LINKS

Strengthening links between technologies and society for European disaster resilience

D7.1 REPORT ABOUT THE NEEDS AND POTENTIALS OF THE LINKS COMMUNITY CENTER

Research Report

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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 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

The LINKS Community Center (LCC) will be a web-based platform facilitating advanced learning for the LINKS Community by enabling the Community to exchange information and experiences and to access, discuss and assess research results of LINKS, such as the LINKS Framework and the LINKS case assessments. This deliverable creates the foundation for the LCC: It establishes a methodology for the development of the LCC and describes a first version of the needs and potentials.

The development of the LCC is based on Design Science and agile software development. Design Science allows the scientific description and evaluation of the LCC as well as the design process of the LCC as an artifact. This allows other projects with similar goals to profit from the lessons learned during the design process of the LCC. Agile software development allows the flexible adjustment of

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the LCC as the development progresses, as not all needs and potentials are known at this stage and the known needs and potentials might change as the project progresses.

Using a literature analysis, an analysis of similar platforms and a workshop within the project, a first list of needs and potentials was compiled and refined using a follow-up survey. These results are used as the input for the design of the LCC, which will be presented in D7.2 (M12).

A key takeaway of this first analysis is a strong interest in the sharing of practical knowledge (e.g. case reports, proven lessons learned), a moderate interest in communication tools such as a forum and a desire to design the LCC as open and accessible as possible. A tight integration between the content of the LCC focusing on the use of SMCS in disasters and the users of the LCC will uniquely position the LCC within the broad landscape of online communities.

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TABLE OF CONTENTS

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

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

LIST OF TABLES

LIST OF FIGURES

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LIST OF ACRONYMS

Abbreviation / Acronym	Description
CoP	Community of Practise
D	Deliverable
DCT	Disaster Community Technology
DMC	Disaster Management Cycle
DMO	Disaster Management Organisations
DMP	Disaster Management Process
GA	Grant Agreement
LAC	Links Advisory Committee
LCC	LINKS Community Center
LCW	LINKS Community Workshop
LL	Lessons Learned
SMCS	Social Media and Crowdsourcing
WP	Work Package

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DEFINITION OF KEY TERMS[1]

Term	Definition
LINKS Community	A sustainable stakeholder community consisting of multidisciplinary stakeholders from several countries, professions and schools of thought. The main stakeholders involved in the LINKS Community are: practitioners, industry, decision makers, researchers and networks (the scientific community) , citizens and civil society
LINKS Community Center	The LCC brings together different stakeholders (LINKS Community) in one user-friendly and flexible web-based platform and enables them to exchange knowledge and experiences and to access, discuss and assess learning materials on the usage of SMCS in disasters.
LINKS Framework	A set of learning materials, such as methods, tools and guidelines for enhancing the governance of diversity among the understanding of 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 Knowledge Bases	The outputs and knowledge obtained from the assessments of the three knowledge domains. The 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 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.

[1] Definitions are retrieved from the LINKS Glossary (forthcoming).

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1. INTRODUCTION

A key objective of the LINKS project is to build a sustainable, multidisciplinary, stakeholder community consisting of different actors from different countries, professions and schools of thought. It is intended that they will learn and benefit from the project development and outcomes and provide their knowledge and expertise to improve LINKS research. The aim of the LINKS Community is to learn and benefit from the project development and results and to provide their knowledge and expertise to improve LINKS research. An important tool for this purpose is the LINKS Community Center (LCC) as it will be the technical foundation for the online community.

> The LCC brings together different stakeholders (LINKS Community) in one user-friendly and flexible web-based platform and enables them to exchange knowledge and experiences and to access, discuss and assess learning materials on the usage of SMCS in disasters. (LINKS Glossary)

The stakeholders will be able to access materials for advanced learning (included in the LINKS Framework), such as methods, ready-implementable tools and easily applicable guidelines to achieve a more effective use of SMCS in disasters. The evaluation and practical application of the LINKS Framework will be enabled by supporting the LINKS case-based assessments of the Framework. The LCC therefore plays a vital role in creating and fostering a lively community around the LINKS project and the project's results. Furthermore, the LCC can be a valuable tool for establishing and sustaining the LINKS Community beyond the duration of the LINKS project.

The LCC directly contributes to the LINKS project objectives by:

- **Sustainable advanced learning on SMCS in disasters (O1):** Integrating the LINKS Framework in an online environment in a dynamic way which enables stakeholders to access, learn and refine the LINKS Framework.
- **Achieve a consolidated understanding of SMCS in disasters (O2):** Supporting the LINKS case-based assessment of the Framework.
- **Govern the diversity of SMCS in disasters (O3):** Providing visibility of the Framework and project results, and supporting the ongoing validation and evolution of the Framework by the LINKS Community.
- **Bring multidisciplinary SMCS stakeholders together (O4):** Providing an online interface for diverse stakeholders to learn through discussions, collaborations and the exchange of knowledge.

This deliverable creates the foundation for the LCC: It describes a first version of the **needs** (stated demand for a (non-)technical solution) and **potentials** (existing (non-)technical solutions that could match a need) regarding defined stakeholder groups of the LCC. The design and implementation of the LCC will be described in D7.2 (M12). The LCC will be implemented in parallel to the establishment of the LINKS Community and the elaboration and evaluation of the LINKS Framework.

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This deliverable starts by describing an overall methodology for WP7 and the specific methodology for gathering the needs and potentials (Section 2). Existing literature on building an online community and existing online networking platforms are analysed to acquire knowledge on how to build a successful online community platform and which lessons learned by other platforms could be adopted for LINKS (Section 3). The needs of the LINKS project partners and other WPs are documented in Section 4. All identified needs and potentials are summarised, categorised, prioritised and listed in Section 5. The follow-up to this deliverable is presented in Section 6 and a short conclusion is given in Section 7.

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2. METHODOLOGY

The following section presents a brief overview of the overall scientific approach to developing the LCC and an in-depth description of the methodology used for researching the needs and potentials.

2.1 Overall Methodology

This section provides an overview of the general methodology used for the development of the LCC.

2.1.1 General Description

"Design Science" as described by Hevner et al. in (Hevner, March, Park, & Ram, 2004) and visualised in Figure 1 provides the scientific framework for the overall research approach of the LCC.

Design Science approaches a problem or goal in information systems research by designing the solution to the problem as an artifact which is continuously improved and evaluated ('Design Cycle'). In the context of WP7 in LINKS, the design artifact is the LCC.

The relevancy of the designed artifact for the intended environment is ensured in the 'Relevance Cycle'. Requirements (or needs) are gathered from the relevant (and well-defined) stakeholders to ensure that the designed artifact solves actual problems of the intended users and provides an added value. This is validated by field testing together with the stakeholders, completing the Relevance Cycle.

Grounding of the artifact to the state-of-the-art is achieved in the 'Rigor Cycle': established scientific theories and methods as well as previous experiences and lessons learned provide a foundation for the design of the artifact (potentials). Publication of results generated in the Design Cycle (e.g. evaluation reports, own lessons learned), e.g. in the form of deliverables or scientific publications completes the Rigor Cycle and ensures a constantly improving and evolving scientific knowledge base.

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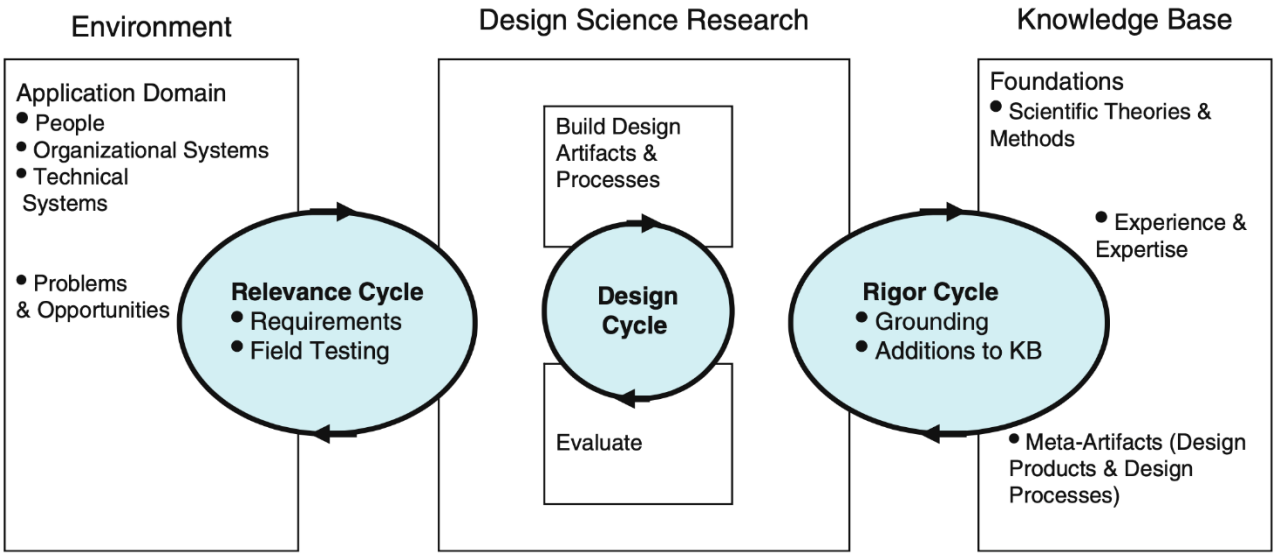
Figure 1: Overall research approach for the LCC



Source: (Hevner & Chatterjee, 2010)

Design Science was chosen as the basic research framework as it provides both a theoretical grounding and practical recommendations and guidelines for the development process. Additionally, it is inherently compatible with the structure of WP7 (see Section 2.1.2) and the actual software design process used (see Section 2.1.4).

2.1.2 Application of Design Science to the Design of the LCC

The general description of Design Science provides structure for this deliverable and all subsequent tasks and deliverables on the design of the LCC. This application of Design Science, taking into account the inputs and outputs of other WPs and tasks in LINKS, is shown in Figure 2. Note that this section provides only a general overview of the WP7 structure, the specific steps and how they relate to this deliverable are described in Section 2.1.3

The **environment** is defined in the first step (T7.1) based on a workshop and a survey, taking into account the outputs and needs of WP2-6 and WP8.

The **knowledge base** for the design of the LCC is based on an analysis of the state-of-the-art of literature and community platforms similar to the LCC as well as the scientific foundation is researched in T7.1. Based on these results, a concept for the LCC is created in T7.2 (taking into account additional information on the state-of-the-art e.g. regarding software engineering) and implemented in T7.3. Completion of the Rigor Cycle is achieved by publishing the experiences and lessons learned during the design of the LCC in the form of WP7 deliverables and scientific publications, allowing other researchers to benefit from them.

The actual design process of the LCC will be conducted in T7.2 and T7.3 and evaluated in T7.4 and in WP6, thus completing all aspects of Design Science.

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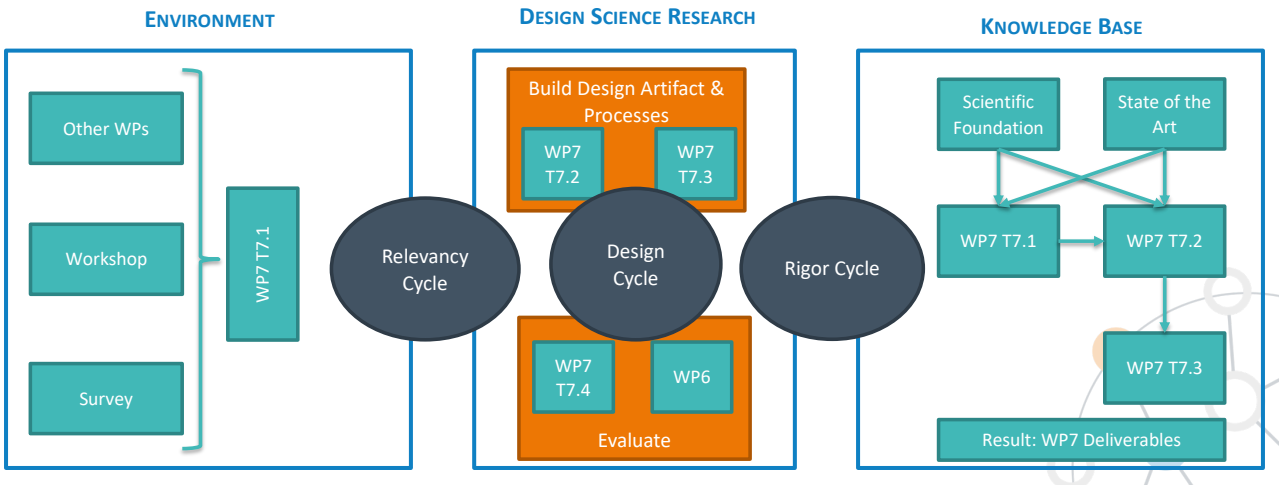
Figure 2: Design Science applied to the design of the LCC



Source: Authors contribution, format based on (Hevner & Chatterjee, 2010)

2.1.3 Deliverable Structure

The main objective of this deliverable is to identify needs and potentials for the development of the LCC. For this purpose, a two-step process is used to identify these needs and potentials and visualised in Figure 3. In the first step, a literature analysis on community building (Section 3.1) and an analysis of other relevant or similar platforms (Section 3.2) are conducted.

