

LINKS

Strengthening links between technologies and society
for European disaster resilience

D5.3 FIRST VERSION OF THE LINKS FRAMEWORK

Research Report

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JUNE 2022



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



DOCUMENT INFORMATION

Grant Agreement	No. 883490	Deliverable Due Date	30 November 2021
Project Starting Date	1 June 2020 (42 months)	Actual Submission	30 June 2022
Deliverable Number	D5.3 (WP5)	Leading Partner	VU

KEYWORDS

LINKS Framework, strategic planning, disaster risk management, social media and crowdsourcing, products

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VERSION HISTORY

Release	Status	Date
0.1	Initial Draft	15 September 2021
0.2	Second Draft	1 October 2021
0.3	Third draft	30 October 2021
0.4	Fourth draft	15 January 2022
0.5	Internal Review Version	29 January 2022
0.6	Fifth draft	16 March 2022
0.7	Six draft	29 April 2022
0.8	Internal Review Version	4 June 2022
1.0	Final Submitted to EC	30 June 2022

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CITATION

Suggest citation: Fonio, C., Clark, N., Bonati, S., Lüke, R., Graziani, F., Habig, T., Nielsen, A., Raju, E., (2022). *First version of the LINKS Framework*. Deliverable 5.3 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 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 consolidates knowledge and experiences on the uses of SMCS into useful products for relevant stakeholders. 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 socioeconomic 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 (5.3) provides the vision and the design of the LINKS Framework. The Framework consolidates knowledge and experiences on the uses of social media and crowdsourcing (SMCS) into products for relevant stakeholders. This document is concerned with how LINKS consolidates and structures the outputs from the research across the LINKS knowledge bases (disaster risk perception and vulnerabilities, disaster management processes, and disaster community technologies) and the cases (earthquake in Italy, industrial hazards in the Netherlands, drought in Germany, flooding in Denmark, and terrorism in Germany) into the first version of the LINKS Framework. The Framework is being developed mainly for Disaster Management Organisations (DMOs) and other practitioners working with disaster risk management. The Framework can assist DMOs in their planning for using

SMCS in disaster risk management, through resources addressing two main themes (engaging with citizens and improving communication) and six sub-themes:

- **Engaging with citizens:** collecting and analysing information, mobilizing citizens, mobilizing volunteers.
- **Improving communication:** targeting communication, ensuring the quality of information, making information accessible.

The Framework supports strategic planning around the themes by providing a set of products, currently under development in the knowledge bases. This deliverable outlines the six products that will feed into the Framework. These include:

- **SMCS Technologies Library** which provides an up-to-date and structured overview in order to grasp the dynamic market and support the selection of suitable technology.
- **SMCS Guidelines Library** that aims to provide a comprehensive overview of existing formalised guidelines and policies that can support users with regards to the application of SMCS.
- **SMCS Examples Library**, which provides a collection of examples of the uses of social media and crowdsourcing.
- **Including Citizens Handbook** that aims to provide different materials, such as explanatory sections, instructions, examples and check-lists, to use existing SMCS and develop new crowdsourcing initiatives to promote more inclusive approaches in disaster risk management.
- **Educational Toolkit** is a set of online tools to strengthen resilience and empower minors through SMCS.
- **Resilience Wheel** which is both conceptual model for holistically framing what organisations need to consider and prioritise when applying SMCS in disaster risk management and it serves as a research-based assessment tool for identifying and mapping current use and application of SMCS in disasters.

The products are actionable outputs, implementable by one or more target groups (e.g. guidelines can be useful to policy makers and practitioners alike; the Educational Toolkit can be of interest to teachers but also relevant to DMOs interested in implementing more inclusive approaches; while the SMCS Technologies Library can be of interest to, *inter alia*, solution providers) and support DMOs with regards to the application of social media and crowdsourcing.

Additionally, the design process for the first version of the Framework is explained by focusing on the inputs from the knowledge bases and the cases and on the structuring of the inputs into interconnected themes and products for the Framework.

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LIST OF ACRONYMS

Acronym /Abbreviation	Description
AIIG	Associazione Italiana Insegnanti di Geografia
CERIS	Community for European Research and Innovation for Security
CMINE	Crisis Management Innovation Network Europe
DCT	Disaster Community Technologies
DMO	Disaster Management Organisation(s)
DMP	Disaster Management Processes
DRMKC	Disaster Risk Management Knowledge Centre
DRPV	Disaster Risk Perception and Vulnerability
LCC	LINKS Community Center
SMCS	Social Media and Crowdsourcing
WP	Work Package

DEFINITION OF KEY TERMS¹

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 assessments	The cross-based assessments (or case assessments) are joint efforts between WP2-4 and investigate the specific knowledge domains across different contexts while exploring interacting themes. The cross-based 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 get “outsourced” to a crowd. It implies tapping into “the wisdom of the crowd” (definition builds on Howe, 2006; see also LINKS Glossary).
LINKS Framework	The LINKS Framework consolidates knowledge and experiences on the uses of social media and crowdsourcing in disasters, into products for relevant stakeholders. The Framework is accessible online through the LCC, and can be used by stakeholders to openly explore knowledge, or as a strategic planning tool for guiding disaster management organisations in their planning for using social media and crowdsourcing in disasters.
LINKS Knowledge bases	The outputs and knowledge obtained from the assessment of three knowledge domains. This knowledge is used to develop the LINKS Framework.
LINKS Knowledge domains	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 Risk Management Processes (DMP) for analysis and how SMCS changes the procedures and processes within the crisis disaster management;

¹ Definitions are retrieved from the LINKS Glossary at <http://links-project.eu/glossary/>.

	Disaster Community Technologies (DCT), for assessing SMCS related technologies used by practitioners (and citizens) in disasters.
Resilience	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 the interdependent Tyler & Moench, 2012; see also LINKS Glossary)
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 (definition builds on Kaplan & Haenlein, 2010; see also LINKS Glossary).
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 crises and crisis response), a social dimension (the ability 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.

1. INTRODUCTION

The current landscape of using social media and crowdsourcing (SMCS) in disaster risk management is scattered. The ways in which SMCS are understood and applied by different types of stakeholders in all phases of disasters vary across Europe. Disaster management organisations (DMOs) often make decisions without having access to consolidated knowledge on the diverse *social*, *institutional* and *technical* aspects around the uses of SMCS. By *social*, we refer to the people (individuals and communities) who use SMCS to be informed and to engage with other fellow citizens and with different types of organisations when a disaster strikes. The *institutional* dimension refers to governance structures, meaning formal institutions and authorities, that interact with technology systems during the entire disaster management cycle. The *technical* dimension is the technological tools, platforms and solutions used in the application of SMCS in disasters.

The LINKS project explores these social, institutional and technical aspects across three interconnected LINKS knowledge domains: disaster risk perceptions and vulnerabilities (DRPV), disaster management processes (DMP) and disaster community technologies (DCT) (see in order D2.1: Bonati S., 2020; D2.2: Pazzi V. et. al, 2020; D3.1: Nielsen, A., & Raju, E, 2020; and D4.1: Habig T. et. al, 2020). The overall purpose is to consolidate the knowledge on how the use of SMCS can be strengthened across diverse social (DRPV), institutional (DMP) and technical (DCT) landscapes. This has led to develop a comprehensive research design (D2.3: Bonati, S. & Pazzi, V., 2021; D3.2: Nielsen, A. et al., 2021; and D4.2: Gehlhar S. et al., 2021) that was applied in four European countries and in five different case scenarios (the LINKS cases):

- Case 1: Earthquakes in Italy.
- Case 2: Industrial hazards in the Netherlands.
- Case 3: Drought in Germany.
- Case 4: Flooding in Denmark.
- Case 5: Terrorism in Germany.

The results from the LINKS cases are used to validate and strengthen the DRPV, DMP and DCT knowledge bases, and contribute to the development of actionable products within the LINKS Framework. This document is concerned with how LINKS consolidates and structures the outputs from the knowledge bases and cases into the first version of the LINKS Framework. The Framework is being developed to a) help DMOs concentrate on what is important when considering the application of SMCS in disaster management processes b) help DMOs in addressing specific themes (e.g. engaging with citizens) in their work. The Framework supports strategic thinking, and can be used as a tool for planning by DMOs on the ways in which they can apply SMCS in all phases of disasters.

Overall, the LINKS Framework encompasses:

- **Useful resources** embedded in the LINKS Community Center (structured knowledge distilled from products) in relation to two main thematic areas: **engaging with citizens, improving**

communication. The uses of SMCS are always context-specific: some of the resources provided in the Framework must be contextualised and adapted according to the socio-cultural context in which they will be used. For example, an Educational Toolkit which has been tailored to the Italian context, may not be applicable in other European countries. However, the educational materials can be an important source of inspiration for others, especially if the materials are varied and speak to different audiences.

- **Actionable products** for different target groups (see D9.2: Opromolla A, 2021), such as a handbook for better involving citizens, and different sets of libraries to explore technologies, guidelines, and examples on how SMCS have been applied. The products are derived from the outputs across the LINKS knowledge bases.

This document outlines the design and the uses of the LINKS Framework by describing the main the resources that will be included and what users can expect when accessing the LINKS Framework. It provides an overview of the design as well the potential added value of the Framework for one target group, mainly DMOs and other practitioners working with disaster risk management.

The first version of the Framework is the result of an intense consultation processes with all partners involved in the consortium who have been actively engaged in a wide variety of activities (e.g. brainstorming, meetings, workshops). Associated partners, specifically DPPI SEE, were also consulted in the design phase in order to assess – from the onset- the usefulness of one of the main outputs of the project. Internal and external stakeholders will continue to be involved in the evaluation and development of the products and of the Framework as a whole in the coming phases of the project.

1.1 Reading Guide

The document is structured as follows:

- Section 2 presents the first version of the Framework with a specific focus on how stakeholders can use the Framework for strategic planning within their organizations. We outline the core components of the Framework by focusing on the products that will feed into it. Moreover, for each of the products it outlines the following aspects: an overall description, target users and the added value for the wider crisis management community.
- Section 3 focus on the design of the Framework. This section explains the roles of the LINKS knowledge bases and of the cases in the development of the first version of the Framework.
- Section 4 deals with the next steps and outlines the next evaluation phase for the second version of the Framework, as well as the steps being taken to integrate the Framework within the LINKS Community Center (LCC) and eventually with already existing EU initiatives.

2. THE FIRST VERSION OF THE LINKS FRAMEWORK

2.1 The First Iteration of Development

The development of the LINKS Framework is a dynamic and evolving process which takes place over three iterations in the project. During the course of the project, inputs to the Framework come directly from the LINKS knowledge bases and from the related work in the LINKS cases. The Framework consolidates and structures those inputs into useful resources (structured knowledge distilled from products) for DMOs and practitioners working in disaster risk management. Additionally, inputs come from the external evaluation process of the Framework during e.g., workshops with external experts and LINKS Advisory Committee meetings. The reflections and outcomes from these meetings have an impact on the rationale behind the Framework and may help steer the development.

The first version of the LINKS Framework was developed in the first iteration. Each iteration entails a number of steps to incorporate the inputs coming from the LINKS knowledge bases and the LINKS cases into the design. For the first iteration these steps entailed:

1. identifying, collecting and preparing the initial inputs for the Framework from the LINKS knowledge bases and the LINKS cases (see Section 3);
2. structuring the inputs into themes that feed into the Framework;
3. identifying and defining interconnections between the themes and identify products.

