive indications from surveys and interviews carried out with DMOs, secondly to do a mapping exercise in collaboration with CATs with the purpose to avoid forgetting groups that could be not mentioned during interviews or surveys, although they could be relevant for the case-assessments. An example could be minorities that live in the geographical area object of the study, like in the Danish case, or elderly people as in the Italian one. Thus, representatives of these groups or members of local associations will be selected according to their strategic position in the local context and they will be interviewed to obtain their perspective on DRPV/DMP and SMCS. This will also be a way to 'validate' the information provided by DMOs and to discover the 'shady areas' in the communication system. According to this method, it is not possible to provide a final list of the research participants in this deliverable. Instructions on how to produce the map of the stakeholders will be provided as part of the interview guidelines.

## 6.2 Timeline for cross-case assessments

A detailed cross-case timeline to ensure smooth planning across WP2-6 has been collaboratively defined and agreed (see: Table 5). The main elements of the timeline are:

- the **methodological design** and the necessary steps at cross-case level (e.g., designing the survey(s), interviews and their respective roles and responsibilities);
- the development of assessment **guidelines and templates** that will be included in D6.2 (e.g., guidelines for conducting surveys and semi-structured interviews as well as templates to report on the data collected);
- the **case assessments**. It is worth considering that the preliminary timeline for the case-based assessments included in D6.1 will be adjusted based on the decision to begin data collection earlier than originally planned (in August-September instead of November). The reason behind it is to ensure that CATs have enough time both for data collection and for translations.

**Table 5: Research Timeline**

| Date      | Activities                                  | WPs                             |
|-----------|---|---------------------------------|
| June 2021 | Detailed planning at case level (mid -June) | WP2-6                           |
|           | Design of the online survey                 | WP4 in collaboration with WP2-3 |

|                                  |   |   |
|----------------------------------|---|---|
| <b>June 2021</b>                 | Design of the semi-structured interviews  | WP2-3 in collaboration with WP4                         |
|                                  | Identification of the online platform for the survey (ethics/data management)   | WP4   |
|                                  | Identification of research participants, expectations setting, minimum requirements at case level   | WP2-6   |
| <b>Date</b>                      | <b>Activities</b>   | <b>WPs</b>  |
| <b>June – August 2021</b>        | Operationalisation of the semi-structured interviews in local cases   | WP2-6   |
| <b>July 2021</b>                 | Translations of the survey and pre-test in all languages/countries  | WP6   |
|                                  | Refinement  | WP2-4   |
|                                  | Guidelines for conducting surveys and cover letters in all languages  | WP2-4 with the support of WP6                           |
| <b>August-September 2021</b>     | Online survey rolled out in all five cases  | WP6   |
|                                  | Identification of interviewees, expectations setting, minimum requirements at case level  | WP2-6   |
|                                  | Case-specific Covid-19 mitigation strategies  | WP6 (CATs: case coordinators with the support of WP2-4) |
|                                  | Translations of semi-structured interviews and pre-tests in all languages/countries   | WP6   |
|                                  | Guidelines for conducting semi-structured interviews; templates for data collection, informed consents                                      | WP2-4 with the support of WP6                           |
| <b>October 2021</b>              | Translation of the survey results   | WP6   |
|                                  | Draft version of the LINKS Framework (D5.3) and of the second work plan for the five cases (D6.2 guidelines and templates)                  | WP5-6   |
| <b>October 2021-January 2022</b> | Semi-structured interviews carried out in all cases   | WP6   |
| <b>November 2021</b>             | Delivery of the first version of the LINKS Framework (D5.3) and of the second work plan for the five cases (guidelines and templates: D6.2) | WP5-6   |
| <b>January- February 2022</b>    | Translations of the semi-structured interviews  | t.b.a   |
| <b>February – March 2022</b>     | Data analysis of the semi-structured interviews   | WP2-4   |

| Date              | Activities   | WPs   |
|-------------------|--|-------|
| <b>April 2022</b> | Analysis sent to WP6   | WP2-4 |
| <b>May 2022</b>   | Consolidation of results in the first LINKS case report (D6.4) | WP6   |

### 6.3 Complementary Cross-Case Assessments

Due to the COVID-19 emergency, in agreement with the other methodological partners, it was decided to avoid the mandatory use of research methods that could be affected by restrictions or whose results could be biased in case they cannot be adequately carried out in all the local cases. Thus, in the first case-assessments phase focus groups are planned to be a complementary instrument to follow-up the data carried out through interviews and the survey. The focus groups will be organized and carried out directly by the WP2 team at a cross-national level. WP3 and WP4 will support the process, providing inputs to identify the subjects to discuss and the research participants. CATs will be consulted on defining the purposes as well as research participants. Accordingly, the focus groups will follow the other two methods and at the moment they are planned to be carried out between February and March 2022. The preparatory phase is expected to take place between December and January when first results provided by the survey will be already available such as some first considerations coming from interviews. The DRPV methodological taskforce will be especially used to inform WP2 about the results of the local case-assessments and to plan the focus groups.

#### 6.3.1 Focus Groups and its Role in DRPV Knowledge Domain

In Table 6 are summarized the main characteristics of the focus group as a research method for DRPV.

**Table 6: Research Method 3: Focus Groups.**

| Focus Groups   |   |
|--|---|
| A qualitative method based on an unstructured group interview, based on discussion amongst participants, exploring one or more topics. Applied across all LINKS cases to generate in-depth on people's opinions, thoughts, experiences, and feelings towards SMCS use, limits, and potentialities. |   |
| Targeted Number of Participants  | Research Participants                           |
| Min. 4 Max. 8 per Focus Group  | Identified in collaboration with WP3-4 and CATs |
| Case Relevance   | Language  |
| All case-based assessments   | English   |
| Lead   | Data  |
| WP2  | Qualitative                                     |

| Level of Information   | Participants Engagement  |
|--|--|
| Deep   | High   |
| Type of Focus Group  | Time   |
| Online   | Max. 2 hours   |
| Benefits   |  |
| <ul style="list-style-type: none"> <li>• It is possible to go in depth and collect details</li> <li>• It facilitates the discussion among different participants</li> <li>• Low financial cost</li> </ul>  |  |
| Research Objective (WP2)   |  |
| <ul style="list-style-type: none"> <li>• To identify the main challenges associated with the use of SMCS in DM in terms of accessibility, connectivity, mobility</li> <li>• To identify challenges and limits of the information flow between DMO and vulnerable groups</li> <li>• To develop potential solutions to the limits of SMCS use</li> <li>• To identify most efficient ways for targeted communication</li> </ul> |  |
| Risk   | Mitigation   |
| <ul style="list-style-type: none"> <li>• Time demanding in terms of preparing and organising</li> <li>• Requires experience and skills to go beyond the popular narrative</li> <li>• High level of engagement during the focus groups</li> </ul>   | <ul style="list-style-type: none"> <li>• The focus groups will be carried online, so no specific other measures are required.</li> </ul> |

In the social sciences, focus groups are a common research method used especially when the researchers are interested in gathering the people's thoughts about some selected topics (Fogel, 2016; Peek & Fothergill, 2009). Focus groups have increasingly been implemented in the context of community-based participatory research (e.g., participatory action research) where groups of community members become agents of change by telling their stories and suggesting strategies for collective action (Kieffer et al., 2005: 147 from Peek & Fothergill, 2009).

Focus groups are a specific type of unstructured group interview, based on discussions among participants, that explore one or more topics (Ahmed, 2011; Chan et al., 2014; Dwywr & Horney, 2014; Eisenman et al., 2009; Fogel, 2016; King et al., 2010). They allow participants to spontaneously express their opinions, ideas, and perceptions. This ability to observe the extent and nature of participants' agreement and disagreement is a unique strength of focus groups. Another strength comes from the researcher's ability to ask the participants themselves for comparisons among their experiences and views, rather than aggregating individual data to speculate about whether or not the interviewees differ and why.

According to Morgan and Krueger (1993), who compared focus groups to other methods, the real strength of focus groups is not simply in exploring what people have to say, but in providing insights into the sources of complex behaviours and motivations. Thus, what makes the focus group

discussion more than the sum of separate individual interviews is the fact that the participants both query each other and explain themselves to one another.

Given the purposes of WP2 (see Section 3) and the scenarios of the case-based assessments in the LINKS project (see Annex IV in Section 10.4) we evaluated that focus groups are a good research method to gather answer to the WP2 research questions (see Section 4).

Questions that could guide the conversation in focus groups are:

- How to reduce the risks associated with the digital environment?
- How to provide useful targeted communication and in relation with which phases of disaster?
- What are the main difficulties in accessing SMCS? How can these difficulties be overcome?
- How can SMCS help when other channels of communication are disrupted?
- Can effectively SMCS give the chance to spread vulnerable people's voice? And to obtain more attention and visibility?
- How has volunteerism in disasters changed with SMCS?

However, as already mentioned, the topics will be defined after that the first results from survey and interviews will be provided.

#### *6.3.1.1 Process for Conducting the Focus Groups*

Semi-structured questions will be used to guide the conversation during the focus groups. The focus groups will follow a thematic path that should touch, in particular, on three areas of discussion: accessibility, connectivity, and mobility in relation to DRP, DCT and DMP. The focus will be specifically on the use of social media and crowdsourcing platforms, on access difficulties and the risks associated with them, in everyday life but also in relation to the DMC, and how communication through these platforms could be implemented and for what purposes.