The second step is a co-design process together with the LINKS consortium and especially WP2-8. Meetings and brainstorming sessions were organised to lay the groundwork for further collaboration (Section 4.1). Furthermore, a workshop (Section 4.2) and a survey (Section 4.3) were conducted with the LINKS consortium to collect, validate and improve the identified needs.

The collected needs and potentials are compiled and presented in Section 5.They will be used in the requirements engineering process and the development of the LCC in the further work in WP7.

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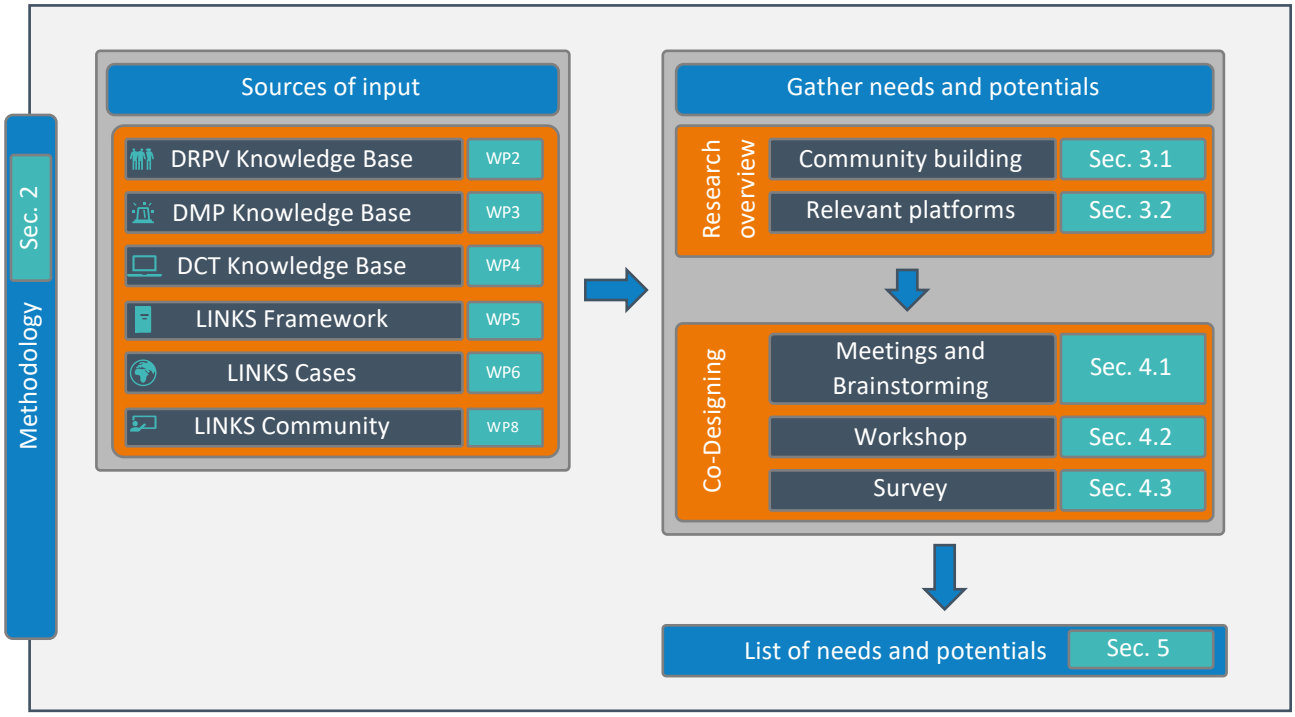
Figure 3: Overall structuring of the Task 7.1



Source: Authors contribution

2.1.4 Software Design Process

Although the main method for the software design process will be described in D7.2, a short explanation will be presented here to complete the overview of the LCC design process. Overall, agile development as described in (Abrahamsson, Salo, Ronkainen, & Warsta, 2002) using the SCRUM method (Schwaber, 1997) is used as the main software engineering methodology. Agile development, in contrast to traditional software engineering, allows for the continuous addition, removal and modification of requirements and the continuous delivery of working product prototypes, making it appropriate for the development of the LCC. Requirements are certain to change as the project evolves and the continuous delivery of prototypes enables a constant evaluation and relevancy testing of the LCC. The incremental software engineering approach also enables a dynamic handling of dependencies between requirements: Once a dependency is identified, it can be resolved by scheduling the development iterations accordingly.

The continuous delivery of the LCC is achieved by using the DevOps methodology (Ebert, Gallardo, Hernantes, & Serrano, 2016), combining the development and operation of the LCC and allowing incremental updates and changes in short time intervals (i.e. every two weeks). The two versions of the LCC defined in the GA (V0 in M16, V1 in M24) are therefore only considered milestones with intermediate versions available for testing. This will allow all stakeholders to influence the design of the LCC while it is still under active development.

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2.2 Stakeholders

While LINKS will initially work with the LINKS Community to gather input for the development of a variety of materials, including methods, tools and guidelines, the Community will also help to validate and test the outputs of LINKS, particularly the Framework. This requires collecting the knowledge of different groups of stakeholders so that they can be actively involved in evaluating the key outcomes of the projects. This approach goes beyond sharing knowledge, as it is about actually developing and evaluating the new information produced by LINKS. Although the LINKS Community plays a role in the overall success of the project, its function in relation to this deliverable is primarily to identify the needs and potential of the LCC. The stakeholders of the LCC, based on the LINKS Community strategy presented in D8.1 (Philpot & Reuge, 2020), are:

- Practitioners
- Industry
- Policy/Decision Makers
- Scientific Community (researchers, networks and related projects)
- Citizens (civil society and vulnerable groups)

One of the main functions of the LCC is to facilitate the exchange of information and experiences and to access, discuss and evaluate LINKS research findings, such as the LINKS Framework through the case assessments. Therefore, while the research review was inclusive of all groups of stakeholders, the co-designing processes focused mainly on practitioners and the scientific community at this particular stage of the process. However, this deliverable recognises that all of the above stakeholders are relevant to the development of the LCC and will be focused on at a later stage of the development process. It is imperative to mention that the involvement of vulnerable groups is of utmost importance and that steps to be inclusive of vulnerable groups can be already taken at this stage, e.g. by making sure that the LCC is compatible with screen readers for vision-impaired visitors.

2.3 Needs and Potentials gathering

The previous section has shown the great diversity within the LINKS community. In this section, the methodology of how the needs of this community for the LCC were identified is presented and discussed. Diversity within LINKS is undoubtedly a positive factor for the overall outcome of the project. However, this circumstance poses a conceptual challenge for the development of the LCC. Although there is a considerable amount of experience in the form of literature and especially from the evaluation of similar platforms, the development of a complex, user-oriented community platform is not a generic task. It is a process with many individual characteristics and needs that must take into account domain and target group specific characteristics. (Leimeister & Krcmar, 2006). Therefore, we could only benefit from third party experience to a certain extent. Thus, a twofold approach was taken (Section 2.3.1): in a first step a literature review was conducted to identify the generic needs of community platform users in general and the needs of stakeholders working in the field disaster

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management organisations (DMO) in particular. The overview offers a definition of terms and basic concepts of community building as well as an analysis of the success factors of online communities. Since communication technologies and social platforms are in a constant state of change, an analysis of similar platforms was conducted. This step can be seen as complementary to the literature analysis, as it expands it with empirical examples.

Although the literature analysis and the analysis of similar platforms delivered an overview of popular and frequently used functions and technologies, a target group-oriented elicitation of requirements was required. Stakeholder involvement in the development process should help to improve expectations of the platform, such as sociability and usability (Leimeister & Krcmar, 2006). Therefore, in a second step, a user-oriented approach was chosen. This approach consists of a workshop (Section 2.3.2) within the LINKS Community and a survey (Section 2.3.3). Both research instruments were deemed the most efficient way to generate empirical data of user needs.

2.3.1 Related Work

A literature analysis on community building provides the theoretical framework for the LINKS Community Center. The analysis was not limited to the topic of community building in the field of disaster management but rather focused on conceptual, theoretical and empirical work on user needs in building a community platform in general. Therefore, a broad approach was taken, including both publications on community building and the empirical studies on the use of SMCS in crisis situations. Accordingly, a variety of sources were considered, including books, scientific papers and project reports. As the aim was to provide an overview for a broad research field, a semi-structured approach according to Snyder was used (Snyder, 2019).

Using the keywords listed in Table 1, approximately 50 relevant papers were identified. The thematic focus was then narrowed on the specific needs of the emergency service community and on papers with a relevant practical implication for the LCC. As technologies are in a constant state of change, the selection of papers mainly focused on the past ten years.

Table 1: Keywords used in text search

keywords	social platform, community building, platform building, virtual communities, research communities, virtual learning communities, community tools, user needs, assessment, platform building, success factors, virtual communities of practice, learning communities

The literature analysis is accompanied by a thorough analysis of platforms related (e.g. due to having a similar goal) to the LCC. While this analysis has been completed in the context of this paper, it is important to highlight that the monitoring of relevant platforms is an ongoing endeavour and thus the list of related platforms will be continuously monitored and expanded during the course of the project.

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An initial list of related platforms was compiled using a variety of sources:

1. Platforms identified during the literature analysis
2. Platforms mentioned in the LINKS Grant Agreement (Table 1.3a of the GA)
3. Platforms suggested by LINKS project participants
4. Platforms identified based on the previous extensive work on community platforms by SIC (the author of this deliverable), acquired e.g. during the projects BMBF-TEAMWORK and H2020-eNOTICE

In the second step, the initial list was filtered to only include platforms which have a similar goal (on a concrete or abstract level, e.g. regarding the networking of DMOs or networking in general) to the LCC and which fulfil some or all of the following criteria:

- The platform is a market leader in its respective field and can therefore provide valuable lessons learned;
- The platform solves a particular problem especially well, so that the problem should not be solved by the LCC again;
- The platform lacks features which could be implemented in the LCC;
- The platform uses innovative approaches which could be relevant for the LCC.

Consequently, the platforms presented in this deliverable are analysed using a Feature Oriented Domain Analysis according to the following categories:

Link	Link to the platform
Goal	Goal or idea of the platform
Positive LL	Positive lessons that can be learned from it
Challenges	Challenges encountered by the platform
Solves	Needs which are already solved by the platform and do not need to be re-solved by the LCC
Gap	Potential features the platform lacks, and which could be implemented in the LCC

Only platforms whose analysis provides significant added value are presented in this deliverable. It is also impossible to deliver a complete overview of related platforms as new platforms might emerge during or after this analysis and some platforms might not be covered by the keywords and criteria used during the research. The further analysis of more platforms will be conducted in T7.5.

2.3.2 Workshop

To reflect the diversity of the LINKS Community and to meet the needs of potential users, a workshop with the LINKS consortium was deemed necessary. Note that this Section only described the methodological foundation of the workshop, the concrete execution is described in Section 4.2. In principle, workshops are good means of knowledge transfer and collection. They enable the active

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and direct exchange of know-how and thus contribute to a better mutual understanding of the participants. Furthermore, depending on their design, they allow for an in-depth discussion of complex issues and are thus an indispensable method of data aggregation in particular and in project development in general. Above all, the direct involvement of participants from different fields and disciplines provides an interdisciplinary understanding of the problems at hand.