The desk studies of the LINKS knowledge bases which took place in the first half of the project provided the state-of-the art in the DRPV, DCT and DMP knowledge domains as well as research gaps and comprehensive overviews of knowledge-related landscapes (e.g., the mapping of the policy frameworks included in D3.1).

At the same time, the preparatory work for the LINKS cases consisted of both meetings, workshops and exercises (e.g., user stories²) and led to identifying themes relevant to the case assessment teams, as well as challenges and needs at the case level. At the time of writing (May 2022), the first results from the first round of case assessments (see Clark N. et.al, 2022: D.6.4) have also been considered helping to confirm and refine the thematic areas of interest.

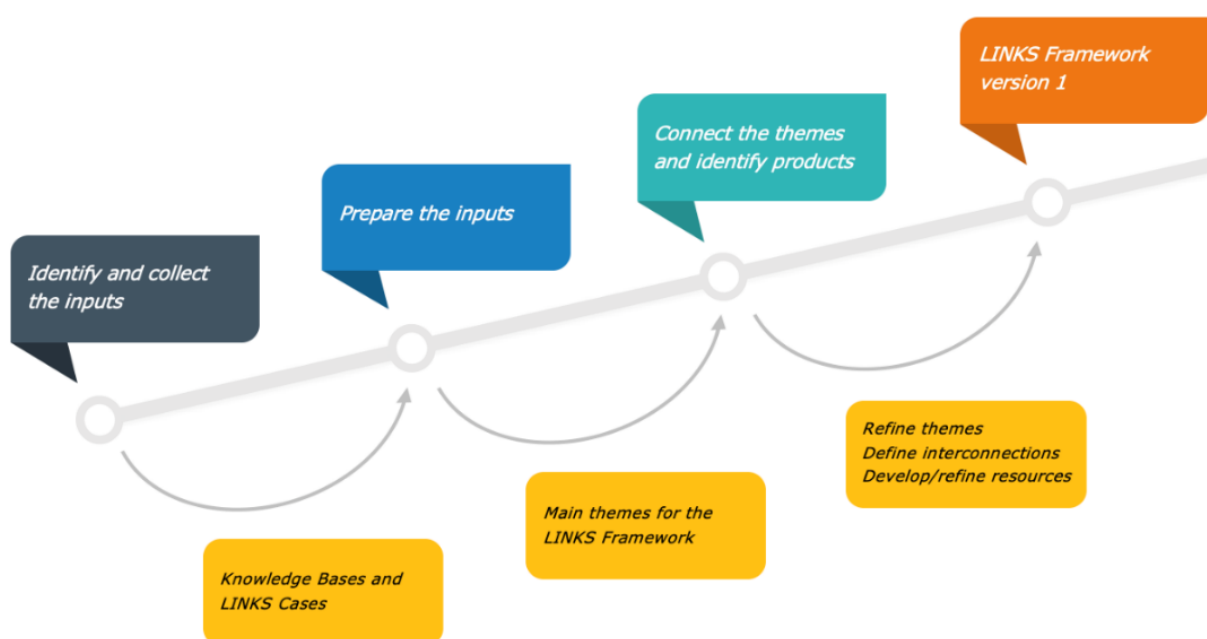
Considering that the Framework is where the three knowledge bases merge, connections were then created by refining and interlinking themes, and tangible products related to those themes, that can

² It should be noted that LINKS practitioners were involved in a “User story exercise” carried out in the summer of 2021. They had to provide a narrative (“story”) told from their perspective on how they expected to use the LINKS Framework. By that time, the overall rationale behind the LINKS Framework was still being refined. Hence, the inputs from the user stories should be framed having this limitation in mind.

serve different stakeholders (see 2.3). This led to developing and/or refining the resources within the Framework, and the integration of those resources within the LINKS Community Center (LCC).

Figure 1, captures the process of development for the first version of the Framework described in this section.

Figure 1: The Development of the LINKS Framework Version 1



Source: WP5's contribution

In the following sub-sections, we explain how the Framework can be used by stakeholders and provide a description of the specific products within the Framework. A detailed description of the design process and of the specific inputs from the knowledge bases and cases which have fed into the first version of the Framework is provided in Section 3 of this document.

2.2 Plan Strategically for the Uses of Social Media and Crowdsourcing through the LINKS Framework

The LINKS Framework provides useful resources for DMOs to assist in their planning for using SMCS in disaster risk management (DRM). Ultimately the resources in the Framework will be accessible through different entry points in the LINKS Community Center (LCC), which functions as the technical home for the Framework. Each entry point has a different logic:

1. **Plan strategically:** This entry point allows users do strategic planning within their organisations for the application of SMCS in DRM, by leading them on thematic learning

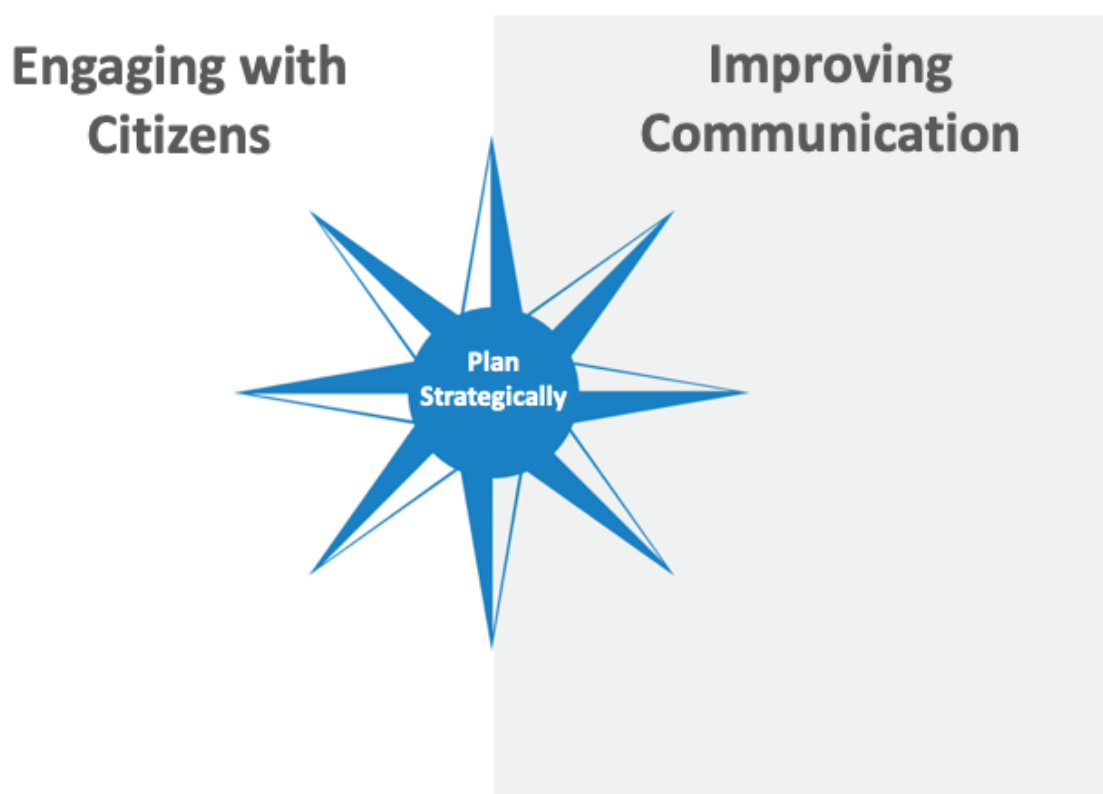
paths through guided questions around two main themes: *improving communication* and *engaging with citizens*.

2. **Search:** This entry point allows a full-text search for all content contained within the Framework and the LCC. It is suitable for users who have a specific term or question in mind and do not want to navigate manually through the resources and products to find an answer.
3. **Explore:** Through this entry point, users can directly access the products contained within the Framework. This is best suitable for users who either know exactly what they are looking for or for users who just want to view all available information.

The Search and Explore entry points are described in further detail in D7.4: *Final demonstrator of the LINKS Community Center* (Kiehl, M., et. al, 2022). In this deliverable, we focus on the first entry point, Plan Strategically.

From this entry point, the LINKS Framework is depicted as a compass revolving around the two main themes *engaging with citizens* and *improving communication* (Figure 2).

Figure 2: Plan Strategically Entry Point



Source: Author's contribution

We use the compass metaphor since the LINKS Framework, like a compass, aims to support navigation and orientation within and across these two themes so that DMOs and relevant stakeholders can take more informed decisions on the uses of SMCS through the LINKS products (see Section 2.3). The Framework can be used in the span of time when objectives are set and resources are identified. Simply put, it comes into play when overarching strategies in relation to uses of SMCS are mapped out by DMOs, specifically by those working at a strategic level: for instance, scenario planners, risk and communication professionals, information officers, analysts and chief of operations, depending on the setup and the goals of the organisation. It will also be of interest to other stakeholders, for example, researchers interested in exploring similar topics and policymakers looking for relevant policy documents.

The two main themes *engaging with citizens* and *improving communication* have been selected in agreement in WP2-4 and the way in which they have been included in the Framework promotes the need for a more “people-centred” approach that is central to all knowledge bases, especially DRPV and DMP. A people-centred approach, which is captured in the need to a) promote a diversity approach; b) be more inclusive and strengthen trust c) include the public in DMP.

Additionally, based on the inputs from the knowledge bases and the LINKS cases, recurrent issues related to communication, citizens’ engagement and the need of (or the lack of) more knowledge on technologies emerged, albeit with different nuances. This is apparent, for instance, when looking at the main DRPV, DMP and DCT themes (see Section 3) and from the activities with the case assessment teams. Moreover, the themes a) allow for working on the interconnections among the three knowledge bases, as the products show (Section 2.3), b) relate to one or more products. This is key to ensure that DMOs find resources to deal with specific issues. For instance, improving communication from the authorities to the citizens entails providing e.g., recommendations on how to be as much inclusive as possible by knowing the target of communication and engaging with more vulnerable groups as well as specific guidelines revolving around communication on social media. It also entails sharing examples and good practices on communication and providing an overview of technologies that can be relevant to take into account.

The themes in the Framework touch upon technical, institutional, and social, aspects and provide useful resources to govern diversity in those three interconnected areas. In a practical way this means providing guidance on relevant SMCS technologies, guidelines, and examples in relation to each theme and sub-theme. For each of the main themes, three sub-themes have been identified.

Figure 3: Themes and sub-themes of the LINKS Framework



Source: Author's contribution

Engaging with Citizens

To better engage with citizens, DMOs can orientate the compass towards three aspects which are of particular relevance and for which we can provide specific products:

- *Collecting and analysing information from SMCS* through technologies that can help in e.g., filtering data and/or gaining a more accurate common operational picture.
- *Mobilising volunteers*, specifically how to mobilise spontaneous and affiliated volunteers who can support DMOs.
- *Mobilising citizens*, specifically how to engage with local communities so that they can contribute to the disaster risk management system, e.g. becoming controllers/overseers/communicators in crises. Potential obstacles to mobility can also be addressed.

Improving Communication

To improve communication, DMOs can orientate the compass and navigate along three aspects that contribute to develop and/or refine their strategies using social media. As for the previous theme, we can provide products for:

- *Targeting communication*, especially ensuring that communication is as much inclusive as possible and all groups, including the most vulnerable, are taken into account.

- *Ensuring the quality of information.* This entails, for instance, issues related to the credibility and reliability of information.
- *Making information accessible,* namely how to improve accessibility to information in disasters through SMCS.