The researcher in charge of carrying out the focus group (who will be a WP2 team member) will take the role of a moderator and will actively encourage discussions among participants who have personal or professional experience with the topic being studied (King et al., 2010; Morgan, 1997; Schutt, 1996 from Peek et al. 2009). From the responses to the questions as well as from the interaction among participants the researcher is expecting to obtain qualitative data for the research (Wayne, 2013 da Fogel 2016).

To let a constructive discussion be generated, the focus group will last no longer than 2 hours and will include two breaks. Additional breaks may be given on the request of the participants. There will be more than one focus group carried out with new members, that uses the same format and question sequence, in order to increase reliability of findings. Usually, focus groups are carried out a minimum of 2 to 3 times (Ahmed, 2011; Chan et al., 2014; Dwyer & Horney, 2014; King et al. 2010; Mora et al., 2015; Qasim et al., 2015; Terpstra et al., 2009).

Thus, the focus groups should be not less than 2 for every group of participants, with the number of participants varying between 4 and 8 (maximum number suggested). The second focus group should work to validate or nullify the results obtained in the first one. That's the minimum number in order to have a control group for each group object of analysis.

Participation will be totally voluntary, and participants will be adequately informed of their freedom to leave the focus group at any time. The focus groups will be carried out online. The platform will be selected on the basis that it ensures accessibility for all the participants. The results will be analysed according to a content analysis (see e.g., Hsieh & Shannon, 2005). After each focus group, the data will be transcribed and pseudonymisation procedures will be used according to the Ethics Strategy (D1.5; see also D10.1 and 10.5).

#### *6.3.1.2 Selection of Research Participants for the Focus Groups*

Focus group participants are believed to possess important perspectives, insights, or expertise pertinent to the topic of the research (Ahmed, 2011; Dwywr & Horney, 2014; Howard et al., 2017; King et al. 2010; Mora et al., 2015; Qasim et al., 2015). Although the main responsibility of the process of selecting research participants is in the hands of WP2, the WP3-4 and CATs will contribute to the drawing up of the potential research participants.

To conclude, it is important to note that the format of the focus groups, presented here, is intentionally broad due to the fact that its aims will be defined after first results from surveys and interviews have been provided.

### **6.4 Research Methods for the Deep Dive Assessments**

This section presents the structure established for the Italian DRPV deep dive as an example. In particular, three research methods have been selected for this specific case: focus groups, workshops, and action research game. Details for workshops and action research game are highlighted in the Annex VI (Section 10.6). The selection has been done on the basis of the research questions identified by the Italian case assessment team and the context characteristics. A first overview is provided at follow.

The consultations with the Italian case assessment team have highlighted the interest in promoting intergenerational dialogue and cooperation as a fundamental basis to implement community resilience as well as participatory processes, especially thinking to minors and elderly. This is also corresponding to one of the gaps identified in D2.1 and D2.2 and that is also at the basis of the WP2: to provide a multi-age perspective on DRPV. Too often children and the elderly are invisible in DMP, seen as vulnerable and in need of help and consequently seen as a 'problem to be solved' for the disaster management operators (see results in D2.1).

Accordingly, the premises for the Italian deep dive are that the elderly and minors are usually:

- Among the most exposed groups to the risks of the digital environment;
- At the margins of the decision-making process in DMP.

Thus, its purposes are to understand:

- How the elderly and minors use SMCS and which risks are they most exposed to;
- How these platforms can be used to provide an effective multi-age communication;
- How to promote intergenerational dialogue for community resilience.

Accordingly, the multi-age criterion was adopted in this case in selecting research participants and methods as part of the methodology based on the following two different levels (details are in Annex VI):

- Compare different age groups through the same method, to see similarities and differences in the answers (comparability purposes);
- Use different research methods according to the age group analysed in case in-depth work want to be done with specific age groups (no comparability purposes).

In terms of the last point, it is recognized that applying specific research methods according to the age group could produce useful results for a DRPV analysis. This is also a way to recognize that not all the age groups respond to a research method in the same way; thus, for example, minors could be more motivated to provide answers and express their point of view during a research game, while elderly could prefer open-ended interviews or focus groups. Obviously, this represents a generalisation and a contextual analysis in the selection of the approaches should be applied. Thus, WP2 will support the process.

This means that the multi-age approach suggested here has no implications on the topics and purposes of the deep dive but represents only a methodological approach to orient the process of selection of the research methods and participants.

Accordingly, the DRPV deep dive in the Italian case will employ the following methods for the first-assessment:

- The first method to be applied is **focus groups**. Focus groups will be used to identify limits and potentialities of SMCS in disaster risk management according to a multi-age perspective. The desired participants for focus groups are members of the local communities. A mapping exercise will be required to identify the best participants for the focus groups. Further details on how to proceed with the mapping of the stakeholders and their involvement in research will be developed in collaboration with Italian case assessment team. In particular, elderly and young people will be involved with the purpose of understanding the dynamicity of the vulnerability concept in relation to the SMCS environment. Thus, two focus groups will be

done with elderly people (over 65), and two with young people (over 14). The specific class of age will be established during the fieldwork to carry out locally in the preparation phase<sup>3</sup>.

- The second method identified for the Italian DRPV dive is **workshops**. In particular, this method will be used to work with minors (12-13 years old). This approach is flexible and gives the opportunity to adapt the different activities to the needs of the group and the participants. By doing so, each group will be able to obtain different results in terms of content developed, while what does not change will be the ability of the youth involved to deepen and reflect on issues and themes that are important to them, to develop resilience strategies and express their views on matters affecting their lives.
- **Action-research game** (third method) aims to increase collaboration among participants during workshops, such as increasing their participation within community life. Moreover, gaming can help to reduce the risk of hierarchical relationships among children. Experts and other members of the community could be involved in the activities. Thus, the action research game will be used to raise awareness on the topic of technologies with respect to the prevention of disaster risks and will be integrated into the proposed activities with the aim of encouraging the implementation of an innovative methodology capable of motivating and actively involving participants. Furthermore, the game-based activities will have a triple function: to enrich research and data collection, to develop a DRPV educational tool, to test the products developed by the project.

Thus, the expected results in the Italian Deep Dive are:

- Direct Results:
  - Raise awareness on the use of technologies and SMCS to reduce the risk of disasters
  - Promote inclusive communication languages for age groups potentially more vulnerable to the risk of disasters
- Indirect Results:
  - Reinforce community resilience through an enhanced engagement and exchange among different age groups
  - Promote active citizenship and civic engagement through an appropriate and safe use of technologies.

The timeline for the DRPV deep dive case-assessments will be established in collaboration with the CATs. A consultation process started in June with them.

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<sup>3</sup> Due to COVID-19 emergency and the restrictions that followed, it was not possible to carry out fieldwork before. Thus, fieldwork in Italy has been planned in June-July to supply the time lost for this.

**Table 7: The Research Methods for the Italian Deep Dive.**

| Methods                              | Research participants                        | Purposes   |
|--------------------------------------|--|--|
| Focus groups                         | Elderly (over 65) and young people (over 14) | <ul style="list-style-type: none"> <li>• identify commonalities and differences in the selected age groups</li> <li>• obtain information on limits and potentialities of technologies and especially SMCS</li> <li>• provide suggestions on how to improve the use of technologies and especially SMCS in DMC</li> </ul> |
| Workshops<br>Action Research<br>Game | Minors (under 14)                            | <ul style="list-style-type: none"> <li>• to promote active citizenship and civic engagement</li> <li>• to promote an intergenerational dialogue</li> <li>• to promote inclusive communication languages</li> <li>• to raise awareness</li> </ul>   |

## 7. LIMITATIONS AND ETHICAL CONSIDERATIONS

This section summarizes the main limitations at the basis of the DRPV Methodology and the ethics considerations in relation to the research design and process.

### 7.1 Limitations

This section highlights the main challenges associated with implementing the DRPV methodology across the LINKS case countries.

**The definition of research plans during the COVID-19 pandemic:** as also explained in the next section on the mitigation strategy, the decisions taken in this deliverable are also with consideration for the pandemic situation which is currently on-going. Considering the uncertainty of the situation, the weight of participatory approaches in this deliverable has been reduced, giving more space to research methods that can be applied also in cases of lockdowns or limitations due to the emergency, without repercussions on the quality of the research. However, because the vaccination campaign in the different countries involved in the project is at different stages, due also to the different characteristics of the countries, it is not possible at the moment to estimate how the emergency will impact on the case research plans in the coming months. Further considerations shall be provided in D6.2, that will be delivered in Month 18.

However, a first mitigation strategy has also been planned in this deliverable, with a specific focus on how research methods could be affected by COVID-19 emergency and how to overlap them. The specific actions to take have been defined in the research methods' descriptions provided in Section 5.

**The complexity of the research design:** as explained also in Section 5, the complexity of the research design is especially connected to the differences in the scenarios' characteristics and in the CATs members, that see the participation of different stakeholders, with also different scientific backgrounds. As for the first point, also in this case, discussion and mediation have been necessary steps to reach a joint decision. Detailed planning across the WP for the implementation of the cross-case assessment methods is also crucial. The first time for these activities can be found in Section 6.2.

Finally, the research activities will be carried out in **areas exposed to risk of disasters**. Accordingly, the research plan could experience setbacks and some of the activities could be rescheduled. This is something that, in some cases, cannot be known in advance (see e.g., earthquake). In case of disaster, the rescheduling of the case-based assessment will be adequately provided under WP6.