In workshops, there is often a tendency for only a few participants to take an active part in the discussion and thus not all those present contribute to the outcome. As a result, important insights are not shared and thus lost for the further research process. To counteract this problem, a mixed-methods approach of learning-teaching methods for cooperative learning was used. The main methods used were the **Think-Pair-Share-Method** and the **3-6-5-Method**. The overarching framework for the workshop was the **Design Thinking** approach.

The **Think-Pair-Share** approach (Bönsch, 2006) is a method for working out problems collaboratively. The main feature of this method is the change from individual to cooperative work. It offers participants the opportunity to discuss an issue first individually, then in small groups and finally with the whole class. In the end, everyone has to become active. The **3-6-5 method** follows a similar approach. First, the problem is formulated. Each participant receives a sheet of paper. The aim is to name three possible solutions in a short period of time. Then the sheet of paper is passed on to the respective neighbour. Each person now tries to add three new ideas. This process is repeated until the sheets of paper are returned to the respective author. Finally, the results are discussed and evaluated in the group.

The time constraints of the workshop made it difficult to use both methods. However, as both methods have their advantages, the methods were combined into one while the **Design Thinking** approach provided the conceptual framework. It has to be noted that the aim is to jointly develop as many ideas as possible for the given problem. It is not about the maturity of the ideas, but about the quantity of approaches and the involvement of the entire group to discover new creative and multidisciplinary ways to solve problems.

2.3.3 Survey

To substantiate the results of the workshop and to gain new insights, a short survey was conducted using EUSurvey[2] about two months after the end of the workshop. The method chosen for this study was an online survey, which is a special form of written survey. In contrast to traditional written surveys, only the medium changes in online surveys. Instead of a letter, the answers are given on an online platform. Nevertheless, this special feature of the survey also brings problems with it: for example, in certain cases the population or the sample drawn is unclear because it is self-selecting

[2] https://ec.europa.eu/eusurvey/

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(Leimeister, Sidiras, & Krcmar, 2003). In the present case, these aspects can be neglected, since both the participants (the LINKS consortium) were defined in advance and the sample was not drawn.

The survey is divided into two parts: The first part consists of a multiple-choice section, whereas the second part consists of a section with open-ended questions, which the respondents are asked to answer briefly. The insights gained from the workshop were refined and summarised and transferred to the survey in the form of multiple-choice questions. The open questions go beyond the existing knowledge and are intended to give indications of needs or potentials that could not be uncovered with the previous methods.

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3. RESEARCH OVERVIEW FOR NEEDS AND POTENTIALS

This Section presents the results of research on the theoretical background of online communities with a focus on resulting needs and potentials (Section 3.1) and existing platforms are also compared and examined for positive properties and gaps (Section 3.2).

3.1 Community Building

This section begins by deriving a definition for the term 'online community' (Section 3.1.1). The research field is narrowed down (Section 3.1.2) and online communities are classified (Section 3.1.3). Then an example of a concept for building communities (Section 3.1.4), success factors (Section 3.1.5) and a brief insight into the specific needs of DMOs regarding SMCS in disasters is given in Section 3.1.6. This section concludes with the implications for the LCC (Section 3.1.7).

3.1.1 Definitions

In the age of the Web 2.0[3] the term 'online community' has become more and more popular, especially in the last two decades with the rise of social media networks (Roser, Ritchie, & Ortiz-Ospina, 2019). 'Online community', 'virtual community' or 'e-community' are used synonymously in literature and practice and are described with similar definitions (de Valck, 2005). In this deliverable the term 'online community' will be used and characterised next.

Firstly, it is important to point out that the basis of the term is formed by 'community'. Based on Hamann, a community can be described as a group of people with social interactions and common interests and ties (Hamman, 2003). Coined on online communities, Preece highlights four basic constituents (Kindsmüller, Melzer, & Mentler, 2009) adapted from (Preece, 2004):

- 'Socially interacting people striving to satisfy their own needs;
- A shared purpose like an interest or need that provides a reason to cooperate;
- Policies in the form of tacit assumptions, rituals, or rules that guide the community members' behaviour; and
- A technical system that works as a carrier that mediates social interaction.'

Combining these points, a definition suited for LINKS and especially this WP is as follows:

Online Community:

> *Online communities connect participants with common interests or needs without spatial or temporal restrictions (e.g. asynchronous communication) and offer a technical platform (e.g. website) on which the participants can communicate (e.g. chat, forum), gain and exchange*

[3] Web 2.0 describes a changed usage behaviour on the Internet in which the user as content creator moves into the focus. Web 2.0 is 'used to describe advanced internet services, especially involving ordinary people creating and sharing information, for example using blogs and social networking'. https://dictionary.cambridge.org/dictionary/english/web-20

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information (e.g. file uploads) or collaborate on community-related topics in compliance with community-specific rules.

This definition is of a general nature. The following definition, taken from the LINKS glossary, specifies the LINKS Community and thus the main target groups of the LCC. In this definition, the different stakeholders are taken into account (cf. Section 2.2)

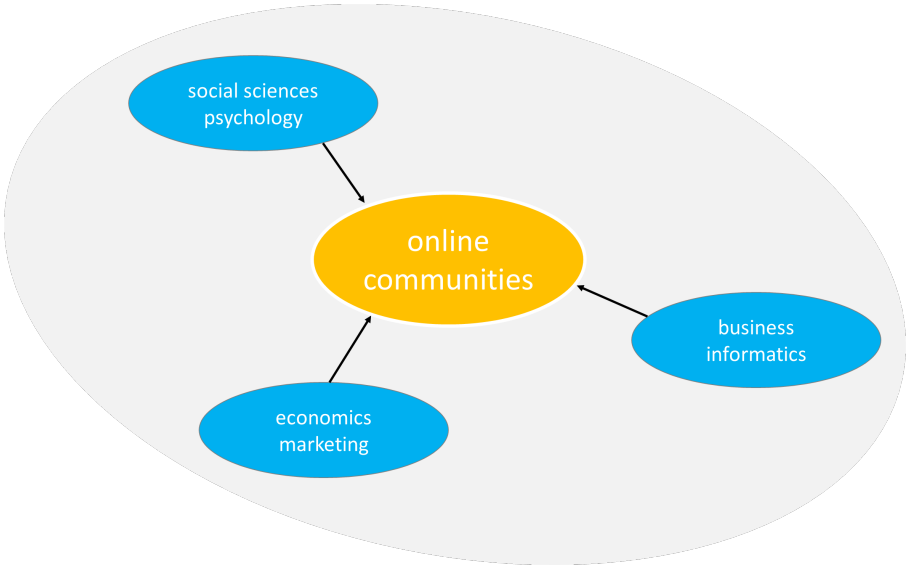
LINKS Community:

A sustainable stakeholder community consisting of multidisciplinary stakeholders from several countries, professions, and schools of thought. The main stakeholders involved in the LINKS Community are: practitioners, industry, decision makers, researchers and networks (the scientific community), citizens and civil society (LINKS Glossary).

3.1.2 Classification of Research

An online community as a research object has several dimensions and can be viewed from different perspectives and thus from different research areas depending on the motive. The research areas most frequently found in the literature are those of the social sciences and psychology, business informatics, and economics, especially marketing. An overview shows Figure 4.

Figure 4: Research areas related to online communities



Source: Authors contribution

The field of **social science and psychology** mainly poses research questions about the motivation for participating in online communities. For example, the motivational drivers to contribute content in community hosted and company hosted online communities got examined by Teichmann et al. with a regression analysis (Teichmann, Stokburger-Sauer, Plank, & Strobl, 2015). A differentiation

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between the factors of opinion leadership (important, influencing members of online communities), self-presentation (both extrinsic), enjoyment and altruism (both intrinsic) was made. Further elaborations regarding psychologic components of motivation can also be found in (Lampel & Bhalla, 2007) or (Zhou, 2011). Closely linked with the motives for participation is the long-term commitment of potential members in the online community.

With the diffusion of information technology into the everyday life of the population as well as almost all business processes, it is not surprising that the **marketing** of companies has also changed fundamentally. Customer loyalty, user behaviour and page views are just some of the key words. Companies use online communities, especially social networks, to strengthen their brands and advertise. A considerable part of the literature found deals with the question of how online communities can be used to generate monetary added value (de Valck, 2009).

The third area, **business informatics**, looks at online communities from a more technical point of view. The implementation of the requirements, which partly arise from the other two research areas, the integration into other processes, networks or company areas and the accessibility for the users are in the foreground. The research and development of application-related issues are also assigned to the area of business informatics. For example, a method to identify online communities in social networks got developed by Khan et al. This was done using algorithms which recognise the same interests or user behaviour and identify them as a connection point (Khan, et al., 2016).

3.1.3 Classification of Communities

In literature and research, there are different approaches to classifying online communities, depending on the focus of the author. Figallo differentiates, for example, according to the type of member behaviour, which can be divided according to the degree of interactivity (topic-specific or to build social ties), the topic focus (specific or general) and the cohesion of the members (loose or family) (Figallo, 1998). Another interesting approach is provided by Porter, in which she differentiates between member-initiated communities and communities initiated by organisations (Porter, 2004).

More comprehensive and geared towards the purpose of the community, Markus developed the approach to differentiate communities according to their orientation (Markus, 2002). She points out that there are communities with a social, professional, and commercial orientation. These three groups differ fundamentally in their purpose and functionality and are shown in Figure 5.

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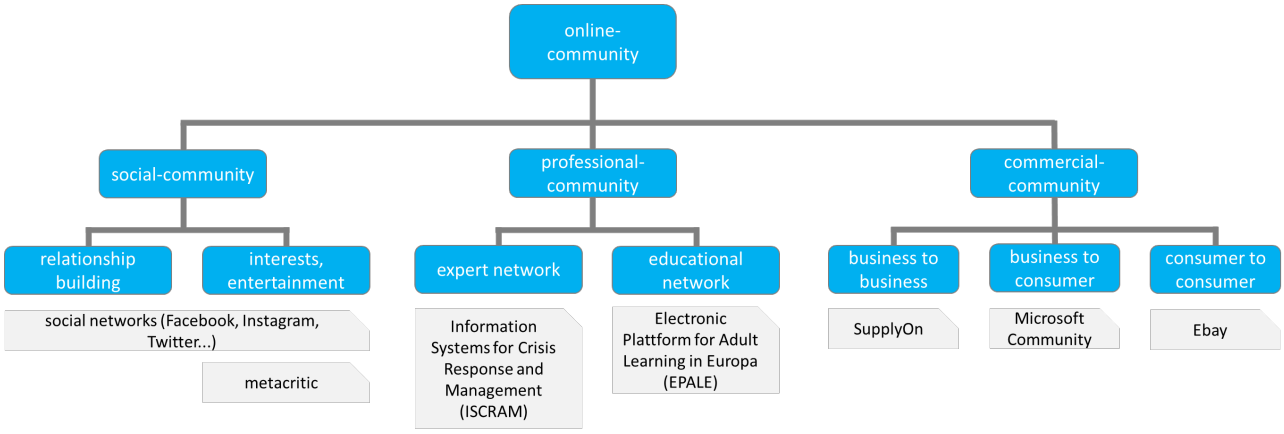
Figure 5: Categorisation of online communities[4]



Source: Authors adaption from (Markus, 2002; Beinhauer, 2003)

According to Markus, individuals meet in a **social-community** for two basic reasons. The first is to build and strengthen social bonds, e.g. by forming new social contacts and maintaining them through communication. The most popular platforms for these purposes are of course the social networks such as Facebook, Twitter and co. Another form of the social community arises from the common interest in a certain topic. That can be very diverse, e.g. the interest in film series, video games, or specific hobbies.