The Framework is being developed to provide a set of guiding questions for each of the sub-themes. These are conceived as pre-defined **learning paths** will be embedded in the LCC. The following user story and Figure 4 below it, provide an example on the *Improving Communication* theme as the starting point for a learning path.

A user story on the LINKS Framework

Jordan works in the fire brigade of a medium-sized German city. He is already familiar with what the LCC offers (see: D7.4, Section 2) but not with the Plan strategically entry point. In 2023 he still works in the communication team and they are facing a problem: in the last crises they faced, (flooding and drought) risk and crisis communication via social media was a) too generic and, in some cases, b) they did not manage to reach all citizens. They noticed these gaps since people did not comply with the recommendations shared via social media and citizens reported a lack of information despite the considerable amount of information shared. Specifically, citizens complained as they could not find information and some minorities did not get access to any information at all.

In the last LINKS Community Workshop (LCW) organised by LINKS partners, the LINKS Framework was mentioned. Jordan recalls the LINKS partners highlighting the strategic planning aim of the Framework with a focus on communication and accessibility. Therefore, he opens the LCC and looks for guidance with regards to how make information accessible.

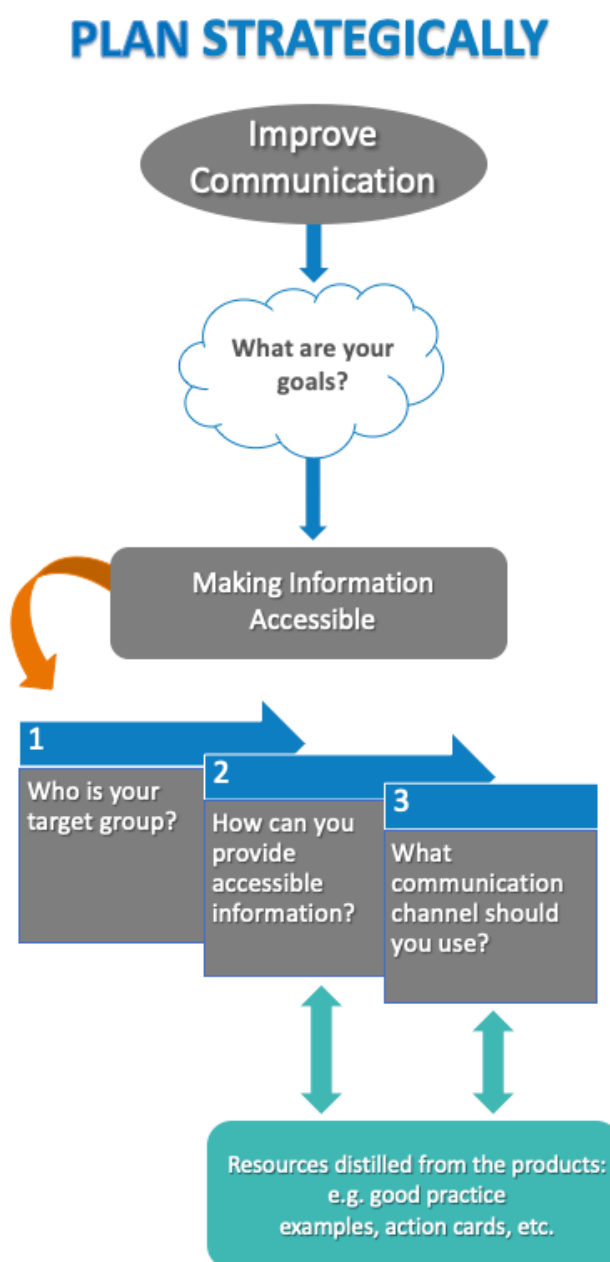
Jordan finds the LINKS Framework captured in a compass and notices the Improving Communication theme. He clicks on it and he is greeted by a question: *What are your goals?* Among the options, he chooses “Making Information Accessible” since this is exactly the problem his organization is trying to address. This theme is focused on how to ensure that useful information reaches different target groups. LINKS develops a number of resources in the Framework to address this.

However, in order to ensure Jordan receives the correct resources and information, he first has to go through a three-step approach guided by questions:

1. Who are the target groups he wants to address?
2. How can he provide accessible information?
3. How can he set up specific communication channels?

Jordan finds the first question interesting as he wants to address the gap that emerged with regards to minorities and accessibility. Once the target group has been defined thanks to the resources included in the Framework, he switches to the second question revolving around the means of communication. He is looking for dos and don'ts as well as examples and checklists and find them useful and relatively easy to apply. The third question further helps to address his interest, because within his team, the need for a specific app to reach all citizens in all phases of emergency has been raised many times in internal meetings. Resources and examples of apps used by other DMOs are provided along with guidelines on how they used them and good practices on how to implement them.

Figure 4: Improving Communication – User Entry Point



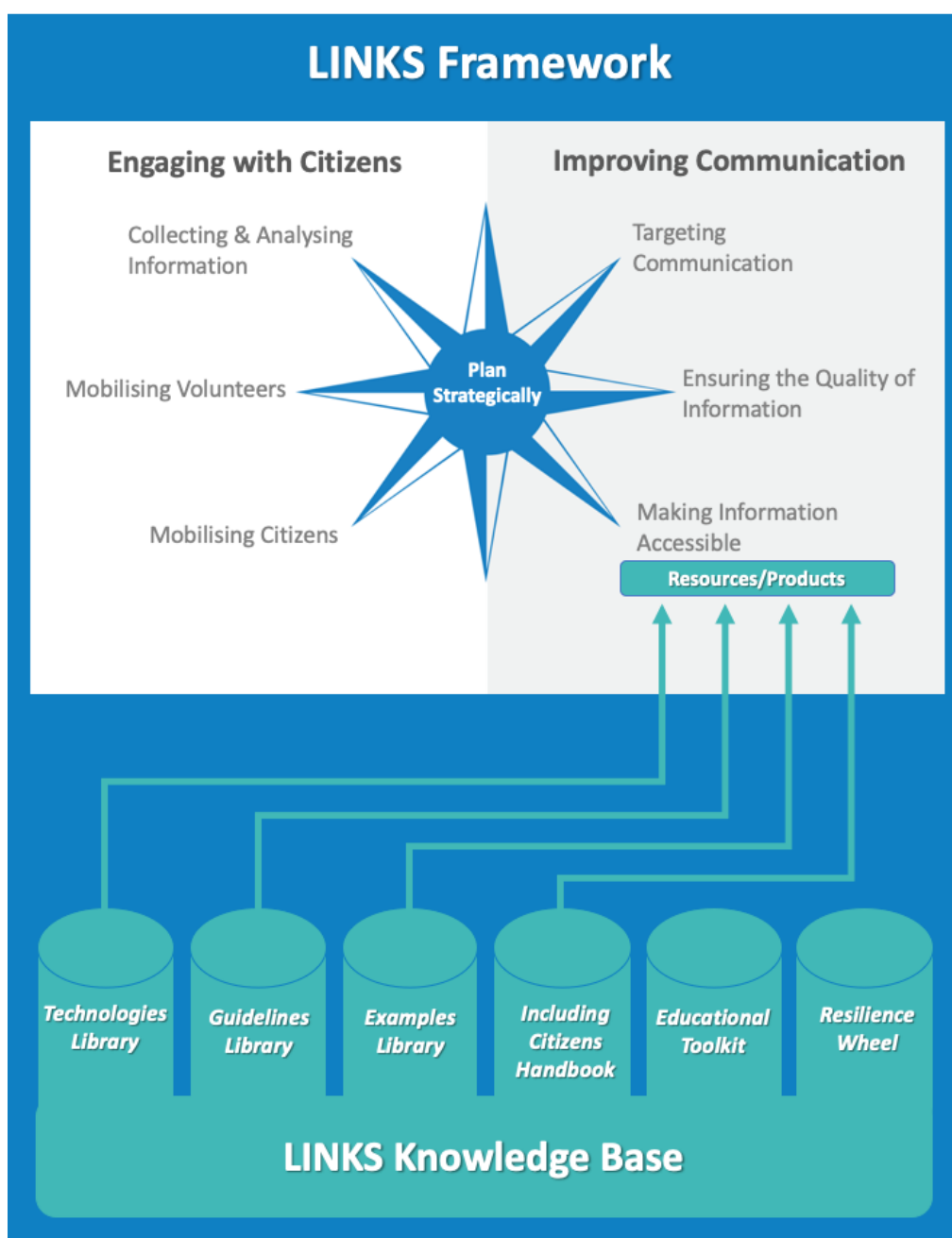
Source: Author's contribution

The Plan Strategically entry point will be implemented in the LCC, recommending content to users based on the responses to specific questions or the selection of specific themes. The content which informs the themes and learning paths is derived from the **LINKS knowledge base**. The knowledge base consists of the resources (structured knowledge distilled from products) in the Framework (available also through the other entry points in the LCC – explore and search). These resources are

the results of the interconnections among outputs from the DRPV, DMP and DCT knowledge bases. The resources may also be distilled into actionable formats such as action cards or checklists.

For instance, a user following the learning path under the *making information accessible* sub-theme, will be provided with relevant resources on SMCS technologies, guidelines, examples, and recommendations from the Including Citizens Handbook, made available and distilled, in practical a way through the products (see Figure 5).

Figure 5: Making Information Accessible



Source: Author's contribution

As previously mentioned, the guidance provided under the sub-themes should be linked, whenever possible, to relevant resources from the SMCS technologies, guidelines, and examples libraries.

Concepts and specifications for the themes, learning paths, and the resources and products made available under the Framework, are linked to the case assessments and require ongoing development and evaluation during the project. Once specifications are in place, and resources and products have met the proper maturity level, the technical implementation and evaluation takes place within the LCC.

In the next section, we introduce the products which are currently under development as part of the LINKS Framework.

2.3 The Products in the LINKS Framework

In this Section we provide an overview of the main products that feed into the Framework. The products are actionable outputs which are implementable by one or more target groups. While, as described in the previous sections, the Framework is mainly conceived for DMOs, some products can be of great interest for other stakeholders (see, for instance, the Educational Toolkit).

The main features for the products that will be included in the Framework are the following:

- Usefulness. A product must be useful for one or more target group. Hence, it should have an:
- Added value for the target group and for the wider crisis management community as whole and it should be:
- Easy to grasp. The rationale behind and the potential use must be clearly defined.

It should be considered that the products:

- Have different maturity levels. The development of some products (e.g. the SMCS Technologies Library) started almost from the onset of the project and come evaluation processes have been already carried out, while others have been conceived at a later stage and have not yet been evaluated.
- May be refined and adjusted based on their evaluation during the second round of case assessments (November 2022) which will be described in the upcoming methodological deliverables (September 2022).

At this time the LINKS Framework consists of 6 products, described below. Short descriptions of the products were also provided in D6.4 and D9.2. All products related to one or more themes and sub-themes. Some products cover all themes (e.g. Including Citizens Handbook), while others are more specific (e.g. the Resilience Wheel). The libraries (cf. Figure 4) are cutting across all sub-themes. The three LINKS libraries serve the purpose of providing structured overviews of respectively: Social Media and Crowdsourcing Technologies, Guidelines and Examples of the applications of SMCS in

different contexts. For this purpose, categories are developed for all three libraries, also there are categories that are used in all libraries (e.g. disaster phase or target group). The libraries can also refer to elements from the other libraries as needed and thus it is possible to create links between the information. An example would be if a guideline describes the application of a certain technology or uses a practical example to explain the usage of SMCS. Within the library approach, the user is able to obtain coherent knowledge about the application of SMCS. Users can either browse through all resources (e.g. all guidelines) or select what they need (e.g. guidelines revolving around flood management through crowdsourcing).