## 7.2 Ethical Considerations

In carrying out research with the community members, LINKS partners have the responsibility to ensure that, at all times, measures have been put in place to protect the health, safety, and well-being of the people participating to the surveys, workshops, focus groups, and other project events (see Deliverable 1.5, D1.5: Bonati & Morelli, 2020; and D10.1: Bonati & Graziani, 2020). This implies that minimum standards and procedures must be respected in all phases of the project, from planning to execution and during the monitoring and evaluation of the work done. This is also paramount and should be given special consideration when the participants involved range from children and young people, elderly people, and other vulnerable members of the community.

In particular, in the context of the right to participation and all related operational declinations, LINKS project can count on 9 standards (based on Save the Children Italy contribution, 2019<sup>4</sup>). In summary, they are as follows:

- **Participation is transparent and aware.** All participants must be sufficiently informed about the program so that they can consciously choose whether or not they want to participate and how. The information must be shared in a language that is friendly and easy to understand; the roles and responsibilities of all the people involved are also well explained.
- **Participation is voluntary.** The participation in project' activities must be voluntary, and all the participants must receive relevant information and have the time to decide whether to participate or not.
- **Participation is respectful.** The research carried out must respect the commitments, values and cultural practices of all.
- **Participation is relevant.** All the topics addressed must have an effective relevance in the life of the participants and the proposed activities must be in line with their interests and abilities.
- **Participation is accessible and friendly.** The methodology used must be applied in a friendly manner and must be represented in an accessible manner, to increase self-confidence and between participants of different sexes and ages. Furthermore, the activities must be accessible to people with disabilities.
- **Participation is inclusive.** The activities must be respectful of gender and age differences and be accessible to people with disabilities. The opportunity to participate must be given to people of different genders and ages and from different backgrounds, including the youngest, the disabled and other marginalized groups. The participation process must be inclusive and non-discriminatory: participants are encouraged to address the issue of discrimination through their participation.
- **Participation is supported by training.** The staff must be competent and able to facilitate and support the participation of everyone.

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<sup>4</sup> [https://resourcecentre.savethechildren.net/node/16093/pdf/partecipare-si-puo\\_0.pdf](https://resourcecentre.savethechildren.net/node/16093/pdf/partecipare-si-puo_0.pdf)

- **Participation is safe and sensitive.** All participants must feel safe when they participate, risks and countermeasures must be identified, and participants should know where to turn if they feel uncomfortable while involved in any participation activities.
- **Participation is responsible.** Participants must be supported in monitoring and evaluating their path, researchers must take their point of view seriously and implement their proposals.

The LINKS partners will ensure the sustainability of all the activities carried out especially with children and vulnerable groups. Accordingly, LINKS has adopted the Child safeguarding policy and code of conduct and the General procedure for reporting and responding to suspected maltreatment, abuse or exploitation of children (Annex I and II of D1.5) produced from Save the Children for work carried out with minors.

Ethical considerations also include the required steps taken by partners for the management and security of research data as defined in the LINKS Data Management Plan. For guidance and uncertainty for the ethical requirements related to the application of the methods and procedures defined in this deliverable, LINKS partners should contact the LINKS Ethics Advisory Board.

#### 7.2.1 Ethics in Research: WP2 Contribution

WP2 has the main responsibility in assisting research carried out with vulnerable groups as well as UNIFI, that is leading the WP, has the responsibility also for the Ethics and societal impact strategy of the project. Accordingly, WP2 will work to provide guidelines that could assist with the research planned in this deliverable and in particular about:

- Accessibility in research and in particular, the criteria for the selection of the online platforms to use, the style of the text/figures, in order to ensure the inclusiveness of the process;
- (In collaboration with WP3) guidelines for interviews, and especially how to interview vulnerable people;
- guidelines for focus groups, on how to conduct focus groups, especially with representatives of vulnerable people.

## 8. CONCLUSION

This section presents the main results and final considerations, as well as future directions, both for the DRPV methodology and for the LINKS Framework.

### 8.1 Summary

As described in the Grant Agreement, DRPV knowledge base was used as a starting point to develop a methodology 'to guide and support the development of the LINKS Framework (WP5) and the five case assessments (WP6)' (p. 15).

The aim of the methodology described in this deliverable was to address the gaps in the existing knowledge, as defined in D2.1 and D2.2, and to ensure the comparability of the findings across the cases. Then, it set out the DRPV framework at the basis of the research, the research questions, the research methods and the recommendations on research participants.

This deliverable addressed the gaps identified in D2.1 and D2.2 – and in particular the conceptual gaps (Section 3.1 and 3.2) and the methodological gaps (Section 3.3 and 6) – as research questions and possible outputs (see Section 4). In particular, one objective of the LINKS project is how to govern diversity for SMCS use in disasters. In this regard, diversity is at the basis of the DRPV methodology, considered at the different levels of institutions, people, and technologies. According to the DRPV methodology, it is necessary to explore the DCT and DMP knowledge bases and methodologies as background dimensions shaping the diversity of DRPV. Thus, the role of the DRPV methodology is to explore a specific dimension of DMP and DCT, focusing on dynamics of marginalization and exclusion that have consequences on people's capacity to be visible in the system. It is only starting understanding the DCT and DMP perspective that DRPV can be defined and addressed.

Moreover, the DRPV methodology has the aim of providing people with a perspective in the debate, giving them the voice to make their needs and challenges heard. Thus, what has been suggested in the DRPV methodology is a people-centred perspective, which not only takes into account how people are considered in DRM but also how people's involvement can improve knowledge and processes. Accordingly, the analysis must start from two main points: on one hand, how disaster management organizations see and interact with people, especially vulnerable groups, and how SMCS and technologies can contribute to people's perception and resilience. An investigation of the limits and potentialities of DMP and DCT, in relation to vulnerable groups should help to identify what is missing today in the communication process and how to improve it. Thus, in the first assessment, the DRPV perspective will focus, in particular, on the limits of SMCS in DRM and how these limits can be overcome, considering both institutional mechanisms and technological knowledge. For this scope, four DRPV research questions have been identified and they will be

addressed in the first round of case-assessments. In particular, two levels for case-assessments have been identified: a cross-case level and a deep dive level, with research methods identified for both levels. This choice has been a consequence both of the complexity of the project and of the research questions identified, and of the need to provide a mitigation strategy for COVID-19 emergency. Accordingly, not all the research activities have been defined as mandatory but the deep dive in particular, that represent an specific research level for DRPV methodology, will be implemented only in those countries where the case conditions and purposes allow it.

## 8.2 Future Directions for the DRPV Knowledge Domain and Methodology

The future steps of WP2 are to refine the DRPV base and methodology. The case-based assessments (WP6) will provide the data to support this process. In particular, between Month 12 to Month 36, WP2 will analyse the findings from the evaluation of the LINKS Framework and the case-assessments (T6.2) with the aim of providing inputs for the revised version of the LINKS Framework. The findings will be also used to update the knowledge base developed in T2.1 and T2.2 and to build the second version of the DRPV methodology, expected in Month 28 (D2.4).

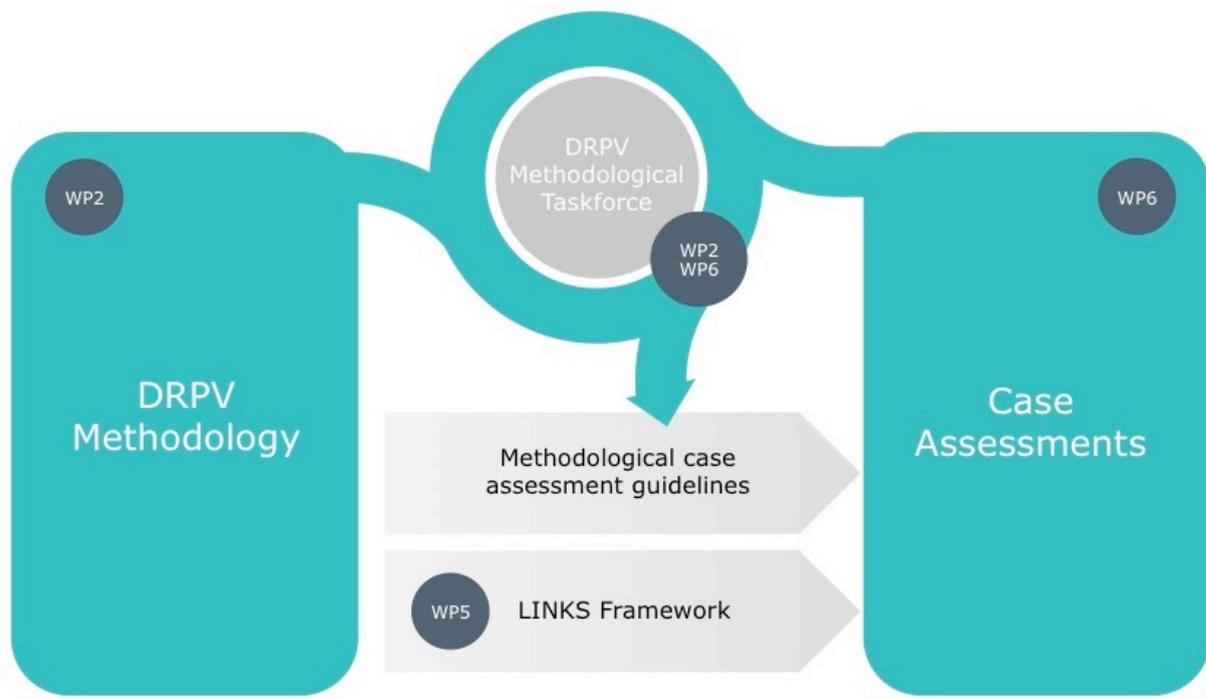
In the short term, however, WP2, in collaboration with WP3 and 4, will work to provide CATs a set of guidelines for research to support the first round of case- assessments (see Section 6.2). In particular, the guidelines will provide information on how to carry out the cross-case and deep dive case-assessments, how to collect data, and to give back results to WP2, 3 and 4 (see Figure 11).