Professional-communities have their origin in the treatment of topics from the mostly professionally motivated environment. The motivation for participation lies in the opportunity to establish contact, exchange information, and collaborate with people outside of your own organisation or working group. On the second level, Markus differentiates between expert networks, in which a topic is to be further developed, especially through collaboration with other experts, and educational networks, in which the primary goal is to make the collective knowledge available to interested target groups. In this context, the term **Community of Practice** (CoP) is also widely used. 'CoPs are self-organized groups of people who share a common interest in a specific knowledge domain.

[4] Metacritic is a website that aggregates ratings for movies, DVDs, music, computer games, books, and TV shows as weighted averages from other rating sources. Users can discuss each title and express their own opinion in a separate user score https://www.metacritic.com/.
ISCRAM is an international community of researchers, practitioners, and policy makers around the development and use of information systems for crisis response and management (https://iscram.org/).
EPALE is a European, multilingual, open community for professionals in the field of adult education, including teachers and trainers, instructors and support staff, researchers and academics and politicians. It is funded by the Erasmus + program and is part of the European Union's strategy to promote more and better learning opportunities for all adults. https://epale.ec.europa.eu/en
SupplyOn is a community developed by the German automotive supplier industry to bring together suppliers in the areas of purchasing, engineering, and logistics. The aim is to achieve commercial advantages and exploit synergies. https://www.supplyon.com/
In the Microsoft community, users can ask questions about various products and receive answers from Microsoft experts. In addition, users can discuss with each other and give their own tips. https://answers.microsoft.com/en-us

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They regularly exchange ideas about different domain specific topics, further develop their knowledge and acquire new skills together.' (Kopf, Sauermann, & Frey, 2018)

The third group, **commercial-communities**, arise from the motives of making a profit, gaining market advantages, or doing advertising. The second level of commercial communities can be derived from the target groups. Business to business communities target supply chains or collaboration between companies. Business to customer communities are used by companies to support targeted products and as an instrument for customer acquisition and retention. Customer to customer communities are mostly operated by professional providers, but the transactions are made between users.

With the increasing relevance and accessibility of **social networks**, it should not go unmentioned that social networks are no longer only used to maintain and build social connections. Rather, social networks nowadays also serve business purposes (Zaglia, 2012). For example, they are the main marketing instrument of almost all companies, are used to maintain business relationships or to communicate between globally networked experts on specific topics. With regards to LINKS and from the perspective of disaster management organisations (DMO), social networks also serve the purpose of information dissemination, data monitoring and analysis as well as enable conversations with citizens and control of coordinated action (cf. D4.1 of LINKS).

3.1.4 Concept for building an Online Community

In the literature and practice there are some concepts for building and maintaining an online community. What unites all concepts is the need to define target groups and analyse their needs and motivation to participate in the community. The concept presented here by Porter et al. should serve as an example of what kind of issues a community operator has to deal with. It does not include any technical implementation, but content and community-related aspects.

A three-stage concept for creating framework conditions to foster and sustain member engagement in an online community was created by Porter et al (Porter, Donthu, MacElroy, & Wydra, 2011). The community was viewed from the perspective of a company as the initiating operator and customers as participants. In order to answer the research question ('How do I build and maintain a community?'), a both qualitative and quantitative data collection was conducted. Over 650 participants from 60 different communities were asked about their motives and behaviour. Eight community managers were also asked in an expert interview about their development process with a particular focus on the involvement and engagement of the participants. The results form the basis of the model shown in Figure 6.

As the literature research shows, due to the agreement in terms of content with other concepts, the specification for companies and customers is irrelevant and can easily be adopted as a theoretical concept for the LCC.

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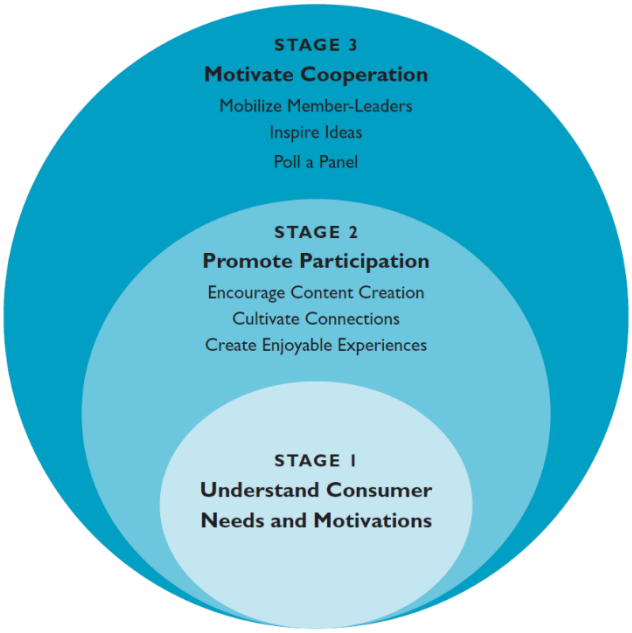
Figure 6: Three staged concept on how to foster and sustain engagement in online communities



Source: (Porter, Donthu, MacElroy, & Wydra, 2011)

The core of the three-stage concept and at the same time the first step in building a community lies in collecting and understanding the 'needs and motivations' of potential users (here: customers). The survey already mentioned for this provided the following needs of the participants:

- **information**: members need access to information that helps them to learn, solve problems, and make decisions
- **relationship-building**: members seek to build relationships through interaction
- **social identity/self-expression**: members want to achieve an emotional and cognitive connection with the community and be perceived as a member
- **helping others**: members enjoy helping other members
- **enjoyment**: members enjoy when their work and expertise in certain areas is recognised and valued. belongingness: members desire a sense of attachment to a community
- **status/influence**: members seek status, influence, and standing within a community

The needs identified are all based on intrinsic motivation. For the development of the community, the objective should always be to keep an eye on the needs and to be able to meet them if possible.

Stage 2 'Promote Participation' of the concept now includes extrinsic motivation and should answer the question of which factors can bring potential members to participate. Three measures are proposed:

- **encourage members to contribute high-quality content**: Porter et al. affirm that a community operator must not assume that the participants contribute good content by themselves simply because of the intrinsic motivation. Rather, there must be a stimulation to

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inspire content. This could include steps such as ranking and highlighting particularly helpful posts, community events based on contributions (e.g. webinars to specific topics) or enabling and promoting member-driven blogs.

- **cultivate connections among members:** This aspect is aimed at the question of what, in addition to intrinsic motivation, can also motivate members extrinsically to help other members with questions or problems. One possibility is, for example, to give the particularly helpful and qualified members the opportunity to build relationships with one another. This can be done, for example, by forming sub-groups within the community.
- **create enjoyable experiences for members**: The third measure to create an incentive to participate in the community aims to give the participants a status of fun. This can turn out differently depending on the community and can be seen as done once the intrinsic incentives have been met. In addition, there is, for example, the possibility of influencing externally through community games or the presentation of success stories.

The third stage 'Motivate Cooperation' focuses on the targeted empowerment of certain members. These members have proven to be particularly committed and motivated and are able to generate value in the community for the operator. The aim is to answer the question of how the members addressed can be integrated into the control and operation of the community. The authors suggest the following measures:

- **mobilize member leaders**: Particularly committed members, whether intentionally or unintentionally, take on a representative function of the community and through good integration they can be given the opportunity to help shape and develop the community themselves. This should be done consciously and through addressing by the community operators.
- **inspire ideas from members**: A permanent screening for good ideas of the community members should be implemented.
- **poll a panel of members**: The most valuable members of the community can be empowered in a special way and, based on mutual trust, be granted exclusive influence on the community or the organisation behind the community. This can mean, for example, participation in products, research projects or professional prospects.

The approach shown by Porter et al. is just one of many approaches to building a community that can be found in literature and practice. Another, often cited approach is provided by Amy Jo Kim in which community building is divided into nine individual design strategies (Kim, 2000). Kraut and Resnick provide an approach to community building resulting from a five-year research project called *CommunityLab* (Kraut & Resnick, 2011). It is based on theories of social science and create empirical evaluation through experiments and statistics on participation in online communities.

3.1.5 Success Factors of Online Communities

The success of a virtual community is already determined in the conceptual phase (Leimeister & Krcmar, 2006). Thus, operators of a community platform should already consider which problem focus the platform will serve and which potential user groups should be addressed. Accordingly, a

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suitable technical architecture must be chosen. An important step here is the early involvement of potential users in the process of analysis and implementation. But the involvement of users goes beyond the development phase. A basic understanding of the user community should be continuous feedback loops generated and evaluated during full operation (Leimeister, Sidiras, & Krcmar, 2003). The results should then be translated into appropriate features. In this context, the development of a community platform must not be understood as a technical process alone. Rather, it requires a social framework that is relevant to the user. Even though it is difficult to realize, the platform should relate to the everyday life of the users and be implementable in everyday routines (Leimeister & Krcmar, 2006).

When developing the technical infrastructure, the factors of stability/reliability should be taken into account. In surveys, participants named the technical reliability of the platform as far more important than failed or missing functions (Lin, 2007) (Leimeister, Sidiras, & Krcmar, 2003). Therefore, a sound technical foundation, which is adequate to the task at hand is necessary.

But the most frequently mentioned criteria in the literature for the success of an online community are usability and usefulness (Lin, 2007) (Preece, 2010). **Usability** usually describes the degree to which a particular technology can be used without much effort. It entails aspects such as layout, colour, graphic and font design to questions of consistency. For example, the system should be intuitive for the user and have a consistent appearance. This way, users can fall back on what they have already learned and do not have to relearn it over and over again. Thus, functions and operating elements should be clearly visible. It is also helpful to allow convenient access to the platform. The aspect of sociability is closely related to usability. **Usefulness** describes the degree to which users can draw relevant information from the platform for themselves or their work. Here, the members play a fundamental role, as they are ultimately the basis for generating the content. For this, however, reaching a critical mass is relevant. The success of a platform can ultimately depend on whether and how quickly the operators succeed in reaching this mass (Leimeister & Krcmar, 2006). To this end, active engagement in the community and moderation of the platform is often recommended. Finally, the success and longevity of the community depends on the quality of the information provided, as it correlates with perceived usefulness (Lin, 2007). Hence, providing useful, easily accessible content is essential.

3.1.6 Empirical Evidence of Stakeholder Needs

The concept of community building and the success factors of online communities offered a broad introduction to the need for online communities without addressing the specific needs e.g. of DMOs (practitioners). Therefore, a brief needs analysis from the perspective of DMOs is presented below. These needs do not necessarily relate to the field of community building but are selected according to the extent to which the needs of DMOs could be met by the LCC.

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In surveys on social media use by DMOs a recurring theme is often a lack of both the time and the human resources to deal with the use of SM in DMPs (safety innovation center e.V., 2020; Rao, Plotnick, & Hiltz, 2017). The topic is often seen as very time-insensitive and outside their own domain of knowledge. This is accompanied by a lack of experience and support in the effective use of SMCS. This results in non-use or underutilization of the potentials of SM. Furthermore, in disaster situations, where social media can fuel public opinion about how first responders handled the disaster, this can lead to public relations misunderstandings in the aftermath of crises (Kalson, 2015).

Organisations that have the capacity to engage in SM only as a dissemination tool, lacking a coherent SMCS strategy. In addition to inexperience, they cite being overwhelmed with the amount of information generated by the content produced by the users of the respective networks as a reason (Rao, Plotnick, & Hiltz, 2017). Furthermore, it is often stated that the uncertainty in the handling of SMCS is partly due to the lack of guidelines, manuals and clear rules for the effective use of SMCS. This finding is also supported by the results in Deliverable 3.1 (Nielsen & Raju, 2020) and 4.1 (Habig, Lüke, Sauerland, & Tappe, 2020) of LINKS.

3.1.7 Summary and Potentials for the LCC

This section provides a brief overview of procedures for building online communities and their success factors. For the development of the LCC, no choice should be made at this point on a specific procedure, but rather provide an orientation for the steps ahead in the development of the LCC.