The products are iteratively integrated into the LCC based on their level of maturity.

2.3.1 Social Media and Crowdsourcing Technologies Library

Overall, the aim of the Social Media and Crowdsourcing Technologies Library is to provide users from practice and research with an up-to-date, structured overview in order to grasp the dynamic market and support the selection of suitable technology. The motivation is to make the confusing and rapidly evolving market more accessible and tangible to stakeholders.

The SMCS Technologies Library has evolved from the term *DCT-schema*, which has been established and developed in Deliverable 4.1. The DCT-schema describes the underlying concept and scientific derivation, while the SMCS Library describes now the more complete product.

According to current knowledge, there is no approach in the field of disaster risk management research that pursues the aforementioned objectives of ensuring a constantly up-to-date overview with different assessment categories. There are such approaches for crisis technologies (especially early warning systems) in general (e.g., Crisis Management Innovation Network Europe – CMINE - ENGAGE Knowledge platform³), but not specifically for social media and crowdsourcing.

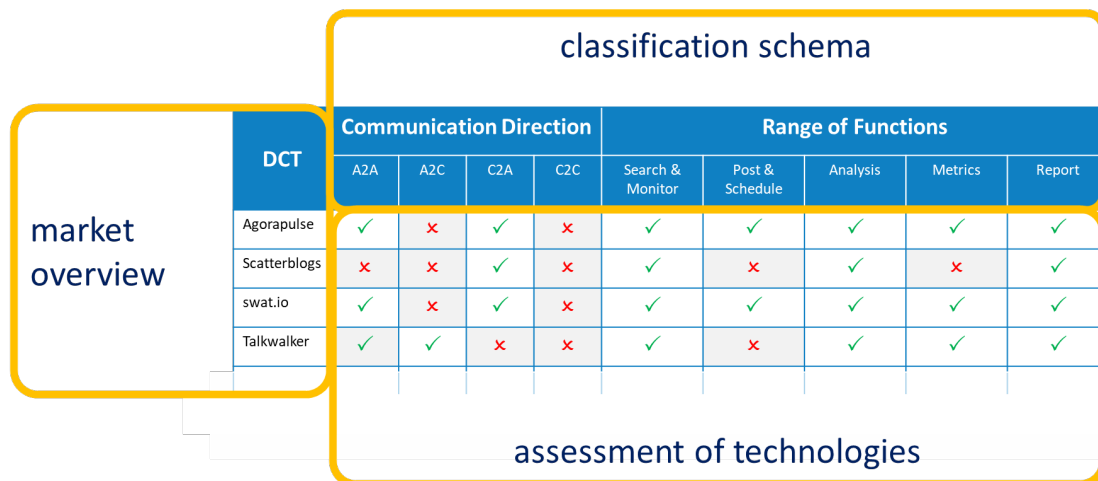
The library consists of three components:

1. a market overview (current collection of and permanent search for new technologies),
2. a classification schema (set of categories to describe and compare the technologies, cf. Deliverable 4.1),
3. and the assessment of the technologies.

The following figure shows the conceptional model behind it with all three components:

³ <https://www.cmine.eu/> and <https://www.project-engage.eu/knowledge-platform/>

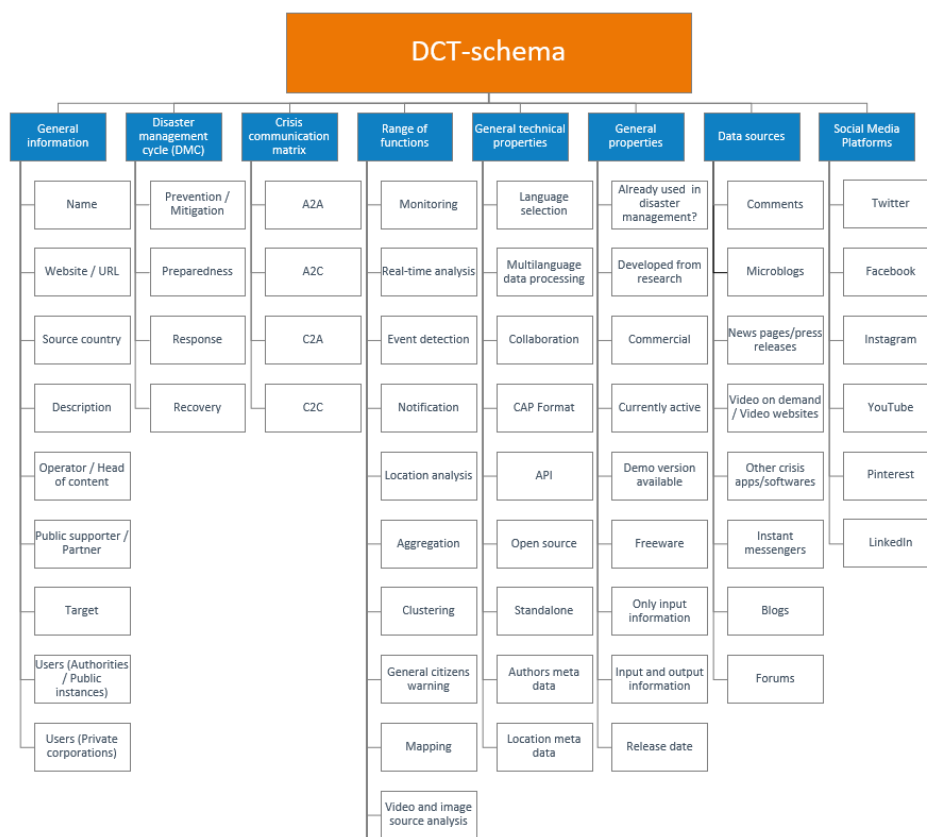
Figure 6: Conceptual Model of the Technologies Library



Source: WP4's contribution

As seen in Figure 6, the technologies found in the market analysis are assessed based on categories, thus building up a extensive, comparable collection of information for each technology. The idea is to indicate, for example, whether the respective technology is designed for a specific communication direction. Four directions have been identified according to the distinction between authorities (A) and citizens (C) as senders and receivers of information. This category should help suggest appropriate technologies, which, for example, concentrate on disseminating information relevant to the crisis (A2C). Technologies that are more suitable for collecting and using information from the population are marked with C2A accordingly. Crowdsourcing technologies fall more in the direction of C2C due to the communication between citizens, while technologies that offer functions for communication and collaboration between organisations are collected under A2A. A more detailed explanation with examples of the communication directions can be found in D4.1. Of course, many technologies can serve several communication directions, and this is justified by the range of functions the technologies offer. The presentation of a functional scope that is as complete as possible is also part of the schema. At the time of writing (May 2022), the range of functions is being extensively revised and will be presented in the next DCT methodology deliverable D4.3. The first draft of the set of categories is shown in the following figure and explained in deliverable 4.1.

Figure 7: First draft of the DCT-schema



Source: WP4's contribution

At the beginning of the development of the product, all data about the technologies and the categories were collected in an Excel list. The data is currently transferred to the LINKS Community Center for a user-friendly access. For the ease of use, a filter function is provided for every category. This allows the user to select given values in the different categories according to their search interests to display the technologies that meet the criterion. Therefore, a comparison and selection of suitable technologies is possible. In addition to the classification schema showed so far, there will be also a single profile page for every technology with all relevant information compiled from the categories. This information allows to grasp all relevant information of a technology in one place. A more detailed explanation can be found in the next DCT methodology deliverable D4.3.

The Technologies Library is mainly designed for the operational level in disaster management organisations working with social media and crowdsourcing. It provides an overview of existing DCT and their features for the organisations for different purposes, e.g. (more examples are provided in Deliverable 4.1):

- more efficient, two-way communication to the population,
- the processing and evaluation of information from social media for better assessment in disaster situations to support decisions,

- initiating, managing and exploiting the potential of crowdsourcing activities in disasters.

The first draft of the library was developed already early in the project (Deliverable 4.1). Since then, it has been constantly refined in many internal and external feedback sessions. It was also presented and discussed at the ISCRAM 2021 conference (Habig T. et.al, 2021). Furthermore, it was also discussed with different types of stakeholders within several workshops (e.g., “digital week” of DGSM-Tech e.V. in November 2021, second LINKS Advisory Committee meeting in February 2022 or in two LINKS Community Workshops (“safety camp” in April 2022 and another LINKS Community Workshop with special forces of the police in May 2022). In addition to the activities mentioned, the library is also evaluated in both the drought and the terrorism cases. Drought is becoming a worsening scenario in the coming years and is a relatively new event in Germany and Europe, accordingly there is not yet so much collected experience especially among the population. Therefore, the population must be informed and warned about impending droughts and necessary measures at an early stage. Dealing with it from the preparedness phase onwards through the support of social media and crowdsourcing technologies will be key to successful coping.

The draft of the library is already implemented as a web-based interface in the LINKS Community Center (<https://links.communitycenter.eu>), where it is publicly accessible.

The wider disaster risk management community will benefit from it in different aspects. The core objective of the library is to ensure that organisational actors are able to select a suitable technology for their purposes. By using these, disaster management organisations are able, for example, to better provide information and instructions with real time alerts and warnings to the population. Technologies can help reduce the workload of an information campaign while increasing awareness. Scheduling posts at certain times, analysing the reach or using several channels at the same time are just a few of the possibilities. In disaster situations, there is a huge amount of information in the social media dealing with important details about the current situation. With automated data collection and analysis, technologies can also help to support the situation awareness to better allocate their resources and improve the overall emergency response.

From a scientific view, the Technologies Library provides an innovative up-to date overview with detailed categories, which will generate a lot of space for new research. The Technologies Library has also the chance to increase the attractiveness of the market for developers and providers of the technologies. There is also the possibility for the businesses to present and market their technology directly within the library leading to a promotion of SMEs.

2.3.2 Social Media and Crowdsourcing Guidelines Library

The overall aim of the SMCS Guidelines Library is to provide a comprehensive overview of existing formalised guidelines and policies that can support users with regards to the application of SMCS. Already in the development of the first knowledge bases, a general absence of helpful and suited guidelines, standard operating procedures and policy frameworks was identified in the desk research and in a survey within the case assessment teams conducted in September 2020. In

response to this need, WP3 and WP4 started an exploratory search and collected available documents that provide guidance on how to deal with social media and crowdsourcing in disaster situations. The content of the guidelines varies depending on the field of action from the publishing organisation and from the socio-cultural contexts in which the guidelines have been applied and/or thought for. For example, guidance on the following aspects can be found in the guidelines:

- Building a communication strategy for social media and consideration of the main elements (e.g., needed roles for the team).
- Set up and evaluate social media activities.
- Recommended actions on social media before, during and after a crisis.
- Tips and behavioural advice for citizens on social media in crisis situations.
- Consideration of legal requirements when using social media.
- Verification of information from social media.
- Use of technologies to support work with social media.
- Support of vulnerable people with specific needs.

Analogous to the Technologies and the Examples Libraries, categories were developed to structure the documents. These are used to describe, compare and assess them in a structured way. Overall, the library consists of three components:

1. A current collection of and permanent search for new guidelines.
2. A classification schema (set of categories to describe and compare the guidelines,
3. and the assessment of the guidelines.

Besides the basic guidelines' information (e.g., language, publishing organisation, year), information on the primary target group, the intended phase of a disaster and an indication of the content of the guideline (e.g., technologies, vulnerability, crowdsourcing, social media analysis) are also provided. With these criteria, DMOs should be able to find an adequate guideline for the desired purpose.