Furthermore, WP2 will continue to conduct the DRPV methodological taskforce meetings with the aim of giving support to the local CATs during the case-assessments.

Thus, the main outcomes that are expected as a result of the first round of case-assessments, are:

- Application of the DRPV perspective to DCT in DMP with the purpose of understanding both their potentialities and their limits and how to overcome them;
- Provision of first recommendations on the basis of the results provided by the first case-based assessments in the different DMC phases;
- Provision of inputs on the DRPV methodology in order to develop the second version.

**Figure 11: Future Directions for the DRPV Knowledge Domain**



**Source:** Authors' adaptation from D3.2

### 8.3 Future directions for the LINKS Framework

The knowledge bases and the methodological deliverables (developed in WP2, 3 and 4) are the building blocks of the LINKS Framework (WP5). Moving forward, dedicated workshop activities are planned to discuss how each of these domain specific methodologies are consolidated for the first version of the LINKS Framework. As shown in Figure 11 above, the methodological deliverables provide the foundation for supporting the assessment guidelines (WP6) and for developing the first version of the LINKS Framework by:

- Operationalizing the theoretical concepts identified in the knowledge bases deliverables;
- Identifying central research questions for improving all knowledge bases;
- Creating a research design for answering the RQs through the first case-based assessments of the LINKS Framework.

Consequently, these methodological deliverables inform an overarching research design applied across the LINKS cases. This research design is also part of the first version of the LINKS Framework.

The three methodologies, together with the knowledge bases and case-based assessments, feed into the key aim of creating outputs for sustainable advanced learning. The learning dimensions in

the project will be addressed both at the overall project level and at the specific case level through the learning materials that will feed into the second version of the LINKS Framework. These learning materials are one of the backbones of the LINKS Framework and will be made available through the LINKS Community Center (LCC). The first version of the learning model for the Framework, including the learning objectives of the Framework, and the case-specific learning objectives will be part of D5.3.

Overall, the learning materials will be designed based on the knowledge gained in the first case-based assessments: the critical reflections on different social, institutional, and technological elements will shed light on needs and challenges that the Framework aims to address. The outcomes from the cross-case and the deep dives will inform the future steps for the development of the Framework. Addressing both the cross-domain questions and the domain-specific questions explored through the deep dives will directly inform the design and the selection of the materials.

The knowledge gained in the first evaluation phase will be paired with the knowledge which has begun to emerge in the meetings and workshops (cross WP5-6) carried out with the practitioners involved in LINKS (more information and preliminary results are provided in D5.1 and D6.1). Common themes across the cases have been identified but more work is needed to understand how this knowledge can be implemented in the second evaluation of the Framework.

The knowledge and learning processes enabled through LINKS will be open to everyone, and will also provide pathways for bridging institutional learning into interactions with other relevant groups for strengthening societal resilience, such as citizens and the private sector.

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## 10. ANNEXES

In this section, the following annexes are provided:

- Annex I: The table with the updated literature review on DRPV and SMCS in disasters, built according to the rules established in D2.1 and D2.2;
- Annex II: Table with the participants to the DRPV methodological taskforce;
- Annex III: The table with the research questions identified through the mapping work provided by the DRPV methodological taskforce (summary of cross-case research questions);
- Annex IV: The table with the research questions identified at the case level by the DRPV methodological taskforce representatives and with the information on the different cases/scenarios;
- Annex V: The table with the research methods identified in the literature review that are mainly used for DRPV studies and SMCS in disasters;
- Annex VI: The research methods for the Italian DRPV Deep Dive.

## 10.1 ANNEX I: Updated Literature Review

| Name of the document | Is the paper outcome from a project? | Name of the project/s | Is the paper presenting an empirical research? | Stakeholders analysed | Phase of DMC (Disaster management cycle) | Method             |                      | Geographical area        |                            | Kind of hazard   |              | Technology involved    | Questionnaire/material shown in detail |
|----------------------|--------------------------------------|-----------------------|--|-----------------------|--|--------------------|----------------------|--------------------------|----------------------------|------------------|--------------|------------------------|--|
|                      |                                      |                       |  |                       |  | Multi-age approach | Comparative approach | Europe (Specify country) | NO-Europe (Specify region) | Hazard (specify) | Multi-hazard |                        |  |
| Boas et al. (2020)   |                                      |                       | X  | Xiamen inhabitants    | response                                 | X                  |                      |                          | China                      | typhoon          |              | social media           |  |
| Chen et al. (2020)   |                                      |                       | X  | Twitter community     | prevention                               |                    |                      |                          | USA                        | natural          |              | social media (Twitter) | yes                                    |



| Name of the document  | Is the paper outcome from a project? | Name of the project/s | Is the paper presenting an empirical research? | Stakeholders analysed | Phase of DMC (Disaster management cycle)   | Method             |                      | Geographical area        |                            | Kind of hazard   |              | Technology involved                        | Questionnaire/material shown in detail |
|-----------------------|--------------------------------------|-----------------------|--|-----------------------|--|--------------------|----------------------|--------------------------|----------------------------|------------------|--------------|--|--|
|                       |                                      |                       |  |                       |  | Multi-age approach | Comparative approach | Europe (Specify country) | NO-Europe (Specify region) | Hazard (specify) | Multi-hazard |  |  |
| Dargin et al. (2021)  |                                      |                       | X  | Household             | Prevention/mitigation - Preparedness - Emergency/Response - Recovery<br>response | X                  |                      |                          | USA                        | hurricanes       |              | social media (Twitter, Facebook, Nextdoor) | yes                                    |
| Hansson et al. (2020) |                                      |                       |  |                       | prevention   |                    |                      |                          |                            | natural          |              | social media                               |  |



| Name of the document  | Is the paper outcome from a project? | Name of the project/s | Is the paper presenting an empirical research? | Stakeholders analysed | Phase of DMC (Disaster management cycle)                             | Method             |                      | Geographical area                                  |                            | Kind of hazard    |              | Technology involved    | Questionnaire/material shown in detail |
|-----------------------|--------------------------------------|-----------------------|--|-----------------------|--|--------------------|----------------------|--|----------------------------|-------------------|--------------|------------------------|--|
|                       |                                      |                       |  |                       |  | Multi-age approach | Comparative approach | Europe (Specify country)                           | NO-Europe (Specify region) | Hazard (specify)  | Multi-hazard |                        |  |
| Hansson et al. (2021) |                                      |                       | X  | Citizens              | Prevention/mitigation - Preparedness - Emergency/Response - Recovery | X                  |                      | Italy, Finland, France, Norway, Estonia, Lithuania |                            | COVID-19 pandemic |              | messages               |  |
| Mohanty et al. (2021) |                                      |                       | X  | Twitter community     |  | X                  |                      |  | USA                        | hurricanes        |              | social media (Twitter) |  |



| Name of the document  | Is the paper outcome from a project? | Name of the project/s | Is the paper presenting an empirical research? | Stakeholders analysed  | Phase of DMC (Disaster management cycle) | Method             |                      | Geographical area        |                            | Kind of hazard   |              | Technology involved    | Questionnaire/material shown in detail |
|-----------------------|--------------------------------------|-----------------------|--|--|--|--------------------|----------------------|--------------------------|----------------------------|------------------|--------------|------------------------|--|
|                       |                                      |                       |  |  |  | Multi-age approach | Comparative approach | Europe (Specify country) | NO-Europe (Specify region) | Hazard (specify) | Multi-hazard |                        |  |
| Weyrich et al. (2021) |                                      |                       | X  | practitioners or young scientists that work in disaster risk management in various countries worldwide | prevention                               | X                  |                      | Geneve                   |                            | natural          |              | social media           | yes                                    |
| Yuan et al. (2020)    |                                      |                       | X  | Twitter community  | prevention/response                      | X                  |                      |                          | USA                        | hurricanes       |              | social media (Twitter) |  |



| Name of the document | Is the paper outcome from a project? | Name of the project/s | Is the paper presenting an empirical research? | Stakeholders analysed  | Phase of DMC (Disaster management cycle) | Method             |                      | Geographical area  |                            | Kind of hazard   |              | Technology involved | Questionnaire/material shown in detail |
|----------------------|--------------------------------------|-----------------------|--|--|--|--------------------|----------------------|--|----------------------------|------------------|--------------|---------------------|--|
|                      |                                      |                       |  |  |  | Multi-age approach | Comparative approach | Europe (Specify country)   | NO-Europe (Specify region) | Hazard (specify) | Multi-hazard |                     |  |
| Orru et al. (2021)   |                                      |                       | X  | Public officials working in national government bodies tasked with DM and representatives of non-government organisations involved in DM | prevention                               |                    | X                    | Germany, Italy, Belgium, Hungary, Sweden, Norway, Finland, Estonia |                            | Multi-hazard     |              |                     |  |