The process described by Porter et al. shows a strong focus on retaining and engaging members within the community. As research has shown, most community building models begin with an analysis of the needs of potential members. This also explains the content of the following sections, in which the needs and potentials of the potential members of the LCC are collected. The literature research on community building contains important and essential steps for the future development of the LCC. The following aspects must be taken into account:

- definition of the target groups and stakeholders
- extensive analysis and collection of needs and potentials (including considerations for specific learning needs and objectives – see D5.1).
- inclusion of different research disciplines as the basis for the technical implementation
- definition of the community type of the LCC and demarcation from other communities in this area
- analysis of different community building concepts and application of these to the concrete implementation of the LCC development. This includes for example:
    - a motivational concept for participating in the community, especially the long-term motivation
    - incentive systems for contributing content
    - developing a role model with different users and authorizations
    - measures for the long-term existence of the LCC (beyond the project)
    - establish measurement criteria for the success of the community

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These fundamental recommendations for the planning process can be supplemented by the results of the analysis of the success factors. Essential recommendations are:

- early involvement of potential users in the process of analysis and implementation
- continuous dialogue with the stakeholder
- ensure maximum usability
- provide usefulness for the stakeholder
- offer quality content
- active engagement in the community and moderation of the platform

The brief overview of stakeholder needs is somewhat out of the ordinary. While so far mainly the factors for good or successful community building have played a role, this short analysis gives an insight into the needs of relevant stakeholders without a specific reference to community platforms. The idea behind this brief analysis was to analyse the needs of DMOs from an empirical perspective and to derive potentials for the LCC. It also provided useful insights that are relevant to the empirical part of this work.

The hindering factor for the use of SMCS by DMOs are often resource problems (see also D3.1). While the LCC cannot provide solutions to monetary, human resource or time problems, it is mainly in the area of expertise that the LCC excels. One of the main problems described by DMOs was that they do not have the resources or at least low-threshold access to information that would allow small or understaffed DMOs to delve into the topic.

A key objective of the LCC can therefore be to provide a platform where stakeholders can network to learn and share concepts and ideas on the use of SMCS. The basis may be condensed versions of the three knowledge bases (**learning**) combined with social or collaborative aspects (**interaction**) and embedded into a **motivation** concept. It remains to be determined in the further course of development which aspects, factors and functions will be taken into account.

3.2 Relevant Platforms

To benefit from the lessons learned and to position the LCC within the broader landscape of networking platforms, a short analysis of related technical platforms with a focus on their features, the needs they already satisfy and the potentials they create for the LCC is conducted in this section. As there is a myriad of similar platforms, only a short excerpt based on the criteria in Section 2.3.1 is presented in this deliverable. A complete analysis of similar networks will be conducted in T7.5 and presented in D7.7 and D7.8.

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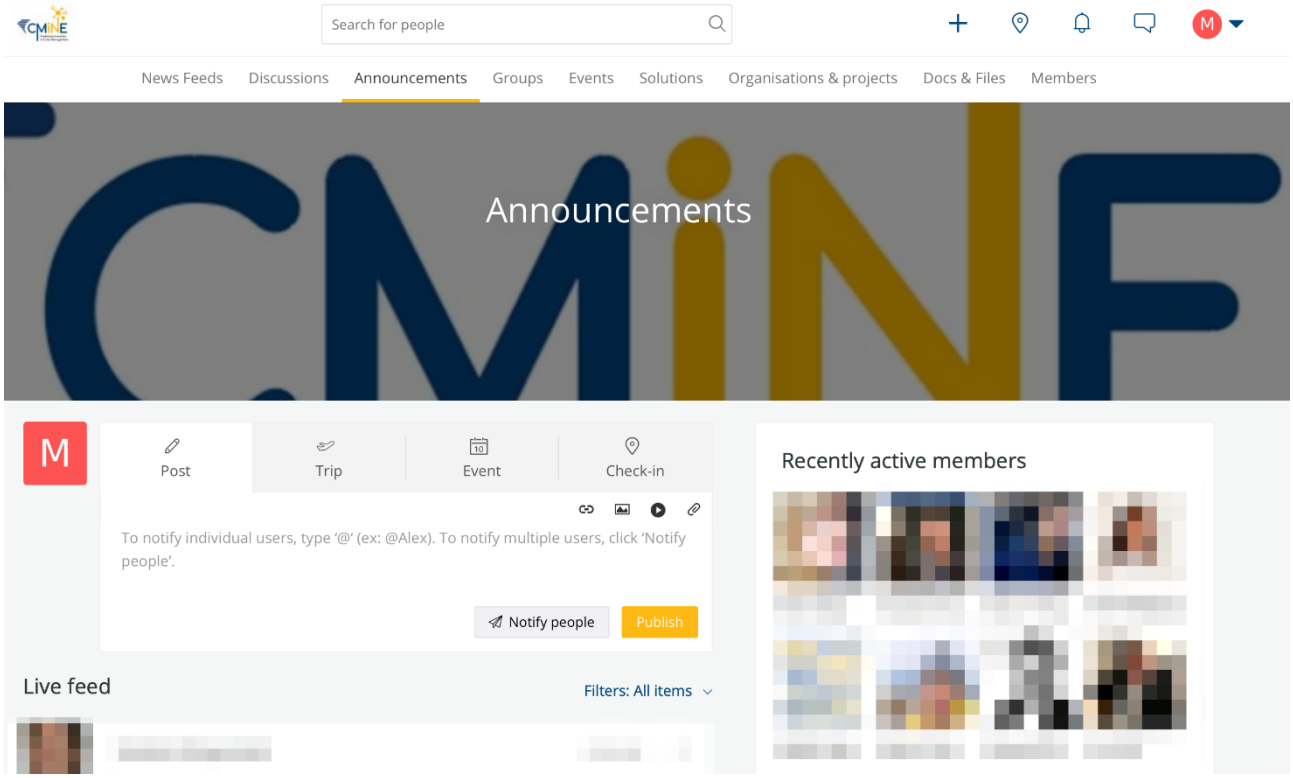
3.2.1 CMINE

Figure 7: Screenshot of CMINE



Link	https://www.cmine.eu
Goal	Generic crisis management networking platform for Europe
Positive LL	• Providing a project-independent networking platform is possible • Establishing a networking platform beyond the end of its project (DRIVER+) in a sustainable fashion is possible
Challenges	• Maintaining user activity once projects conclude is difficult
Solves	• Large directory of users • Social networking features similar to Facebook • Project-independent overview of events taking place in the security research community
Gap	• 'Portfolio of solutions' (a catalogue of technological solutions) is technology and use-case agnostic and therefore lacks significant filtering capabilities • All networking features (i.e. forum, filesharing) are subject-agnostic by design, leading to only a weak connection between content and technical features • Users are specific to the crisis management domain

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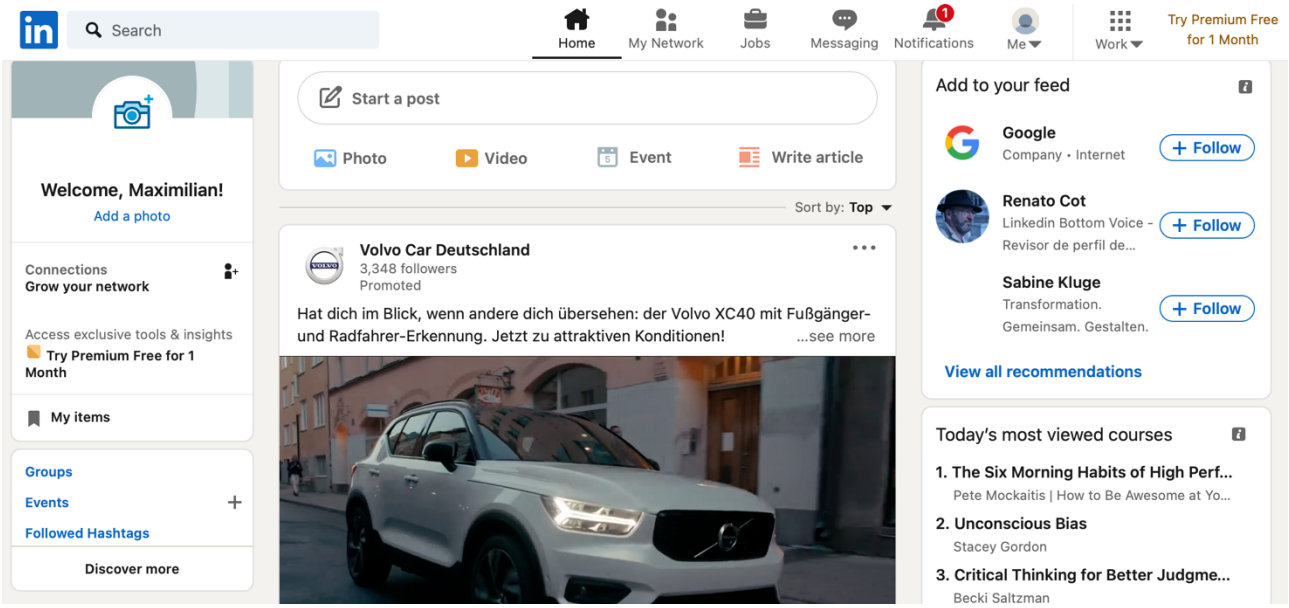
3.2.2 LinkedIn

Figure 8: Screenshot of LinkedIn



Link	https://www.linkedin.com
Goal	Provide a generic professional social network
Positive LL	• Specific interest groups can engage in lively exchanges on LinkedIn
Challenges	• Privacy concerns (i.e. LinkedIn being a commercial company) inhibit the free sharing of information
Solves	• Many professional stakeholders are already members • Many 'social' features similar to those provided by Facebook (e.g. wall, posts, photos)
Gap	• Any content-specific specializations or features

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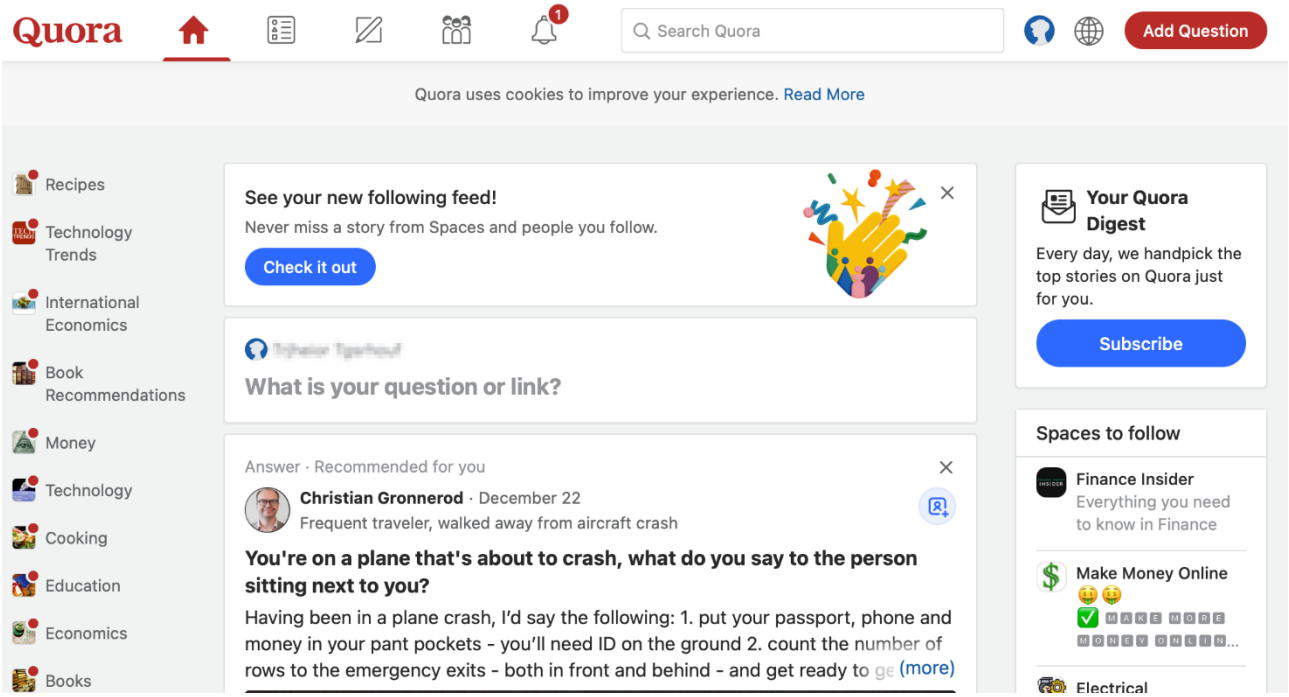
3.2.3 Quora