A draft of the classification schema is also already available in the LINKS Community Center (<https://links.communitycenter.eu>).

The development of the Guidelines Library was accompanied by several workshops. With external partners at the "digital week" of DGSM-Tech e.V. in November 2021 or also at the second LINKS Advisory Committee meeting in February 2022 the guideline categories were discussed. Likewise, an internal workshop with all practitioners of LINKS in were conducted in January 2022.

Based on the feedback discussions and validation of the previous results, it became clear from the practitioners' feedback that, in addition to the categories developed so far, a more in-depth, qualitative analysis of the content of the guidelines is also necessary. To serve that need, it is necessary to extract the most helpful information per relevant topic (cf. the list above) from the guidelines and present it in a user-friendly environment. This process has already started and will be part of the next steps for the Guidelines Library.

The wider disaster risk management community will benefit from it in different aspects. The core objective of the library is to ensure that organisational actors are able to select either a suitable guideline or selected parts from different guidelines for specific needs. By using these, disaster management organisations are more likely able to establish an efficient social media strategy or improve the current one in various aspects.

From a scientific view, the Guidelines Library provides a not yet available up-to date overview with detailed categories, which will generate a lot of space for new research.

2.3.3 Social Media and Crowdsourcing Examples Library

During the development phase of the SMCS Technologies and Guidelines Libraries, as well as in the workshops held, the need for a collection of examples of the uses of social media and crowdsourcing became clear. The aim of the SMCS Examples Library is to show through examples how social media and crowdsourcing have been used or can be used in the real world. This enables the opportunity to give disaster management organisations a concrete indication of how and for what SMCS can be used in practice. With the help of this library, the following questions could be answered:

- What technologies have DMO used to collect and analyse data from social media in crisis situations?
- What technologies and measures were used to organise crowdsourcing in recent crises?
- What steps and measures are DMOs taking to integrate social media information into the operational process?
- What are the concrete ideas and implementations to reach specific vulnerable groups, for example, in a long- lasting drought?

The idea is, analogous to the other two libraries, to also record and describe the examples with a structured classification schema in order to be able to present them more clearly and comparably. Above all, it should be clearly presented what added value the example provides and in which aspect it could be useful for DMO.

A first draft of categories has already been created and currently contains the following structure:

- Core data (title, short description, dates (start/end), disaster phase, location, type of disaster (earthquake, flooding, ...), type of example (real disaster, exercise, use-case), size of disaster.
- Extended data (long description, media on the disaster (photos, videos), links for further reading (newspaper, articles, reports, ...), links to social media (e.g., important tweets)
- Specific questions (e.g.):
 - Which DMO were involved?
 - Which technologies were used?
 - Which specific functionality of SMCS was used?
 - Which vulnerable groups were specifically involved?

- What limitations were identified? What didn't work well?

The specific questions are of particular interest to DMOs, as they access the library motivated by similar issues. The Example Library offers the chance to combine both the three knowledge bases in LINKS and the experience of the case assessment teams. Accordingly, in the course of the project, the library is to be filled with examples primarily by the case assessment teams and their practitioners.

Analogous to the other two libraries, categories are currently drafted. These will be used to describe, compare and evaluate them in a structured way. Overall, the library consists of three components:

1. a current collection of and permanent search for new examples.
2. A classification schema (set of categories to describe and compare the examples),
3. and the evaluation of the examples.

The Example Library is the most recently designed library and has therefore only been covered in a workshop at the LINKS Annual Meeting in June of 2022. This workshop has yielded several useful suggestions (e.g. further specific questions) and first ideas on how to present the Examples in the LCC. More workshops and evaluation sessions will be conducted in the future to further improve the concept of the Examples library and to eventually test its implementation in the LCC.

The wider disaster risk management community will benefit from the Example Library in many ways. The core objective of the library is to give DMO ideas on how they can use SMCS in a concrete way and what benefits they may bring. If a DMO is in a similar situation or wants to achieve the same goals through SMCS as another DMO has already done, it can learn from the experience of others. Ideally, it should then be possible to contact the DMO via the LCC, for example to ask for further details. It is also conceivable that examples will be shared where bad experiences have been made or mistakes have been made.

2.3.4 Including Citizens Handbook

The Including Citizens Handbook aims to provide different materials, such as explanatory sections, instructions, examples and check-lists, to use existing SMCS and develop new crowdsourcing initiatives to promote more inclusive approaches in disaster risk management. It is a place holder to those interested in having all the materials related to including citizens using SMCS in disaster risk management collected in one place. It will be structured to guide the reader to the different steps to follow, but each section could also be used separately, according to the specific needs of the reader. Knowledge from the Handbook will be pulled out and linked to the main themes and sub-themes of the Framework (e.g., recommendations on making information accessible, and targeting communication).

At the moment of writing (June 2022), the structure of the Handbook primarily draws on the vulnerability model developed by WP2 and the vulnerability driver included in the Resilience Wheel developed by WP3. In combination, the two models, provide an integrated understanding of what

DMOs need to consider when applying SMCS to ensure an inclusive and collaborative approach to disasters. It focuses on three aspects: making information accessible, raising awareness, and mobilising people, ideas and resources. Specifically, the sections are focused on the following topics:

- Making information accessible: this section has the purpose to present some assessment tools and information speeches that could support users to implement or develop guidelines for producing and providing accessible information. Accessibility is here meant according to the model of accessibility developed in D2.1.
- Raising awareness: This section addresses the need for increased public awareness and perception of local disaster risk. It provides disaster management organisations with evidence, recommendations and examples of how to inform the broad public about disaster risk, improve targeted communication activities and include citizens in awareness and education activities.
- Mobilising people, ideas and resources: this section has the aim to answer how volunteers, and especially spontaneous ones, can be part of the response system, but also to present what could be the mobility problems of people and resources and how they could be overcome using social media and crowdsourcing. Finally, the section will provide some recommendations on how citizens can be involved in different ways. This section is based on the work carried out under WP2 and WP3.

The structure will continue to be implemented, also according to the consultation activities already planned in the project. Furthermore, the development of the Handbook will follow the development of the Framework since it covers some of the themes of the Framework.

Figure 8: Example of Introductory Page of a Chapter in the Handbook



Source: WP2's contribution

The Handbook is mainly conceived for practitioners, especially those interested in understanding how to collaborate with citizens (e.g., mobilising volunteers) and/or involve them in some initiatives. Based on the results obtained during the consultation and research process with the partners and local case stakeholders, one of the main needs is to understand how to engage citizens during the different phases of the disaster reducing the risks of conflicts or overlaps between official response system and spontaneous initiatives.

Thus, the Handbook could contribute to promote more inclusive disaster risk reduction plans and responses, stimulating practitioners to adopt/review internal operative guidelines or practices in line with the Handbook principles.

2.3.5 Educational Toolkit

The Educational Toolkit is a set of online tools to strengthen resilience and empower minors through SMCS. It aims to:

- Promote the participation of young people.
- Raise awareness on the rights and duties of minors,
- Provide concrete support and didactic incentive to the educational community.

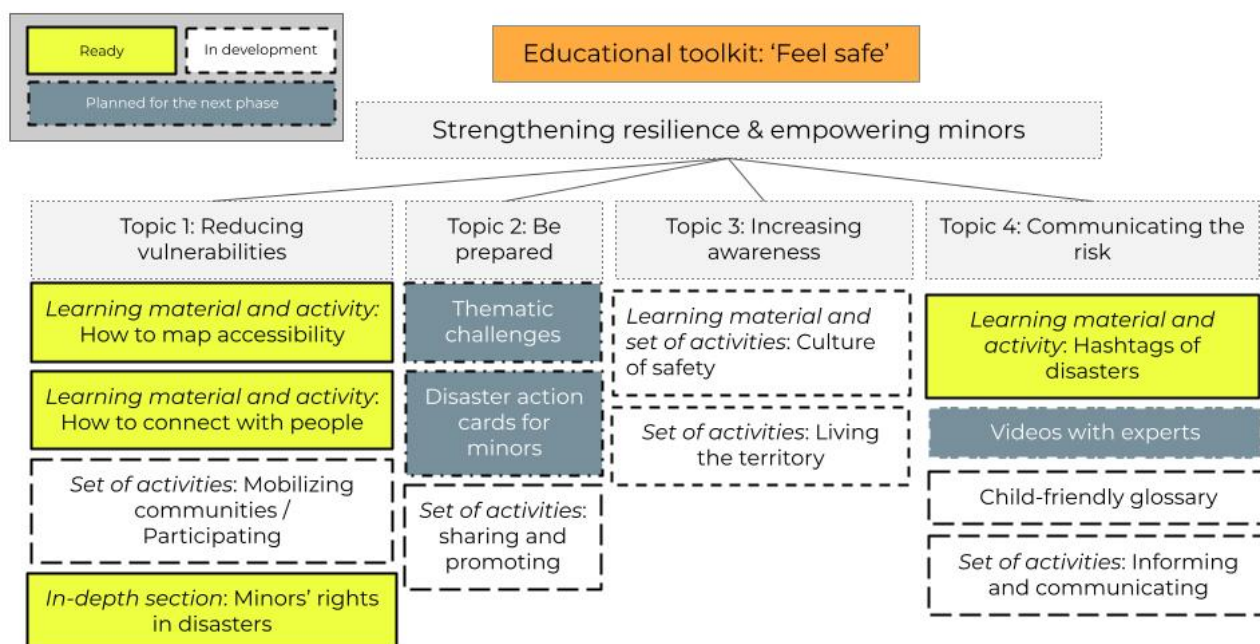
Currently, there are no platforms for minors that offer a detailed collection of different kinds of materials focused on the culture of safety and that combine experiences on using SMCS by minors concerning disaster risk. The platform will be provided in two languages: English and Italian.

The toolkit is based on the following four training pathways which have been identified according to the purposes of the LINKS project and are also presented in Figure 9:

1. Reducing vulnerabilities.
2. Be prepared.
3. Increasing awareness and
4. communicating the risk

Specifically, the toolkit is conceived to offer training paths to schools, educators, public institutions and NGOs working (or interested in working) with minors and families. The activities are for children and pre-adolescents. Each section of the kit will host different resources, such as a child-friendly glossary, short-explanatory videos and didactics (action) cards.

Figure 9: Structure, Components and Maturity Level of the Toolkit



Source: WP2's contribution

The kit will be available on an online platform where people can get information, find in-depth materials, educational resources on disaster risk reduction and technologies. The platform will be implemented at the end of the project by Save the Children Italy. The platform will also see the collaboration with other educational experiences (e.g., AIIG – Associazione Italiana Insegnanti di Geografia, and Missioni Geografiche <https://www.missionigeografiche.it/>).

The first draft of the kit is based on the DRPV model developed in WP2 and the work carried out in a school in Italy (Terni, Umbria region) exposed to a multi-hazard situation (especially earthquakes, floods and fires) where Case 1 takes place. The structure of the kit and some of the contents have been tested with the students and the teachers of the school. Furthermore, the design of the website is currently in progress.

Further user testing within the national context and in other countries is planned in the next round of case assessments starting from November 2022. The evaluation will be based on the second version of the methodologies due in September 2022.