## 10.2 ANNEX II: Participants to DRPV Methodological Taskforce

**Table 8: Participants to DRPV Methodological taskforce.**

| DRPV-MT participant | Partner | Scenario/Role   |
|---------------------|---------|---|
| Sara Bonati         | UNIFI   | Leading person  |
| Francesco Graziani  | SCIT    | Earthquake (Italy) scenario representative              |
| Judy Veld-Op-Het    | PT      | Industrial hazard (Netherlands) scenario representative |
| Nina Baron          | UCC     | Flood (Denmark) scenario representative                 |
| Simon Gehlhar       | SIC     | Drought (Germany) scenario representative               |
| Annika Hamachers    | DHPOL   | Terror attack (Germany) scenario representative         |

## 10.3 ANNEX III: Results of Research Questions Mapping Exercise

**Figure 12: Research Questions for DRPV Methodology**

|             | <br>Technologies   | <br>People   | <br>Institutions   |
|-------------|---|---|---|
| <b>DRPV</b> | <p>Can SMCS affect vulnerability/resilience? How and in which DRM phases?</p> <p>Are there geographical and cultural differences in the way DCT are used in DMP? With which consequences on DRM?</p> <p>Who is most exposed to fake news, disinformation, or misinformation?</p> <p>Who are the main persons exposed to technological attacks (like phishing) during an emergency?</p> <p>How can people/institutions reduce these attacks?</p> <p>Who has more difficulties in accessing information and/or in understanding the common language of communication?</p> <p>What are the DCT characteristics or communication factors that can contribute to increase/influence awareness/perception?</p> <p>What are the main differences between the learnings acquired from SMCS and other channels?</p> <p>Can SMCS reduce the difficulties of cultural/information accessibility like linguistic ones?</p> <p>How can SMCS help when other channels of communications are disrupted?</p> <p>How can SMCS mobilize resources/aid and reduce vulnerabilities?</p> <p>Can SMCS communication reduce the time of relief provision and the mapping/identification of the most affected people?</p> <p>How can SMCS help in case of immobility of the victim?</p> | <p>Which are the socio-economic and cultural characteristics that can increase/reduce vulnerabilities in relation with SMCS?</p> <p>How does vulnerability change in relation with the different risk/context/scenarios/SMCS platform?</p> <p>Which is the level of trust in DCT reliability?</p> <p>When trust in institutions is low, are SMCS considered an alternative way to receive qualitative information?</p> <p>Are people with disaster experience less likely to use SMCS as information source?</p> <p>How SMCS improve community resilience?</p> <p>Can SMCS effectively promote social cohesion?</p> <p>Can effectively SMCS give the chance to spread the vulnerable people's voice?</p> <p>How is volunteerism in disasters changed with SMCS?</p> <p>Who mainly use SMCS for active engagement?</p> | <p>Can they increase social disparity?</p> <p>How can targeted information reduce risks and vulnerabilities and improve perception?</p> <p>How to provide targeted communication and in relation with which DRM phases?</p> <p>What is the level of trust that institutions have in SMCS channels?</p> <p>What are the risks associated with their use?</p> <p>Which people do practitioners/institutions/first responders have difficulties to reach and how SMCS could help them?</p> <p>Who can effectively benefit by online institutional accessibility?</p> <p>Can SMCS facilitate the operations of disaster response and recovery?</p> <p>Can SMCS facilitate the communication of campaigns of prevention/preparedness?</p> <p>How institutions reach vulnerable groups through SMCS?</p> <p>Do SMCS reduce the time to mobilize people and monitoring movement flows?</p> <p>Which are the consequences of volunteerism changes in DMP?</p> |

Source: Authors' contribution

## 10.4 ANNEX IV: THE LINKS CASES

At follow the results of the consultation process of the DRPV methodological taskforce are provided such as the maps of the main DRPV research questions and expectations at the case level. The entire process is described in the Section 5 of this deliverable.

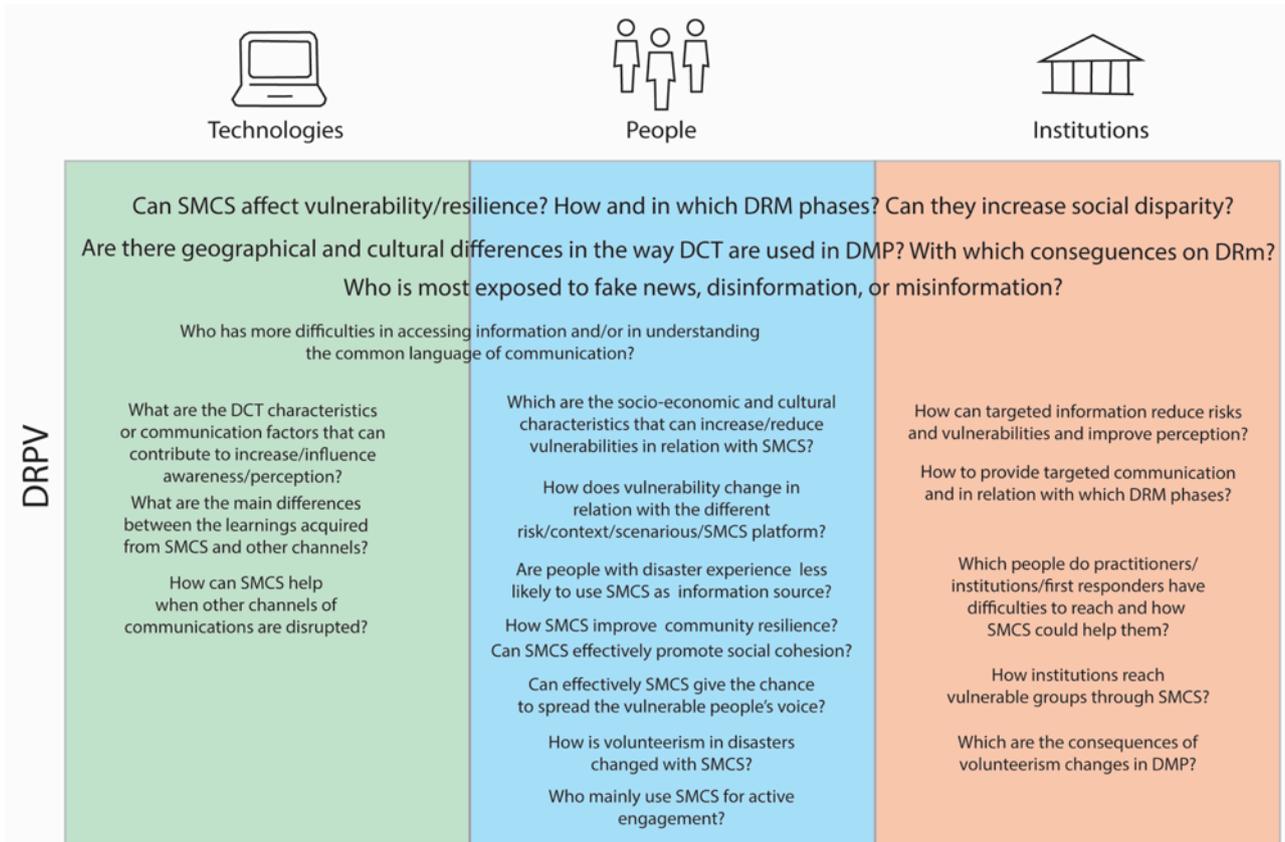
### 10.4.1 Earthquake/Italy

Central Italy is characterised by a moderately high seismic hazard. Between 2016 and 2017, a series of earthquakes devastated over a hundred municipalities in four different regions (Marche, Abruzzo, Umbria, Lazio), following two other earthquakes in 2009 (L'Aquila) and 2012 (Emilia-Romagna) that hit the country. These disastrous seismic events highlighted the weaknesses of traditional disaster communication mechanisms, especially for vulnerable groups.