Figure 9: Screenshot of Quora



Link	https://www.quora.com/
Goal	Focus on asking and answering questions with answers often provided by high-profile users or subject matter experts
Positive LL	• Voting on answers provides all network members the opportunity to contribute and improves the quality of answers
Challenges	• Privacy concerns (i.e. Quora being a commercial company) inhibit the free sharing of information
Solves	• Asking interesting questions to a broad audience
Gap	• Social aspects • Content-specific features • A specialized audience for the field of public safety and security • The possibility to ask and answer questions in private

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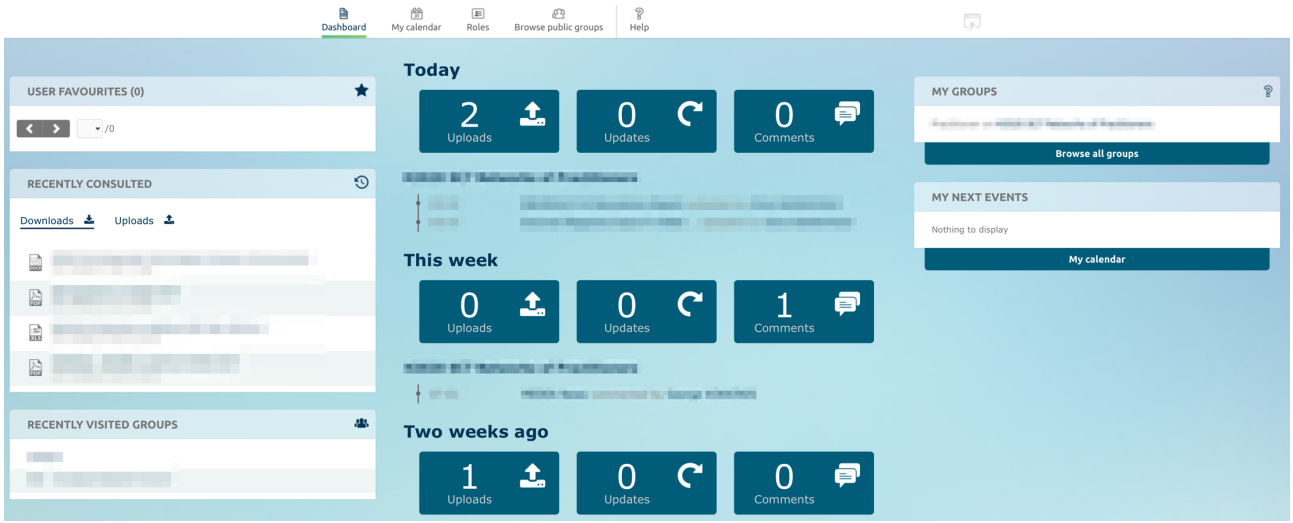
3.2.4 CIRCACB

Figure 10: Screenshot of CIRCACB



Link	https://circabc.europa.eu/
Goal	Networking and information sharing within and with the European Commission
Positive LL	• Closed networks can be used across a broad array of domains and use cases if mandated
Challenges	• Activity is only group-based with no easy way of identifying and joining active groups
Solves	• High-level networking within very specific interest groups
Gap	• General user base • Easy access to information • Content-specific features

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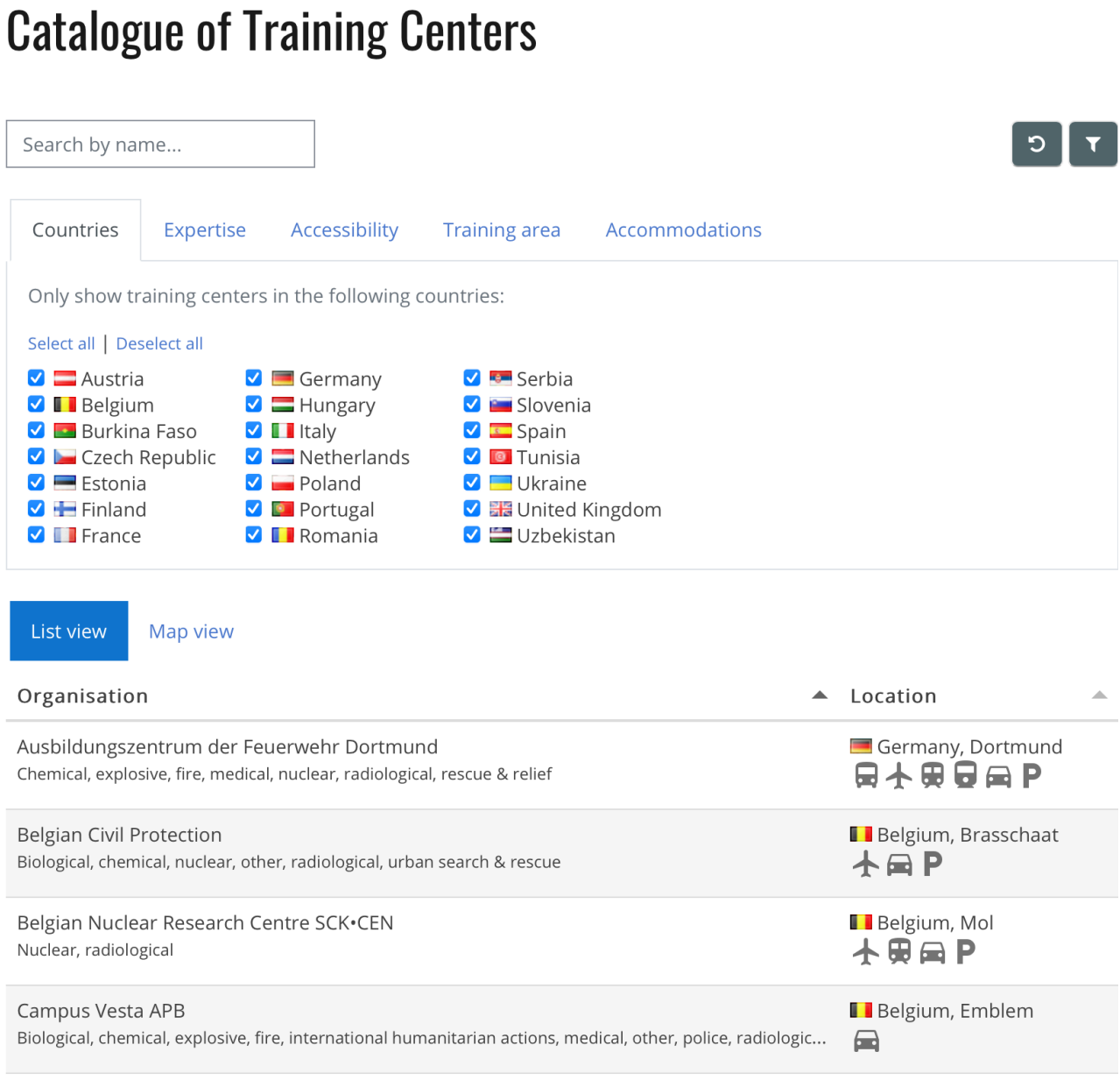
3.2.5 eNOTICE

Disclaimer: SIC is a partner in eNOTICE

Figure 11: Screenshot of eNOTICE



Link	https://www.h2020-enotice.eu
Goal	Providing an information and communication platform for Chemical, Biological, Radiological and Nuclear Training Centres in Europe
Positive LL	• Relevant information can be provided to stakeholders not familiar with the security research domain though low-threshold online tools

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Challenges	• Constant motivation and fostering is required to achieve an organic and active online community
Solves	• Provides some content-specific features (e.g. catalogue of Training Centers), but they are not collaboration-based
Gap	• Most of the community is behind closed doors and the information is not public • Networking features are mainly based on a forum

3.2.6 Other

The following section presents some networking platforms which were not analysed in detail, but which might still provide valuable insights.

3.2.6.1 SEC21

The SEC21 call established 11 networks of practitioners with specific thematic (e.g. eNOTICE, NO FEAR) or geographic (ARCSAR, DAREnet) focuses[5]. However, most of these networks do not provide a publicly accessible networking platform and require a registration and approval processes before a visitor can see the benefits of joining the community. This creates a hurdle for potential members of the community and should be avoided for the LCC.

Some of the SEC21 networks use CMINE as their networking platform, making it significantly easier for new members to sign up and allowing the networks to integrate into the wider community represented on CMINE. Unfortunately, this removes any possibility for customization of the networking platform and prevents content-specific features from being implemented, as the networks are completely dependent on CMINE. This could also be problematic from a sustainability perspective as the availability of CMINE is only guaranteed until June 2023[6].

3.2.6.2 ENGAGE, RESILOC and BuildERS

ENGAGE[7], RESILOC[8] and BuildERS[9] are sister projects of LINKS also developing networks or networking, knowledge or cloud platforms. Although no concrete information is available on the specific features of their platforms, collaborations could be initiated in the future to avoid duplicating work and to find and exploit synergies.

[5] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/sec-21-gm-2016-2017
[6] From: https://mailchi.mp/8946299511ec/driver-results-cmine-34?e=31cc7f54b1
[7] https://www.project-engage.eu/knowledge-platform/
[8] https://www.resilocproject.eu/cloud-based-platform/
[9] https://buildersproject.eu/

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3.2.6.3 TEAMWORK

The German research project TEAMWORK[10] focused on creating interactions and collaborations between ordinary citizens and practitioners with the goal of increasing the resilience of the overall population by using serious gaming. Citizens and practitioners could create virtual worlds (i.e. based on their own hometown) and then train emergency response procedures in the virtual world together. It achieved most interactions and collaborations through the creation of dedicated online and offline events: Livestreams and workshops proved to be efficient and necessary tools for activating the community and achieving good project results. A continuation of such events should therefore be strongly considered for LINKS.

3.2.7 Conclusion

The analysis of already existing networking platforms has identified some needs which are already sufficiently solved but also identified some potentials which could be relevant for the LCC. In particular, many platforms seem to solve the 'social' aspect of networking (i.e. LinkedIn, CMINE) through contacts/friends, posts and social walls. However, none of the analysed platforms seemed to build a strong connection between the people on the platform and domain-specific content (SMCS in the case of LINKS).

[10] https://www.teamworkprojekt.de/, members of SIC were also partner of TEAMWORK

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4. CO-DESIGNING NEEDS FOR THE LCC

This Section presents an overview of the co-design process of the needs for the LCC within the LINKS consortium.

4.1 Meetings and Brainstorming

Co-designing, coordination, and brainstorming sessions together with WP5 (Development of the LINKS Framework), WP6 (Evaluation of the LINKS Framework) and WP8 (LINKS Community Workshops) were used as a starting point to create a shared vision of the LCC, to best find and exploit synergies and to get an initial overview of the needs for the LCC. Based on this initial cooperation, the other LINKS project partners were invited to contribute their ideas and opinions in a joint workshop and a survey as described in the following sections.

4.2 Workshop on the Needs

A Design Thinking workshop was organised jointly with the work packages 5-8 online on December 10th, 2020 with the participation of 14 project partners. The goal was to identify and collect ideas, expectations, and needs for the LINKS Framework (WP5), the LCC (WP7), and the LINKS Community (WP8). [11] For this purpose, three worksheets were designed. With these worksheets as a basis, it was the task of the participants to actively share their thoughts, expectations, and ideas on the need and potentials of the LCC in discussion rounds that built up on each other.

The organisation of the workshop is described in Section 4.2.1. The LCC worksheet is presented in Section 4.2.2. The ideas and input from the collaborative work of the project partners regarding the LCC is summarised in Section 4.2.3.

4.2.1 Organisation

As described, the general idea of the workshop is to work in small discussions groups in several rounds on a mind map-like worksheet. One important aim was to involve all project partners in the upcoming development of the LCC. Of the 15 project partners, 14 took part in the workshop with at least one person, which resulted in a total of 18 participants.