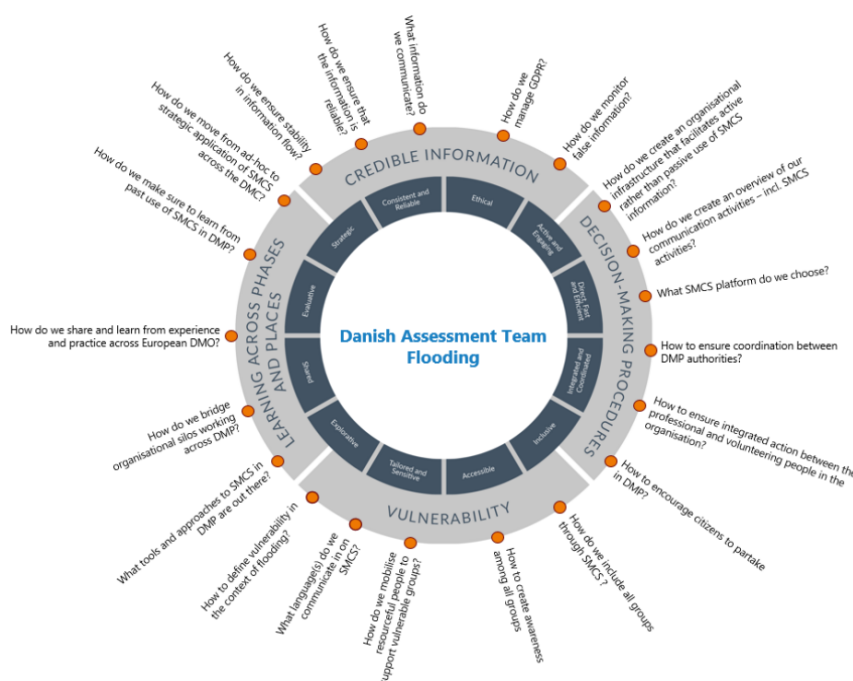
2.3.6 Resilience Wheel

The Resilience Wheel has two main functions. First, it is a **conceptual model** for holistically framing what organisations need to consider and prioritise when applying SMCS in disaster risk management. At the moment, there are no frameworks available that combine the aspects of organisational capacities and goals with technology. The Wheel is one of the first attempts to bring together organisational and technological domains that are crucial for disaster risk management

with regard to SMCS. It has four main drivers and a set of characteristics associated with each driver. The Wheel serves as a useful inspiration for various disaster management organisations and the disaster risk reduction community to reflect on the drivers and provides a novel way of working with disaster governance and resilience in an SMCS context. Further, policy makers' access to a common language/vocabulary for discussion and approaching technology and institutions in DRM efforts.

Second, it serves as a research-based **assessment tool** for identifying and mapping current use and application of SMCS in disasters. The assessment tool is supported by the protocol for interviews that provides a guide for how to make a research-based assessment. The assessment function provides a tool for systematic yet flexible and localised, ways of researching the role of social media and crowdsourcing in disaster risk management processes. The assessment tool was used for the case-based assessment. Here the Wheel thus helped translate how complex theoretical concepts such as "decision-making", "vulnerability", "credibility", and "learning" resonate with empirical specificities in close collaboration with each of the case teams (see D 3.2, section 4 for more details on the operationalising). As explained in Section 3, the Wheel also helped refining the themes and sub-themes that feed into the LINKS Framework.

Figure 10: Danish DMP Resilience Wheel



Source: WP3's contribution

At the moment (June 2022), data outputs from the case-based assessments point to how the Wheel can be re-organised to better fit the realities of current SMCS use in disaster management processes across the five LINKS cases. The updated version will be presented in the upcoming methodology (D3.3.) and the results from the first case assessments will be discussed in detail with all the practitioners during the second case assessments in 2022 and 2023 to further develop the wheel to

be ready for a wider audience. The aim is to re-position the Wheel into a more powerful conceptual model and tool supporting its two functions: helping disaster management organisations to reflect on current practices while supporting them in assessing current challenges and future potentials of applying SMCS in disaster management processes in their specific setting. In this way the Wheel has also contributed directly the supporting key themes and sub-themes in the LINKS Framework, which have been conceived having in mind both the main drivers and the contextualisation of the questions with the local teams.

KEY TAKEAWAYS FROM THIS SECTION

- The design is a dynamic and evolving process which takes place over three iterations in the project.
- The first version of the LINKS Framework was developed in the first iteration by taking into accounts the inputs from the knowledge bases and the cases.
- The Framework will be made available in the LINKS Community Center (LCC) through three entry points: Plan Strategically, Search and Explore.
- In the Plan Strategically entry point, users can navigate using the Framework that, like a compass, aims to support navigation and orientation within and across two main themes (engaging with citizens and improving communication) and six sub-themes (engaging with citizens: analysing and analysing information, mobilizing volunteers, mobilizing citizens) and (improving communication: targeting communication, ensuring the quality of information and making information accessible).
- The core components of the Framework are 6 products: the Handbook for involving citizens, that Educational Toolkit, the Resilience Wheel and 3 Libraries (Social Media and Crowdsourcing Technology Library; Guidelines Library; Examples Library).
- The main aim of the products is to provide. actionable outputs which are implementable by one or more target group.
- All products relate to one or more (sub) theme.

3. THE LINKS FRAMEWORK DESIGN

As described in Section 2, the development of the Framework follows three iterations during the project. The first iteration included identifying, collecting and preparing the initial inputs for the Framework from the LINKS knowledge bases and the LINKS cases, and then structuring the inputs into interconnected themes and products that feed into the Framework.

In this section we will describe in detail how the inputs from the knowledge bases and the cases during this period, have contributed the design of first version of the Framework.

As mentioned in the Introduction, it should be considered that the design is the result of an intense consultation process with all partners involved in the consortium who have been actively engaged in a wide variety of activities (e.g. brainstorming, meetings, workshops), as also shown in the inputs from the cases outlined below. The LINKS Framework design entailed co-creation with all partners at different levels: from the main rationale behind it and the preparation of the inputs, to the expectations and the practical implications for the development of the first iteration.

3.1 Identification, Collection and Preparation of the Inputs

The inputs from the LINKS knowledge bases come from the state-of-the-art in the three domains the research gaps and comprehensive overviews of knowledge-related landscapes included in D2.1, D2.2, D2.3, D3.1, D3.2, D4.1 and D4.2. The inputs from each LINKS knowledge base are described below. It should be noted that inputs are rich and varied and, in the frame of this deliverable, only the inputs that contribute directly to the Framework's design are taken into account. In addition, the knowledge bases followed similar and yet different routes in their development stage. For instance, from the on-set, the DCT knowledge base had a product-oriented approach (already captured in, e.g., the DCT schema) which was applied at a later stage in the context of the DRPV and DMP domains. Hence, while we use the same structured approach for developing the first iteration of the Framework, differences among what has been consider inputs from the three domains must be acknowledged. The data analysis of the first case based-assessments is currently ongoing (June 2022). This is the reason why the inputs from the LINKS cases relate mainly to the meetings and workshops carried out both at the cross-case and case level and the results included in the case reports (See Clark N. et. Al, 2022: D6.4).

3.2 Inputs from the DRPV Knowledge Base

Identification and collection from the deliverables

The inputs from the DRPV Knowledge Base can be summarised as follows:

- The DRPV model is the main conceptual input for the development of the Framework from this knowledge base. It is a model to analyse, evaluate and identify vulnerability and risk perception based on diversity, background, interpersonal and individual levels for disaster

risk perception, and diversity, accessibility, connectivity and mobility in relation to vulnerability.

- Conceptual and methodological gaps. Specifically, how disaster risk perception is related to vulnerability and diversity as well as how to overcome a static approach to vulnerability (namely, the coping capacity and the resilience of vulnerable groups are not considered). Methodological gaps mainly refer to: a) the lack of SMCS studies in the European context b) hazard and phase-wise wise, man-made disasters are hardly taken into account and the preparedness phase is more emphasised than others for DRP, while the focus is more on response in relation to vulnerability c) moreover, there seem to be an information gap concerning the validity of the collected information via SMCS, especially linked to the limited access to SMCS of some social groups
- Conceptual needs that refer to diversity, trust and vulnerability. Specifically, the need to promote a diversity approach in DRPV. This entails, for instance, the need to distinguish among vulnerable groups to promote targeted communication; the need to strengthen the trust in communication channels (the most marginalised groups have less trust in official communication channels and prefer using non-official ones), especially for DMOs, and the need to consider vulnerability as a dynamic concept, avoiding to 'freeze' some people in the status of 'vulnerable'.
- Practical gaps. For example, some people have less access to technologies and information. This comes with the risk of increasing social disparities; there is a lack of coordination between spontaneous processes (e.g., spontaneous volunteers) and institutional ones (formal decision-making process and procedures). Spontaneous volunteerism is also a way to remedy the deficiencies of the system. More often than not, vulnerable groups are "outside" the institutional space (invisible or underrepresented); SMCS are not perceived as "learning tools": the common attitude, especially among adults, is to use them mainly for leisure in their spare time. Another gap that seems to emerge is the knowledge gap: specifically, how vulnerable people perceive risks and interpret risks-related information provided on SMCS.
- Registries of existing knowledge (literature review grid, DRP definitions, methodologies and main research questions, bibliography and list of research projects).

Preparation

All inputs (except for *registries of existing knowledge*) have been considered and grouped into themes that serve the purpose of identifying the main themes for the Framework:

- Accessibility.
- Awareness.
- Connectivity.
- Diversity.

- Information flows.
- Mobility.
- Trust.

In-depth explanations of the themes are provided in WP2 deliverables. All themes have been deemed relevant for the development of the main themes and sub-themes of the LINKS Framework. They all speak, directly and indirectly to “Engaging with Citizens” and “Improving Communication” but they have been translated into the Framework through a more planning and operational focus for DMOs: e.g. accessibility feeds into the Framework as “Making information accessible”, namely how DMOs can make sure that information is accessible to all (this also related to diversity). Trust is indirectly captured in “Ensuring the quality of information”. Quality and credibility are in fact interconnected and the latter cannot be ensured without trust. Mobility has been framed along the lines on mobilising volunteers and the civil society, as explained in the previous Section. Diversity is indirectly captured in the “Targeting communication” sub-theme as targeted communication strategies facilitate a more diverse and inclusive approach. As shown below, the need for a better or targeted communication emerged also from the LINKS cases.

Identification, collection and preparation from the LINKS Cases

To identify the inputs from the LINKS cases, the needs and challenges in each case have been considered. This led to the identification of themes which correspond to three key themes captured in Figure 2 (above): **awareness**, **connectivity** (communication) and **trust**.

From the case reports, it can be inferred that there is a lack of knowledge about vulnerability (as a concept) and vulnerable groups. There is not a common approach toward vulnerability. While, on the one hand, this was to be expected, considering the socio-cultural differences, on the other, the degree of sensitivity to vulnerability varies considerably from, e.g., “vulnerable people are always taken into account during an emergency” (case 1, Italy), to “many organisations do not take vulnerable groups into account” (case 2, Netherlands). Across all cases, except for case 5 (Germany, Terror) in which vulnerability has specific nuances and is interpreted differently if compared to other cases, the approach to vulnerability is static or non-existent. For instance, “citizens are all alike” (case 4 Denmark) or “vulnerable groups are not explicitly considered (Germany, Drought), or there is a need “to have some guidelines on how to communicate with them” (case 1, Italy). Moreover, targeted communication is extremely rare.

Identification, collection and preparation from relevant workshops and meetings

The most relevant workshop for identifying inputs is the DRPV workshop was carried out in March 2022. The active participants were the representatives of the LINKS practitioners. This event was preceded by and prepared on the basis of the results of the meetings with the Case Assessment Teams (CAT) leaders in the DRPV Taskforce that supported the works of the first DRPV methodology.