**Table 9: Case/Scenario: Earthquake, Italy**

|                                 | Case/Scenario: Earthquake, Italy   |
|---------------------------------|--|
| <b>Disaster phase</b>           | Preparedness (risk communication) and response (crisis communication)  |
| <b>Context</b>                  | Valnerina (Province of Terni, Umbria region), one of the areas hit by last earthquake. It is a mountain area, with small villages; high presence of elderly people.  |
| <b>Main focus</b>               | Building social connections and inclusiveness  |
| <b>Main challenges for DRPV</b> | How to reach most vulnerable groups, especially elderly people, migrants and temporary residents (main challenges in access to information and to be in touch with local authorities)<br>How to promote intergenerational dialogue for DRM<br>How to involve children in DRM |
| <b>Stakeholders</b>             | Province of Terni, Municipalities, Civil Protection, local population, schools, local associations/NGOs  |

**Figure 13: Research Questions: Earthquake, Italy**



**Source:** Authors contribution

### 10.4.2 Drought/Germany

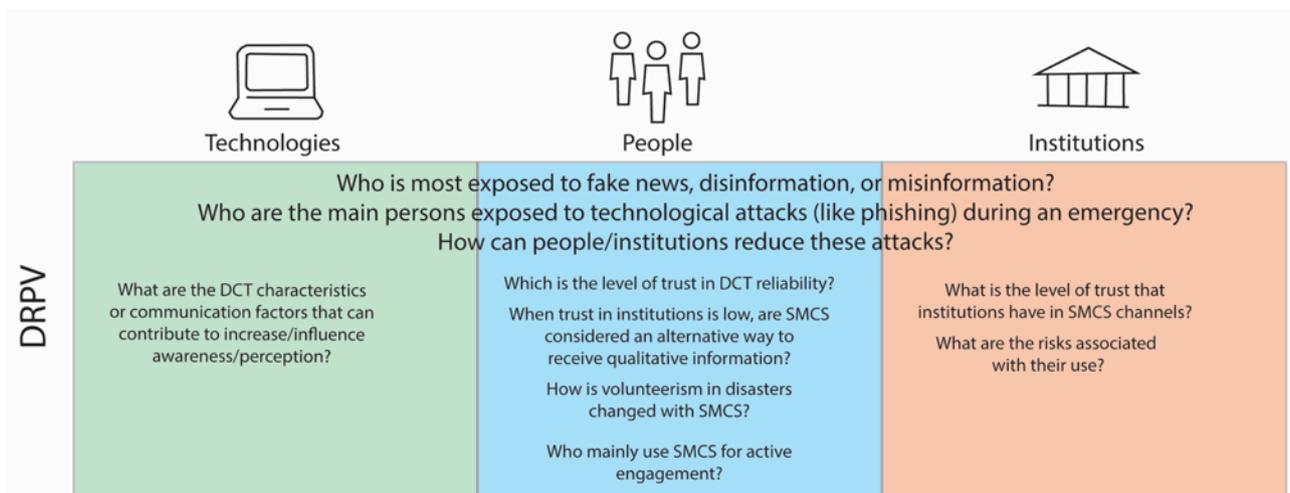
Drought is the result of various weather situations. For example, long-lasting high temperatures, relatively little rain and high irradiation can significantly disturb the balance between precipitation and evaporation and thus the water balance (Samaniego et al., 2018). Unlike other extreme events such as floods, storms and local storms, droughts often have large spatial dimensions and therefore can affect many citizens in Europe with numerous secondary consequences. This includes water shortages, forest fires, health problems (especially for the most vulnerable citizens such as the elderly and children) and impact animals, the agricultural sector and industry as a whole (European Environment Agency, 2017).

Germany experienced two years of extreme drought in 2018 and 2019 (Marinho et al., 2021).

**Table 10: Case/Scenario: Drought, Germany**

| Case/Scenario: Drought, Germany |  |
|---------------------------------|--|
| <b>Disaster phase</b>           | Preparedness (risk assessment rather than communication), response (crisis communication)  |
| <b>Context</b>                  | The state of Brandenburg and the regional area around Paderborn are worth to be mentioned as separate examples of investigation. The state of Brandenburg was particularly affected by the drought in 2018. As a result of the prolonged drought and due to the geographic structure of Brandenburg, more than half of the forest areas fell victim to long-lasting wildfires (Fernandez-Anez et al., 2021). The Paderborn district continues to be of separate interest. Large rural areas as well as larger municipalities and the city itself, low average rainfall, water scarcity already occurring in 2019 highlight the suitability of the district of Paderborn as a special study area (Environmental Research Center Helmholtz, 2021). |
| <b>Main focus</b>               | Given the relative novelty of the phenomenon in Germany, this methodology aims to capture the current status of DCT application in droughts and assess potentials.   |
| <b>Main challenges for DRPV</b> | To reach citizens to create awareness of drought among citizens<br>To reach vulnerable groups (elderly)  |
| <b>Stakeholders</b>             | Municipalities, Fire Brigade, Citizen  |

**Figure 14: Research Questions: Drought, Germany**



Source: Authors contribution

### 10.4.3 Flooding/Denmark

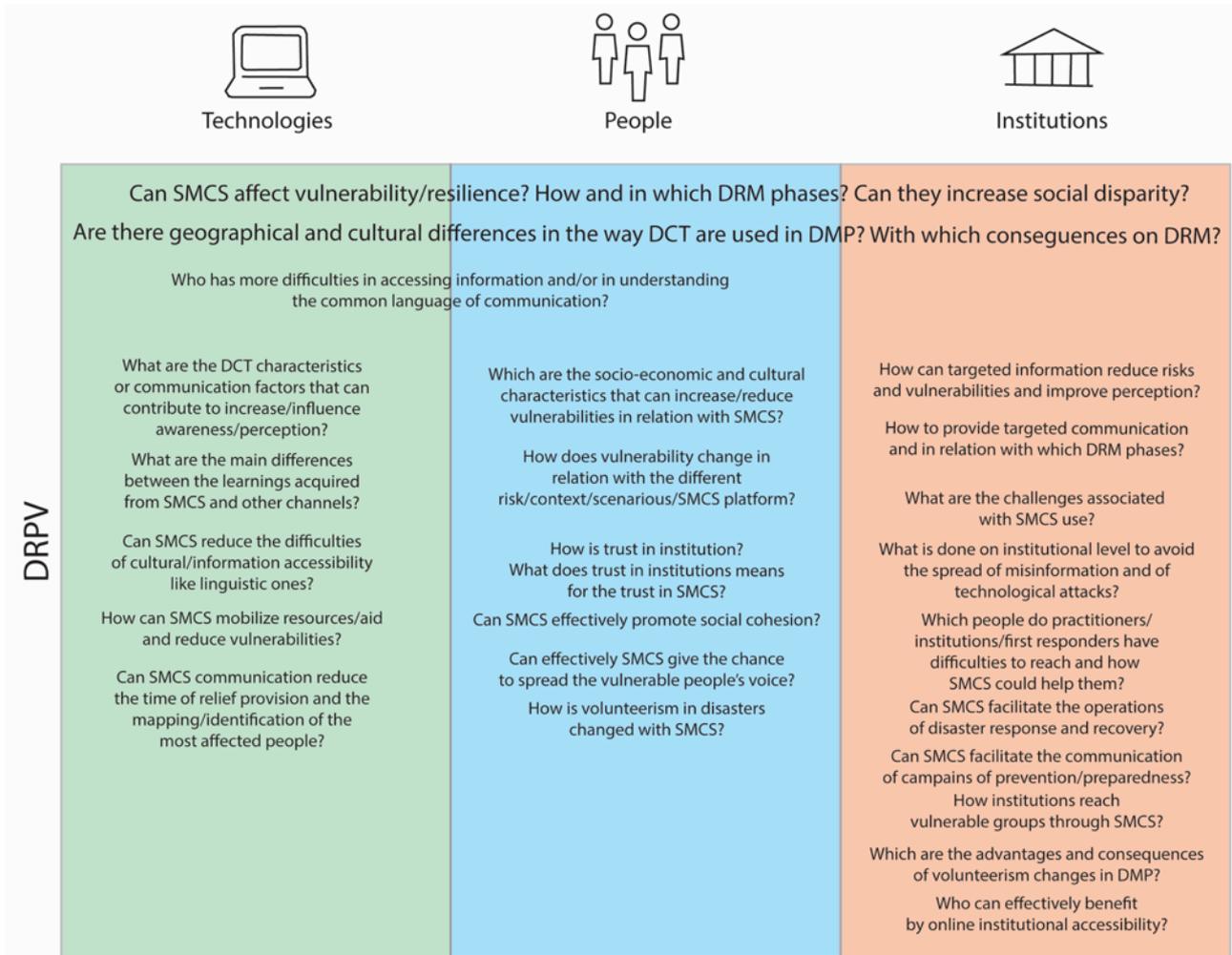
Frederiksberg municipality experienced a severe cloud burst on July 2nd in 2011, which was an eye-opener and a warning for future climate change related incidents. The incident had a massive impact on the infrastructure, it created a need for comprehensive emergency management operations.

Many initiatives have been started since to secure the city from flooding in case of future cloud burst, but there is a need to involve the residents even further, since their perception, preparedness and actions will define the resilience of the society.

**Table 11: Case/Scenario: Flooding, Denmark**

|                                 | Case/Scenario: Flooding, Denmark   |
|---------------------------------|--|
| <b>Disaster phase</b>           | May 1 <sup>st</sup> – October 31 <sup>st</sup>   |
| <b>Context</b>                  | Urban setting, the municipality of Frederiksberg is placed in the capitol of Denmark   |
| <b>Main focus</b>               | Risk perception and awareness among citizens<br>Bridging of communication between professionals and citizens   |
| <b>Main challenges for DRPV</b> | For the authorities to reach all citizens<br>A more nuanced approach among the authorities to the diversity among the target groups<br>Awareness of flood among citizens |
| <b>Stakeholders</b>             | Citizens<br>Authorities  |