The participants were split into five pre-determined, diverse groups (Group 1-5). To meet the objective of the workshop and to get a representative picture of the reality from multiple perspectives, the groups were made up of participants from different stakeholder groups. Accordingly, each group consisted of a mixture of participants from academic institutions, first responders, public authorities, and civil society organisations. The sequence of the workshop is shown in Figure 12.

[11] For the initial results on the Framework in from these events, see deliverable 5.1 Work Plan for the LINKS Framework (Fonio & Clark, 2021).

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Figure 12: Sequence of the workshop on December 10th, 2020

	Group 1	Group 2	Group 3	Group 4	Group 5
Blue Round	LINKS Framework A *Facilitator 1*	LINKS Community Center A *Facilitator 2*	LINKS Community A *Facilitator 3*	LINKS Framework B *Facilitator 4*	LINKS Community Center B *Facilitator 5*
Green Round	LINKS Community A	LINKS Framework A	LINKS Community Center A	LINKS Community B	LINKS Framework B
Red Round	LINKS Community Center A	LINKS Community A	LINKS Framework A	LINKS Community Center B	LINKS Community B
Orange Round	LINKS Framework A	LINKS Community Center A	LINKS Community A	LINKS Framework B	LINKS Community Center B

Source: Authors contribution

Three different worksheets were created as a mind map with the following topics to serve as a template and basis for discussions:

- LINKS Framework (WP5) from the partner VU
- LCC (WP7) from the partner SIC (highlighted in Figure 12)
- LINKS Community (WP8) from the partner EOS

The workshop consisted of four rounds (blue, green, red, and orange) of approximately 30 minutes each. There were two identical versions of the worksheet (version A and B). Version A was processed by groups 1-3 and version B by the groups 4-5. The participants worked in their groups under the moderation and guidance of a facilitator on every worksheet once in the first three rounds. After each round, the worksheet of the groups passed along the next group as an input for their round. In the last round, after the worksheets cycled through three groups (the B versions of the worksheets were only worked on two times due to the number of groups), the groups got back their first worksheet and could elaborate on the reactions to their own ideas and expand them further.

As mentioned, every worksheet got supervised by a facilitator (expert of the topic) who accompanied the worksheet throughout the workshop. The facilitator's task was to clarify the content by providing background information and answering any questions that might arise. The basic idea of the workshop is the independent discussion among the participants. However, the facilitator was also there to stimulate the discussion if required.

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As can be seen in Figure 12, the worksheet LCC-A was edited and discussed four times and the LCC-B worksheet three times. The blank worksheet is presented in the following Section 4.2.2.

4.2.2 LCC Worksheet

The worksheets designed for the workshop served the participants as a basis for generating ideas on the individual focus of the topics. The content of these was drawn up on the basis of the GA and project experience already gained. Created in cooperation with the co-organisers VU (WPL5, 6) and EOS (WPL8), the delimitations were also defined. The worksheet should be expanded and changed by the participants according to their needs. The LCC worksheet can be seen in Figure 14.

The three main categories, *motivation, content areas, and features,* were specified based on the literature analysis summarised in Section 3.1.7. The category *motivation* was probably the most difficult category to fill and should provide approaches on what could motivate stakeholders to participate in the LCC. The category *content areas* was divided into *knowledge* (how users can learn and acquire new knowledge using the LCC) and *interaction* (type of communication). The *features* covered both vague and specific desired functions that the LCC should offer. This initial categorisation was designed so that the features of the LCC will be able to best accommodate the needs of the cases, Framework and knowledge bases in the future.

Since all participants were LINKS consortium members, they were already informed on the goal of the LCC. As a quick reminder, the participants were given the following guidance on the goal of the LCC, based on the GA (Figure 13):

Figure 13: Short guidance definition of the LCC as an introduction to the worksheet

Definition of the Online Platform LINKS Community Center

1. Bring together LINKS Community members and project partners on the LCC, enabling them to exchange information, discuss and plan activities like the LCWs.
2. Enable the exchange of experiences and the learning from the cases
3. Offer the LINKS research results in a user-friendly way, make them available to the relevant stakeholders.

Source: Authors contribution

The empty worksheet of the LCC is shown in Figure 14.

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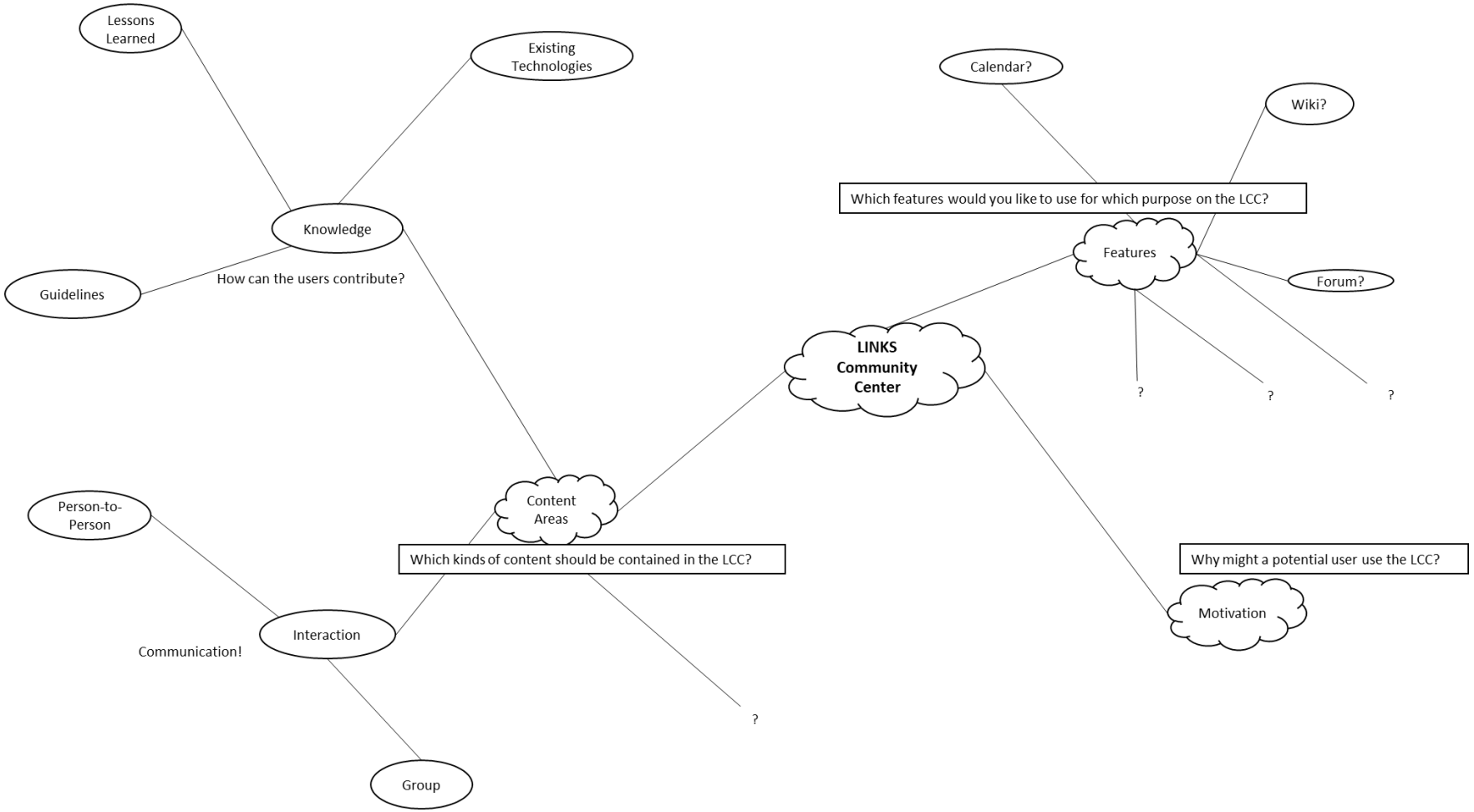
Figure 14: Empty worksheet for the elaboration of ideas in the workshop



Source: Authors contribution

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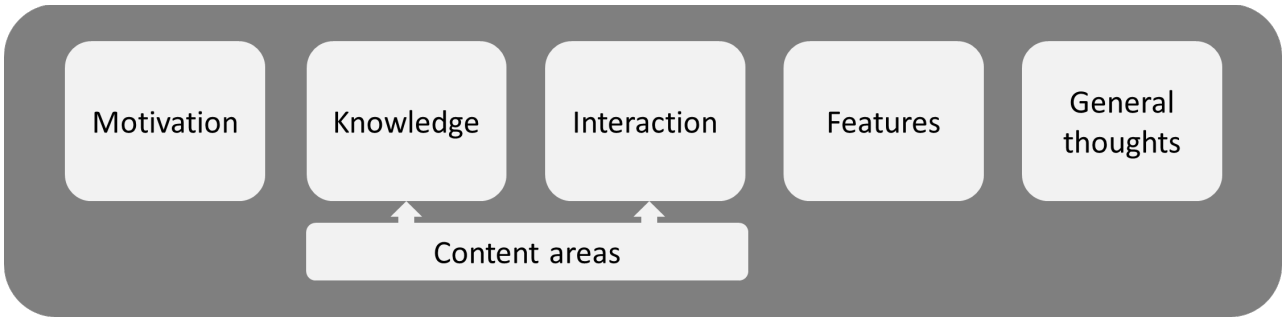
4.2.3 Summary of the Results

According to the structure of the worksheet, the summarised results of the two groups (LCC-A & LCC-B) are presented below. It can be seen that there are large variances between the concreteness of the ideas in the workshop. The transfer into structured needs and potentials then follows in Section 5.

Figure 15 gives a brief overview of the categories of the workshop.

Figure 15: Categories of the LCC worksheet from the workshop



Source: Authors contribution

The first category is the collection of ideas about motivation. This comes first because of its relevance. As shown in Section 3.1.4, the motivation of potential participants is a must for the success of the LCC.

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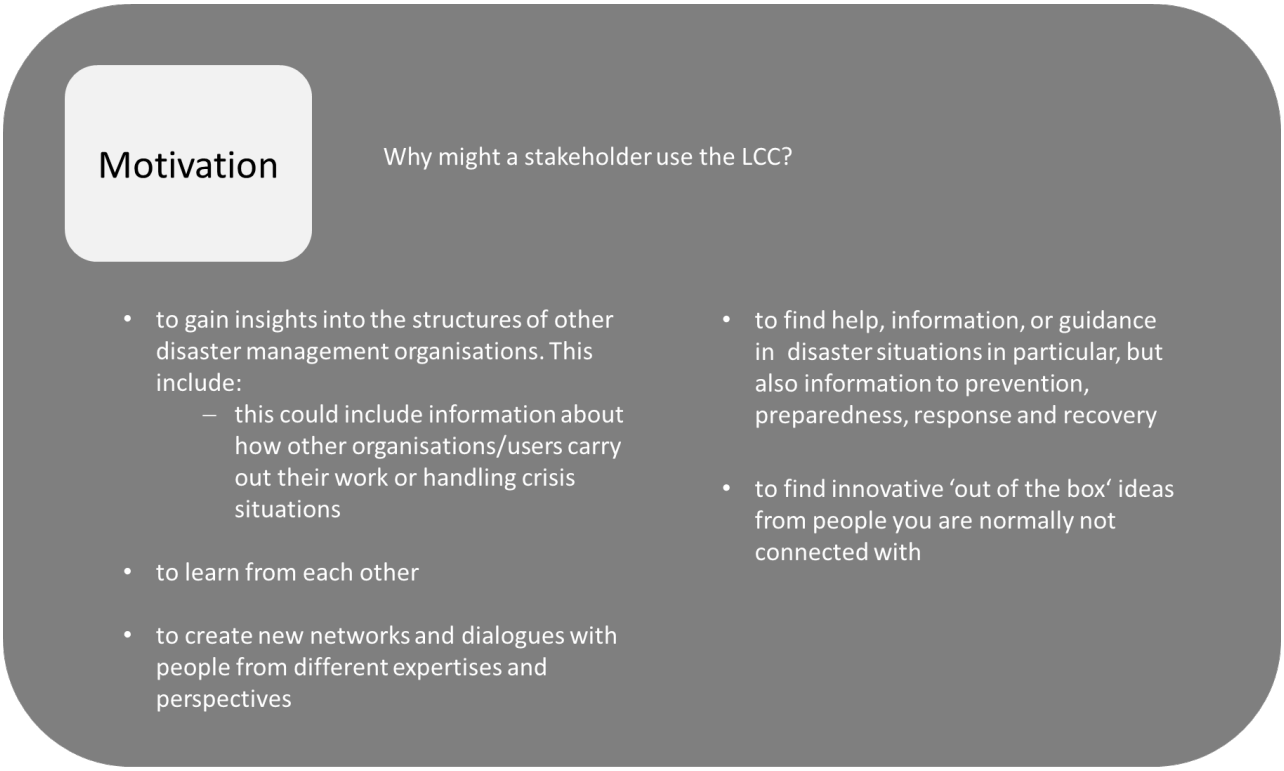
Figure 16: Workshop-ideas for motivation