The group discussion was focused on accessibility, connectivity, mobility and diversity and offered interesting insights both on the approach to vulnerability and on specific domain-related tools or products that can help DMOs reach the most vulnerable groups. Regarding accessibility and connectivity, the LINKS practitioners raised the points of the needs (both *identification* and *understanding* of needs) and the importance of using a more targeted communication, for which specific recommendations would be needed. On the other hand, targeted communication may be too selective with the risk of not being inclusive. Additionally, special emphasis was given to the uses of SM by marginalised people and how many can be reached only through SM. Overall, these inputs specify but do not change dramatically the themes identified above.

From the objectives, gaps and needs collected at the case level in meetings and through templates, risk perceptions and vulnerability are not mentioned directly but rather in relation to the more general dimension of inclusion and resilience as in, e.g.:

- Encourage participation of children and young people in disaster risk reduction processed and decision making.
- Engage citizens in updating emergency plans.
- Raise awareness of risks and disasters.
- Promote knowledge of disaster risk reduction.

All these dimensions are embedded in the Educational Toolkit product.

Therefore, the themes identified above can be confirmed and further explored through the lens of at least three macro themes: 1. Knowledge, 2. Inclusiveness and 3. Engagement, captured in the Framework under “Engaging with Citizens”.

In addition, DRPV-related themes emerged also in the user stories, framed along the following lines:

- The need to understand a) “ways and good practices to ensure youth participation in emergency response and decision making to assess how further promote the youth movement and on-line citizenship” and to B) share “experiences and existing mechanisms in Europe to include children and young people in disaster management”; c) which SM channels are preferred by people with disabilities; the possibility of “diving deep into the concept of risk perception and vulnerability” to support socio-economic vulnerable people.

3.3 Inputs from the DMP Knowledge base

Identification and collection from the deliverables

The inputs from the DMP knowledge base can be summarised as follows:

- The DMP Resilience Wheel, is a conceptual model for assessing institutional resilience. The Resilience Wheel was initially designed to assess the uses of SMCS in DMP. The Wheel has four drivers for institutional resilience: credible information, decision-making procedures,

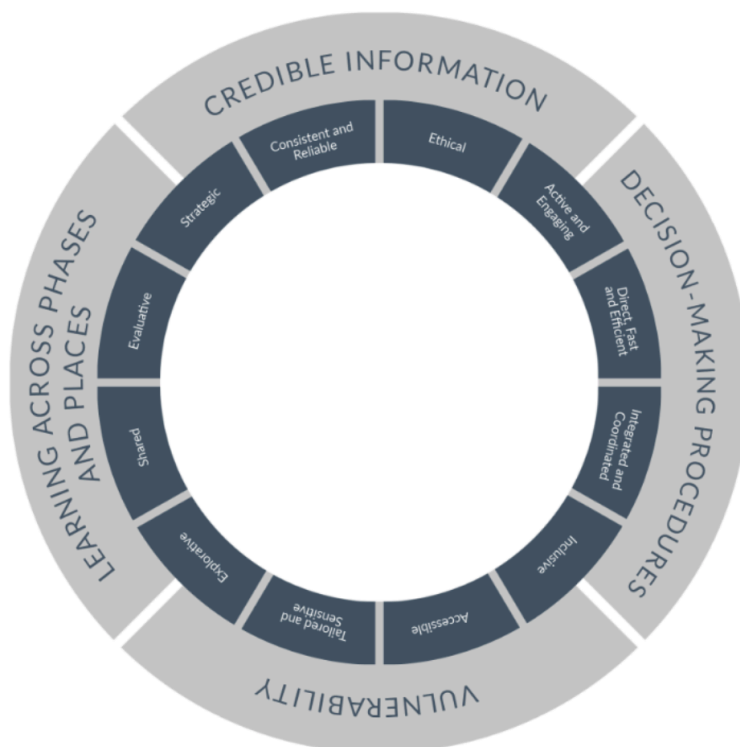
vulnerability and learning across phases and places. **The Wheel is part of the conceptual backbone of the LINKS Framework** since it is its mainstream of inspiration, also visually, through the compass (See: Section 2). The model inspired the development and the main aims of the LINKS Framework. The contextualisation of the Wheel (See: D3.2: 5.2.1 and Annex 2) with the questions related to the main themes included in the wheel was key to developing the approach captured in the user entry point (see Section 2.2) for the LINKS Framework. However, it should be noted that the Framework does not support the assessment of institutional resilience but has more general ambitions. As outlined in the Introduction, the Framework is more focused on strategic planning and on supporting DMOs navigating through specific themes.

- Conceptual and methodological gaps. The most prominent conceptual gap is a “knowledge gap” about the interactions between people, power and technologies. More specifically the lack of a more people-centred approach to address which, the Resilience Wheel has been developed. A “move” towards people would entail that publics are included in processes and efficiently coordinated with official DMP through SMCS. Methodological gaps mainly refer to: a) the lack of comparative and interdisciplinary analyses of the uses of SMCS studies in DMP and b) hazard phase-wise, there is a focus on preparedness and response while a more holistic approach would be needed.
- Conceptual needs that refer to the uses of SMCS in DMP. The needs are exemplified in the four drivers of the Wheel and refer to: 1. Proper allocation of resources and know-how to actively use SMCS in disaster management processes (i.e. decision making procedures); 2. False information challenges and how authorities deal with them as well as ethical dilemmas related to data protection versus the protection of the people in disasters (credible information); 3. The identification and inclusion of vulnerable groups in DMP processes through SMCS and the creation of awareness across all groups in society (institutional sensitivity to vulnerability); 4. The coordination and integration of actors working across the DMC cycle for improved learning and the creation of organisational infrastructure for good evaluation and sharing practices (learning across phases and places).
- DMP research questions, design and methods.
- Registries of existing knowledge (policies, guidelines and frameworks guiding SMCS in DMP, bibliography, a list of research projects focused on DMP and new technologies in disasters and a list of local policies and guidelines).

Preparation

In this case, the preparation was already done through the drivers and the themes included in the Resilience Wheel.

Figure 11: Resilience Wheel – Drivers and Characteristics



Source: WP3's contribution based on Tyler & Moench (2012) and the Rockefeller Foundation & Arup

In-depth explanations are provided in WP3 deliverables (D3.1 and D3.2). As with the DRPV inputs, all the themes included in the Wheel have been key to design the Framework. The thematic drivers in the Wheel (alongside inputs from the other knowledge bases) have guided the data collection in the first case assessments, and the results have informed directly the main themes and sub-themes of the Framework. Based on the results from the cases, the Wheel themes have been further interconnected and refined across the knowledge bases, and integrated into the Framework along thematic lines which helps facilitate strategic planning by DMOs for applying SCMS in disasters. For example, vulnerability is indirectly captured in Targeting Communication (e.g. Target communication for vulnerable groups), while ensuring the quality of information speaks to the main driver Credible information since consistency, reliability and ethical issues relate to the quality of information during disasters. Engaging with Citizens draws on the decision making procedures driver in relation to “active and engaging” and “inclusive”.

Identification, collection and preparation from the LINKS cases

The inputs from the LINKS cases in relation to the needs and challenges in each case have and for each driver are outlined in D6.4.

From the objectives, gaps and needs collected at the case level in meetings and through templates, DMP-related issues are mentioned in relation to the following areas which reflects the drivers and some of the related themes captures in the Wheel, e.g.:

- Involve groups in decision making processes.
- Build relationships among stakeholders.
- Encourage participation in communication processes.
- Ensure unambiguous communication.
- Increase clarity and effectiveness of communication.
- Reduce the gap between alerting and informing.
- Organise, activate and coordinate the work among different stakeholders.
- Install gatekeepers to address misinformation.

Identification, collection and preparation from relevant workshops and meetings

The most relevant activities for identifying inputs were a series of workshop sessions to operationalise the Wheel at local level in all LINKS cases. The outcomes are included in D3.2 (Table 1 p. 23).

In addition, DMP-related themes emerged also in the user stories, framed along, e.g. the following lines:

- The need for “strategies for the involvement of citizens to actively reporting” from the streets” as well as for “guidelines on the uses of social media in the report phase of a terrorist attack e.g., fast handling information from the public”.

3.4 Inputs from the DCT Knowledge base

Identification and collection from the deliverables

The inputs from the DCT knowledge base can be summarised as follows:

- A main gap referring to the lack of relevant information for DMOs to understand and select appropriate DCTs and an overall lack of clarity about the benefits and drawbacks of SMCS in disaster situations. The implications of this are: a) a lack of overview of existing DCTs and their features; b) the lack of application scenarios and examples; c) the lack of a consolidated and structured data on which DCT are used in disaster situations and which DMO have successfully implement them (lack of overview of good practices); d) the lack of common

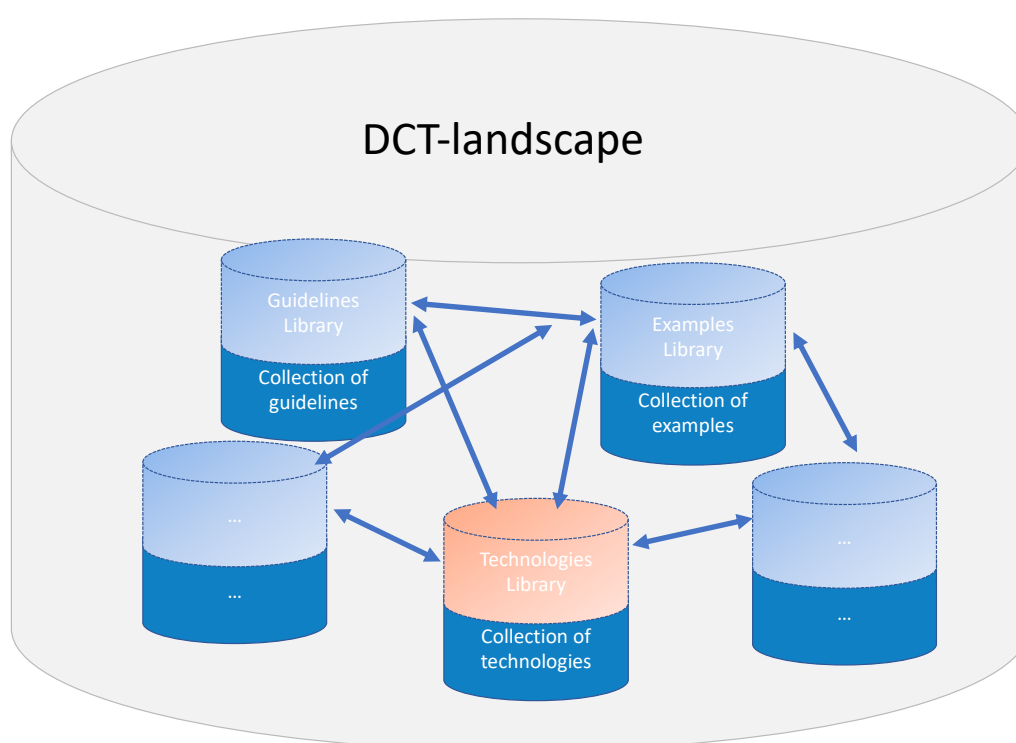
guidelines for effectively understanding and applying DCTs (including how to deal with data protection, quantity, quality, validity and trustworthiness of SMCS information).