**Figure 15: Research Questions: Flooding, Denmark**



Source: Authors' contribution

#### 10.4.4 Industrial hazard/Netherland

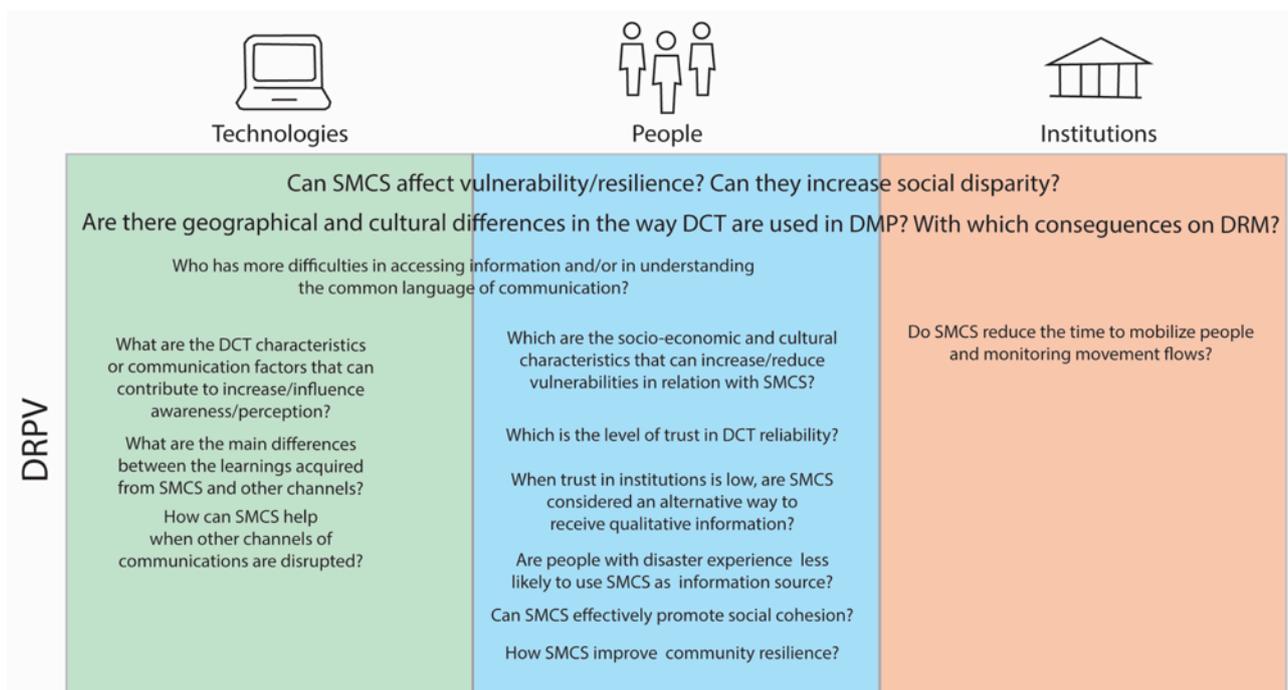
The Sitech industrial site, embedded in the Safety Region Zuid Limburg, produces chemicals, performance materials and sustainable materials for a very wide range of applications and markets. Comprising its own port and rail terminal, the chemical cluster is located right next to the main road network and pipelines and connects with Antwerp, Rotterdam and Rhine, Ruhr area.

**Table 12: Case/Scenario: Industrial hazard, Netherland**

| Case/Scenario: Industrial hazard, Netherland |   |
|--|---|
| Disaster phase                               | Preparedness (risk communication) and response (crisis communication)   |
| Context                                      | Chemelot site: multiuser site and research campus, including 64 plants; located very close to the urban environment which makes it paramount to act effectively in case of large-scale emergency situations that affect the nearby environment.<br><br>Province: Limburg. |

|                                 |   |
|---------------------------------|---|
|                                 | The emergency response at the Chemelot site is a special cooperation between a public (Veiligheidsregio Zuid-Limburg-VRZL) and non-public organization (Sitech-ST). Sitech is responsible for emergency actions on-site, whereas VRZL is responsible for managing the effects off-site.   |
| <b>Main focus</b>               | Building and maintaining a trustworthy and long-lasting connection between Chemelot, governmental organisations and residents.  |
| <b>Main challenges for DRPV</b> | How to reach vulnerable groups (risk communication)<br>How to build a community in which the government Chemelot and the local communities work together<br>How to build an interactive community<br>How to be transparent and at the same time avoid a negative impact (negative feeling of safety) on the people living off site. |
| <b>Stakeholders</b>             | CSP, Sitech, Site users, VRZL (Veiligheidsregio Zuid-Limburg) municipalities, Province, Environment, representatives of villages, areas, region and specific target groups.   |

**Figure 16: Research Questions: Industrial hazard, Netherland**



**Source:** Authors' contribution

### 10.4.5 Terror attack/Germany

Like other European countries, Germany has experienced a rise in terrorist attacks over the past years. Major concerns must be addressed in relation to the lack of information standards and accountability mechanisms, information overload, interoperability between information and

communication technologies used by the first responders and underdeveloped skills to analyse gathered data.

**Table 13: Case/Scenario: Terror Attack, Germany**

| Case/Scenario: Terror Attack, Germany |   |
|---------------------------------------|---|
| <b>Disaster phase</b>                 | Preparedness (risk assessment rather than communication), response (crisis communication)   |
| <b>Context</b>                        | <p>The qualitative part of the case-based assessment will be performed with stakeholder groups from one of four regions that have been affected by major terror attacks in recent years: Hanau (in Hesse), Halle (in Saxony), Munich (in Bavaria) or Berlin. The actual selection is currently still pending and will be based primarily on the accessibility of crucial interview partners. For a detailed analysis of the four case scenarios please refer to this document.</p> <p>The quantitative part (the survey) will abstract from the local level and be carried out across multiple of the 16 German states and at the national level.</p> |
| <b>Main focus</b>                     | Building trust among the public and media and maintaining interpretational sovereignty on information surrounding terrorist attacks, countering rumours and instrumentalized false information, preventing mass panics.   |
| <b>Main challenges for DRPV</b>       | <ul style="list-style-type: none"> <li>• How to manage the balancing act between risk awareness and a mass panic</li> <li>• How to align communication quickly – internally ('one voice policy') and with the other authorities (other first responders and municipals)</li> <li>• How to identify vulnerable groups at the first level (potential targets of the perpetrators) and at the second level (groups indirectly negatively affected by the attack, e.g., religious groups being blamed) and how to protect them</li> <li>• How to engage the public in order to assist the police during an attack</li> </ul>                              |
| <b>Stakeholders</b>                   | Police authorities at different levels (local, state, national, potentially international) and with different jurisdictions (first responders, tactical forces, investigation units), other first responders (particularly fire fighter and the THW), municipals, local citizens, the media, representatives of the justice system (e.g., district attorneys)   |

**Figure 17: Research Questions: Terror Attack, Germany**

|             | <br>Technologies   | <br>People           | <br>Institutions   |
|-------------|---|---|---|
| <b>DRPV</b> | Who is most exposed to fake news, disinformation, or misinformation?<br>Who are the main persons exposed to technological attacks (like phishing) during an emergency?<br>How can people/institutions reduce these attacks?                             |   |   |
|             | What are the DCT characteristics or communication factors that can contribute to increase/influence awareness/perception?<br><br>Can SMCS communication reduce the time of relief provision and the mapping/identification of the most affected people? | How is volunteerism in disasters changed with SMCS?<br><br>Who mainly use SMCS for active engagement? | How can targeted information reduce risks and vulnerabilities and improve perception?<br><br>How to provide targeted communication and in relation with which DRM phases?<br><br>What is the level of trust that institutions have in SMCS channels?<br><br>What are the risks associated with their use?<br><br>Which people do practitioners/institutions/first responders have difficulties to reach and how SMCS could help them?<br><br>Who can effectively benefit by online institutional accessibility?<br><br>Can SMCS facilitate the operations of disaster response and recovery?<br><br>Can SMCS facilitate the communication of campaigns of prevention/preparedness?<br><br>How institutions reach vulnerable groups through SMCS?<br><br>Do SMCS reduce the time to mobilize people and monitoring movement flows?<br><br>Which are the consequences of volunteerism changes in DMP? |

**Source:** Authors' contribution

## 10.5 ANNEX V: Research Methods Employed to Study DRPV and SMCS

| Research Method   | Reference   |
|---|---|
| <p>Surveys:<br/>           Purposive sampling survey<br/>           Computing survey<br/>           Geospatial survey<br/>           Panel survey<br/>           Structured online survey</p> | <ul style="list-style-type: none"> <li>• Boyle et al., 2004</li> <li>• Chou et al., 2009</li> <li>• Enenkel et al., 2015</li> <li>• Fallon et al., 2018</li> <li>• Helgeson et al., 2013</li> <li>• Imran et al., 2015</li> <li>• Kaufhold et al., 2019</li> <li>• Lai et al., 2018</li> <li>• Reuter et al., 2016</li> <li>• Reuter et al., 2019</li> </ul>  |
| <p>Interviews:<br/>           Semi-structured interview<br/>           Standardized open-ended interview</p>  | <ul style="list-style-type: none"> <li>• Cornia et al., 2016</li> <li>• Fadaee &amp; Schindler, 2014</li> <li>• Hargittai, 2002</li> <li>• Harrison &amp; Johnson, 2019</li> <li>• Lai et al., 2018</li> <li>• Mehta et al., 2017</li> <li>• Shkolovski et al., 2010</li> <li>• Silver &amp; Matthews, 2016</li> <li>• Walkling &amp; Haworth, 2020</li> </ul>  |
| <p>Workshops/Focus Groups</p>   | <ul style="list-style-type: none"> <li>• Ahmed, 2011</li> <li>• Chan et al., 2014</li> <li>• Dwyer &amp; Horney, 2014</li> <li>• Eisenman et al., 2009</li> <li>• Fogel, 2016</li> <li>• Howard et al., 2017</li> <li>• Kapucu et al., 2013</li> <li>• King et al., 2010</li> <li>• Mora et al., 2015</li> <li>• Peek &amp; Fothergil, 2009</li> <li>• Qasim et al., 2015</li> <li>• Terpstra et al., 2009</li> </ul> |
| <p>(N)ethnography</p>   | <ul style="list-style-type: none"> <li>• Checker, 2017</li> <li>• Fele, 2012</li> </ul>   |

| Research Method   | Reference  |
|---|--|
|   | <ul style="list-style-type: none"> <li>• Madianou, 2015</li> <li>• Veer et al., 2015</li> </ul>  |
| Big-data analysis<br>(Geo-tagged twits tracking; content-analysis; ...) | <ul style="list-style-type: none"> <li>• Abel et al., 2012</li> <li>• Andrade et al., 2018</li> <li>• Bhavaraju et al., 2019</li> <li>• Chib, 2010</li> <li>• Earle et al., 2012</li> <li>• Fan et al., 2020</li> <li>• Kent &amp; Capello, 2013</li> <li>• Kongthon et al., 2014</li> <li>• Li et al., 2013</li> <li>• Lin et al., 2020</li> <li>• Martín et al., 2017</li> <li>• Martín et al., 2020</li> <li>• Nicholson et al., 2019</li> <li>• Vieweg et al., 2010</li> <li>• Wang et al., 2019</li> <li>• Xiao et al., 2015</li> <li>• Zou et al., 2018</li> </ul> |
| Multi-approach  | <ul style="list-style-type: none"> <li>• Pongponrat &amp; Ishii, 2019</li> </ul>   |
| Web-based interactive maps  | <ul style="list-style-type: none"> <li>• von Stulpnagel &amp; Krukar, 2018</li> </ul>  |
| Literature review<br>Commentaries                                       | <ul style="list-style-type: none"> <li>• Alexander, 2014</li> <li>• Fussel, 2018</li> <li>• Fussell et al., 2018</li> <li>• Jurgens &amp; Helsloot, 2018</li> <li>• Kankanamge et al., 2019</li> <li>• Kent &amp; Ellis, 2015</li> <li>• McCallum et al., 2016</li> <li>• McKinnon et al., 2017</li> <li>• Reuter &amp; Kaufhold, 2018</li> <li>• Svensson &amp; Hällgren, 2017</li> <li>• Viswanath &amp; Finnegan, 1996</li> <li>• Wang &amp; Ye, 2018</li> </ul>  |

## 10.6 ANNEX VI: The Italian DRPV Deep Dive: Further Materials

At follow some further materials are provided about the Italian DRPV deep dive as anticipated in Section 7 of this deliverable. Details on the research methods that will be used in the Italian deep dive are here provided.

### 10.6.1 Research with Minors

The research planned to be carried out with children is based on the "pedagogy of rights", that presupposes that the educator becomes part of an educational relationship based on the recognition of the child as the owner of rights and on the possibility that children can, through the educational activities that the adult proposes, know and exercise their rights. Moreover, in this way children have the opportunity to develop new skills, increase their self-confidence, knowledge and feel that their opinions are valued and respected. Adults also learn, both as individuals and professions, that working collaboratively with children brings a new perspective to their work, as well as greater credibility, potentially leading to better outcomes.

This is part of a multi-age perspective that is in line with what is required by the United Nation Convention on the Rights of the Child (UNCRC, 1990<sup>5</sup>) to ensure the active participation of minors in all aspects that affect their lives. This principle empowers children and young people by making them become active protagonists of in decision-making processes that have a direct impact on their lives. This type of approach can also be applied in the context of disaster risk reduction (DRR), involving them in the different phases of the DMC, with the aim of stimulating the empowerment of the community. Participation is therefore not a privilege to be granted by adults or a merit to be gained by boys and girls, but it is a practice that values and empowers children as citizens by right.

Thus, the proposed methodology intends to stimulate thinking, raise awareness, and promote the groups of beneficiaries and stakeholders involved in the initiative to act. A previous example of this approach is the CUIDAR European H2020 project (see box below).

#### The experience in CUIDAR European Project

During the CUIDAR project, the group of young people who participated in the project activities decided to create a web-based map using their child-friendly version of the municipal emergency plan. Their idea was to convert the community map into a digital community map and mobile phone compatible website, as smartphones are the primary device used by young people and their parents. The website, later called '*Piano alla Mano*', contains information on the risks, strengths, vulnerabilities, and local resources identified by the participants, with particular attention to earthquakes. The purpose of this map is to make children, young people, and adults aware of the importance of knowing their territory and of the security actions that can be

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<sup>5</sup> <https://www.ohchr.org/en/professionalinterest/pages/crc.aspx>

implemented, in order to be active and resilient citizens. To create the map, the participants worked with a web designer and experts to develop the tool, to translate the complex information in the local emergency plan into a child-friendly version, adapting the content and technical functions to the needs of their peers. "*Piano alla Mano*" is a useful tool as it indicates the emergency collection points located in the city and the main resources in case of emergency (hospitals, civil protection offices, municipalities, etc.). The municipal emergency plan is now available for download and contains information on what to do in the event of an earthquake and a list of emergency numbers to contact in case of need. This informs both children and the community about what to do and where to go in the event of an earthquake, especially in public spaces, where young people have said they feel most vulnerable.

### 10.6.2 Workshops

The cycle of workshops can be conceived as a journey divided into 3 main phases:

- Sensitise and stimulate knowledge
- Facilitate deeper understanding and capacity to identify solutions
- Communicate.

The workshop is structured in such a way as to be enable the carrying out of specific activities for specific objectives.

Some guidelines for the implementations of workshops are:

- **Theory:** the presence of children and young people does not in any way invalidate the participatory and confrontational work methods. Indeed, often the moment of theoretical input manages to awaken knowledge in listeners or allows you to stimulate new thoughts or even allows you to rearrange confused ideas. It is important, however, that the trainer is able to mix theory and practice, reflection and experience, seriousness and play, learning and fun.
- **Small groups:** discussions in a whole group often risk not producing the maximum of participation or confrontation between different ideas. During discussions in a large group, only the most extroverted children speak, and sometimes the overall position of the group can be dominated by a single idea or a handful of participants. Splitting into smaller groups can be very helpful. These can be couples, triads, or larger groups. They can be chosen at random, or the children can choose groups among themselves. Thus, in a relatively short period of time all participants have the opportunity to exchange their points of view. In some cases, it is useful to set time limits and invite or choose someone to take notes within each group, in order to present the most important points and problems raised by the group to the plenary. Small tricks allow you to activate discussions or better address, more easily, the topic under discussion: delivery of cards to fill out, proposal of questions to be answered and

the presentation of cards to comment, can all be useful for activating the discussion and keeping it focused.

- For this type of experience to be a truly effective bearer of learning, the analysis process following the activity, commonly known as the **debriefing session**, is essential. The goal of this moment is to review and describe the experiences experienced by the participants and to evaluate the implications of these experiences and the meaning attributed to them.

### 10.6.2.1 Action Research Game

Although the use of action research games, such as the use of gaming in DRR, is nothing new (see Friesen, 2006), the approach followed here will be structured on the basis of the DRPV framework, with the purpose to produce an educational product as itself a learning material of the project.

The 'gaming' activities will consist of three different approaches:

- **Outdoor activities.** This activity aims to involve participants before or after workshop activities. Through these outdoor activities, participants can act in the discovery of information relating to aspects of vulnerability and resilience in their family, home, neighbourhood, community. These games also allow participants to reconnect with the territory and promote individual and social well-being with a view to support the overcoming of the pandemic and the stress caused by social isolation.
- **Intergenerational exchange activities** with grandparents and community elders that inspire thinking and awareness on the use of social SMCS as tools to make our community more resilient to, both natural and man-made, disaster risks.
- Activities based on the use of a **multimedia product** (i.e., educational video, digital animations, visualizations of data and interactive graphics, web series, screenplays, podcasts, apps) that aim to raise awareness of the importance of the appropriate use of social media as a useful tool to strengthen resilience with respect to the risk of earthquakes and disasters in general.

The gaming activities proposed for the project will incorporate the following elements:

- To consider children in the age group 12-13 as the main target, although the activity can be also considered among other age classes;
- Consider 'senior' citizens as a secondary target encouraging moments of confrontation and exchange between young and old which aims to produce the mutual sharing of knowledge
- Promote awareness of risk and promote the importance of an appropriate use of digital technologies to promote disaster resilience factors;
- Promote mechanisms for the prevention, preparation, and management of the risk of disasters;
- Promote sustainable learning with actions that can go beyond the life of the project;
- Have a 'child friendly' language that puts the beneficiary at the centre of the action;

- Encourage participation through activities such as brainstorming, problem solving, focus groups, mapping, learning, and sharing of experiences. Multiple phases of the project can be conceived and developed through co-creation with the beneficiaries themselves.

It is important to inform that the action research game and the workshops are a two-years activity that are considered to work both in the first and second assessment phases. This is due to the complexity of the work and its experimental nature.

To conclude, the concept of continuous learning and growth translates perfectly into one of the strategic objectives of the LINKS project which is to promote 'sustainable advanced learning'. Children are, to all intents and purposes, community members and citizens, and their potential is essential in shaping more effective responses during emergencies and disasters, both locally and nationally. Adolescents can, especially, feel they are the architects of positive change and it is therefore important to encourage them to initiate or participate in the processes of identification, prevention, and management of risks, alongside their peers and the organizations and institutions that deal with these issues.