- The main gaps and its implications led to the development of the DCT landscape which is a constantly evolving structuring schema revolving around: existing DCT, good practices/application examples, related projects and guidelines for the implementation and usage of DCT (D4.2). This input from the DCT knowledge base has a direct impact on the development of key products feeding into the Framework. It was developed, from the onset, with the aim of providing to DMOs and other stakeholders a comprehensive and consolidated understanding of the DCT usages as well as additional /practical information (examples, projects and guidelines).

Preparation

In the case of the DCT knowledge base, the preparation was already done through the DCT landscape whose elements inform the LINKS Framework, specifically the rationale behind the libraries. As mentioned in Section 2.5, the three LINKS libraries serve the purpose of providing structured overviews and they cut-across all sub-themes. Additionally, one sub-theme directly relates to the technical dimension, namely “Collecting and Analysing Information”.

Figure 12: Draft of the DCT Landscape



Source: WP4's contribution

Identification, collection and preparation from the LINKS cases

To identify the inputs from the LINKS cases the needs and challenges in relation to technical aspects in each case have been considered. This led to the identification of two main themes referring to the **current and future usages of SMCS** by different types of organisations and to the need for better integration and **knowledge of technologies** for the uses of SMCS in crises. For instance, in case 1 (Italy) “an important challenge in the future could be use the social media information about risks as monitoring tool for the civil protection”; in case 2 (Netherlands), emphasis is put on platforms (e.g. WhatsApp) to which organisations have no access to and for which ethical and privacy concerns should be considered: “the challenge is how you can still retrieve information, link it and share it with each other without violating privacy rules or other legislation”; in case 3 and 5 (Germany, drought and terrorism) getting “an overview of easy to use software that can assist in gathering and analysing information from social media would be very helpful” as well as having tools that “help sorting incoming information / navigating quicker through SM”.

In addition, several DCT-related themes emerged also in the user stories, framed along, e.g. the following lines:

- “a database of best practices, templates, tools and documents that are useful for the set-up, operation and various scenarios of social media use in emergency response planning”.
- How to “filter requirements for a technology”
- How to integrate a technology into the existing processes in an organisation

Identification, collection and preparation from relevant workshops and meetings

Products from the DCT knowledge base have been the subject of several workshops and meetings so far (e.g. second LINKS Advisory Committee meeting in February 2022 or two LINKS Community Workshops (“safety camp” in April 2022 and another LINKS Community Workshop with special forces of the police in May 2022). The discussions have led to refinements of the outputs will be explained in more detail in the next knowledge base deliverables.

KEY TAKEAWAYS FROM THIS SECTION

- The inputs from the LINKS knowledge bases come from the state-of-the-art in the three domains the research gaps and comprehensive overviews of knowledge-related landscapes.
- The inputs are rich and varied: only the inputs that contribute directly to the Framework's design are taken into account.
- All inputs from the deliverables have been considered and grouped into themes that serve the purpose of identifying the main themes for the Framework.

- The inputs speak directly or less directly to the two main themes and six sub-themes included in the first iteration of the LINKS Framework.
- The inputs from the case and from relevant meetings and workshops have also been taken into account.

4. CONCLUSION

This document provides a description of the first version of the LINKS Framework. The Framework has been conceptualized to structure the results in LINKS into useful resources for the disaster risk management community, and in particular for Disaster Management Organizations (DMOs). The resources in the Framework are structured around themes and sub-themes to guide stakeholders in their strategic planning for applying social media and crowdsourcing SMCS in disasters. The themes include:

- **Engaging with citizens:** collecting and analysing information, mobilizing citizens, mobilizing volunteers.
- **Improving communication:** targeting communication, ensuring the quality of information, making information accessible.

The themes are connected to learning paths through relevant, guided questions and actionable resources and products, currently under development in the knowledge bases. The six products currently under development within the Framework include:

- SMCS Technologies Library.
- SMCS Guidelines Library.
- SMCS Examples Library.
- Including Citizens Handbook.
- Educational toolkit.
- Resilience Wheel .

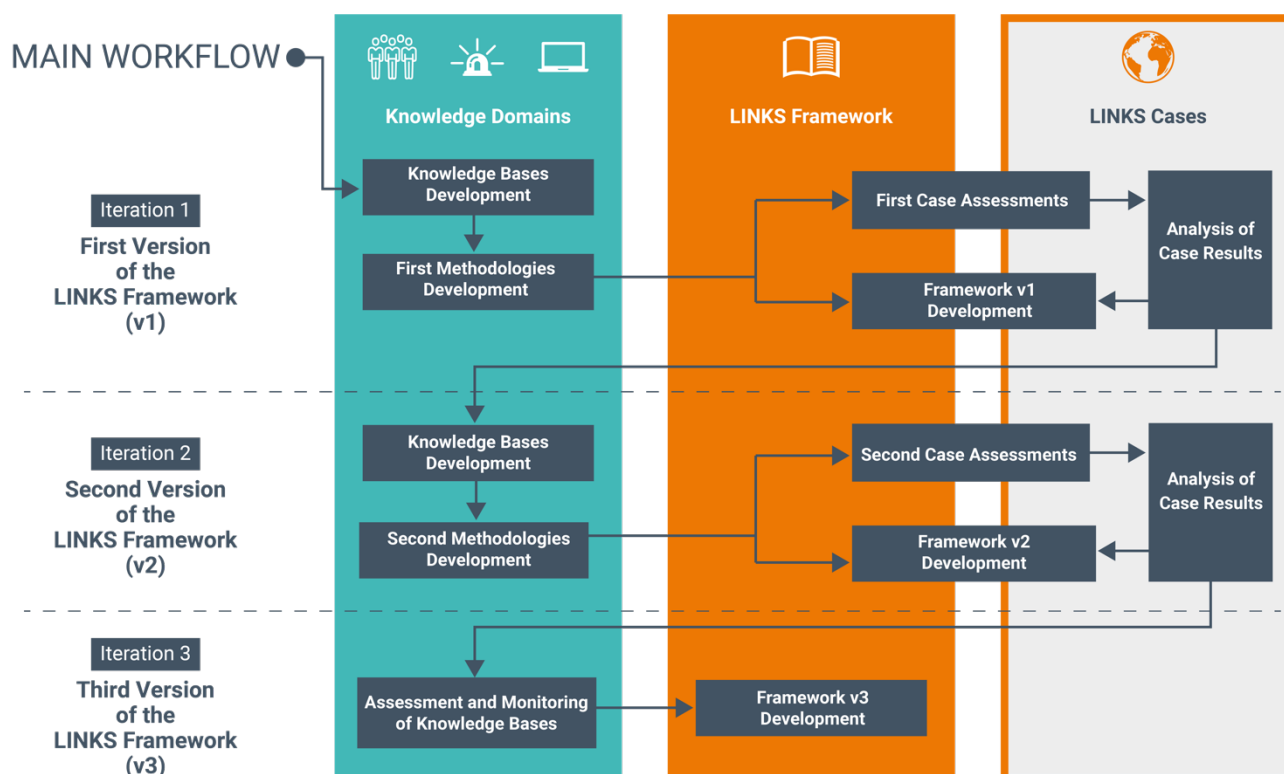
The products and Framework are still in the development phase. Their ongoing development relies on inputs from the LINKS knowledge bases, and from the evaluation processes within the LINKS cases and the broader DRM community. In the following Section, we present the next steps in the development feeding into the second version of the LINKS Framework.

4.1 Next steps

4.1.1 LINKS Framework Version 2

The development of the second version of the LINKS Framework is already underway. As previously explained, the Framework is developed through three iterations during the project lifetime (Figure 12).

Figure 13: Framework Development Workflow



Source: LINKS

Each iteration of the Framework entails a number of steps to incorporate the inputs coming from the LINKS knowledge bases and the LINKS cases into the design.

In the second iteration these steps include:

- Feeding the results from the first round of case assessments into the further development of the knowledge bases and the second set of methodologies (to be ready September 2022).
- Pilot testing the methodologies with the case teams in preparation for the second round of case assessments.
- Conducting the second round of case assessments, both in the cases and with the broader DRM community (beginning November 2022).
- Continuously integrating the findings from the knowledge bases and cases into the second version of the Framework.

The Framework is developed in parallel to the ongoing work under the knowledge bases and the cases. Different levels of assessments and analysis feed into the refining and addition of the content and resources during each iteration. During the second iteration, the second round of case assessments will focus on the evaluation of the products being developed and the usefulness of the Framework as whole. This will be done through user-centric testing with stakeholders in the cases

and within the broader crises community. The LINKS Community Workshops and the LINKS Advisor Committee will also play key roles in the evaluation processes. The Framework will also undergo different stages of integration and testing within the LINKS Community Center in this phase.

In the third and final iteration 3, we consolidate the Framework and deliver the final version for the wider crisis management community and undergo a round of internal and external validation with the broader DRM community.

4.1.2 The LINKS Framework within the Broader Landscape for Disaster Risk Management and Disaster Risk Reduction

It is worth positing the LINKS Framework as part of a broader European and global agenda. Since it revolves primarily around knowledge, the Framework has the potential to integrate and combine with already existing initiatives, mechanisms and networks, such as the EU Civil Protection Knowledge Network⁴, the Disaster Risk Management Knowledge Centre (DRMKC)⁵ and the Community for European Research and Innovation for Security (CERIS)⁶. It is in this landscape that we see the LINKS Framework, as knowledge is at the core of the revised EU Civil Protection Mechanism (2019) and has a prominent role in all main relevant EU initiatives. The emphasis on knowledge, Commission knowledge centres, knowledge exchange, good practices and learning opportunities emerge in the current policy and regulatory context. The ambition of providing a structured set of knowledge, in the format of products and learning paths included in a Framework, is aligned with the growing number of EU initiatives that consider knowledge and knowledge transfer as one of the key pillars for informed and evidenced-based policies (e.g. DRMKC).

The LINKS Framework should be seen as complementary to already existing initiatives, rather than yet another repository of knowledge. It should also be considered as an additional effort to provide *specific* knowledge that, in the long run, can be beneficial to many stakeholders who equally are equally important in the disaster management cycle.

In the context of the EU Civil Protection Knowledge Network and of the DRMKC who led the scientific activities of the Network, the LINKS Framework has the potential to contribute actively to:

- The Learning corner by enriching it with learning materials on the uses of SMCS;
- The **Scientific output repository** through ad-hoc guidelines, policies and regulatory frameworks;

With regard to CERIS, the LINKS Framework can contribute to the thematic area of “disaster resilient societies” by facilitating the identification of research gaps, based on operational needs of the practitioners involved in the case assessments. Additionally, the Framework can support synergies

⁴ https://ec.europa.eu/echo/what/civil-protection/eu-civil-protection-knowledge-network_en

⁵ https://ec.europa.eu/echo/what/civil-protection/eu-civil-protection-knowledge-network_en

⁶ https://ec.europa.eu/home-affairs/secure-safe-resilient-societies/index_en

and exchange of knowledge relevant networks and activities (e.g. Crisis Management Innovation Network Europe).

The knowledge that the Framework will bring the existing landscape focuses specifically on the uses of the social media and crowdsourcing (SMCS) with the aim of governing the diversity of SMCS in disasters. This work contributes to an overall objective of facilitating and promoting collaborative processes to co-create knowledge at the local (community) level for improved disaster resilience. This resonates also with the guiding principles of the Sendai Framework for Disaster Risk Reduction (2015-2030), especially empowering local authorities and communities “through resources, incentives and decision-making responsibilities as appropriate”. Knowledge is an important resource and it is also considered a crucial element in the priorities for action (Casajus Vallers et. Al, 2020).

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