Source: Authors contribution

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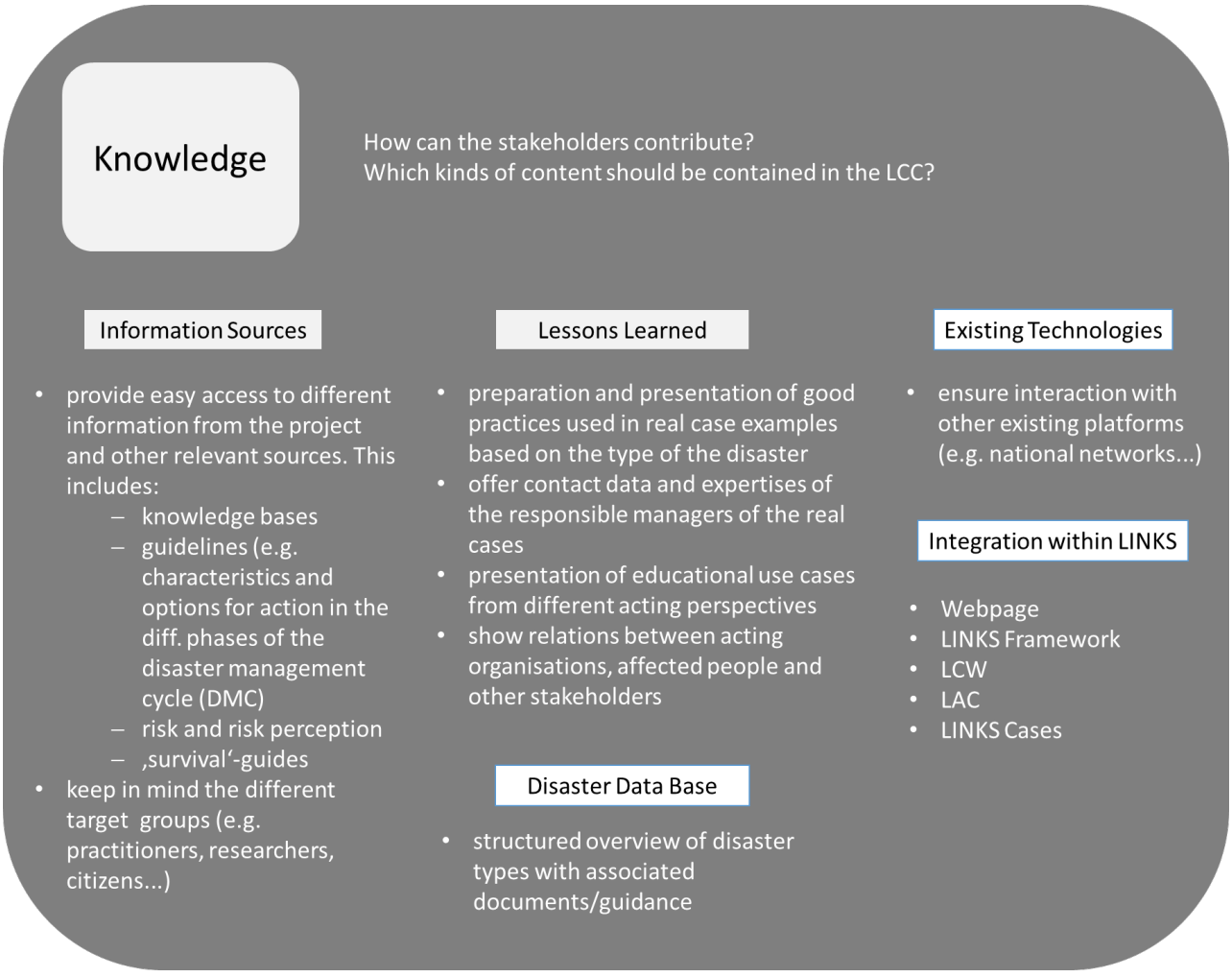
The ideas about acquiring knowledge (learning) are shown in Figure 17. For better structuring, the ideas were divided into the sub-categories information sources, lessons learned, disaster database, existing technologies, and integration within LINKS based on the clustering of the feedback of the participants.

Figure 17: Workshop-ideas for knowledge



Source: Authors contribution

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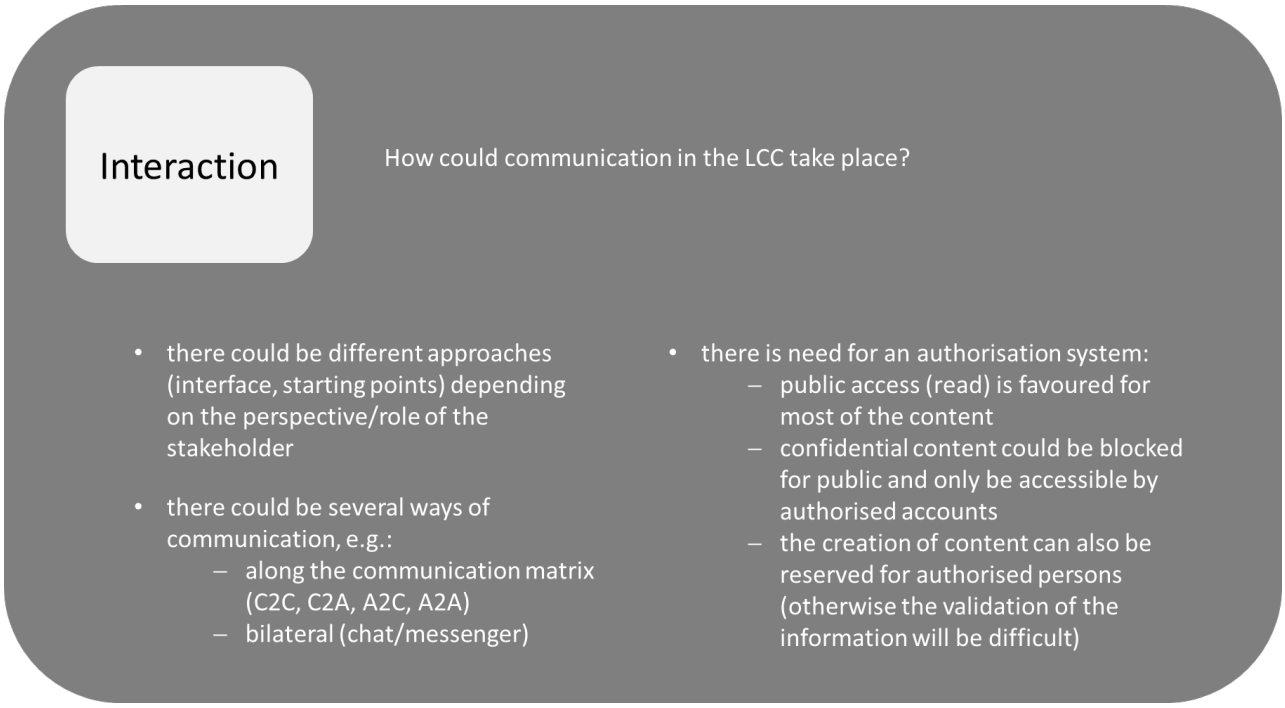
Figure 18 summarises the participants' thoughts on the type of interaction.

Figure 18: Workshop-ideas for interaction



Source: Authors contribution

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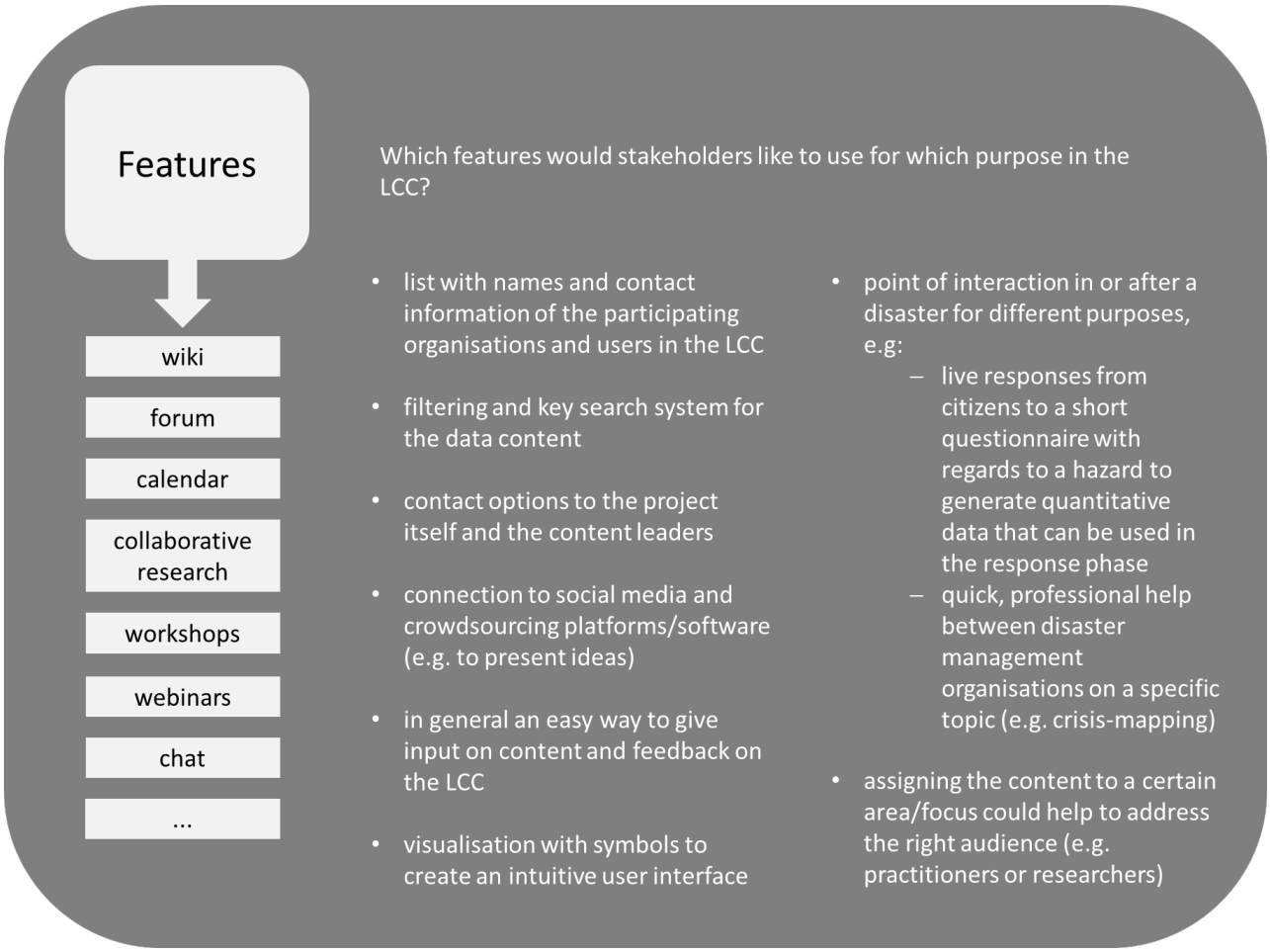
The more technical area was covered by the category of features, which is shown in Figure 19.

Figure 19: Workshop-ideas for features



Source: Authors contribution

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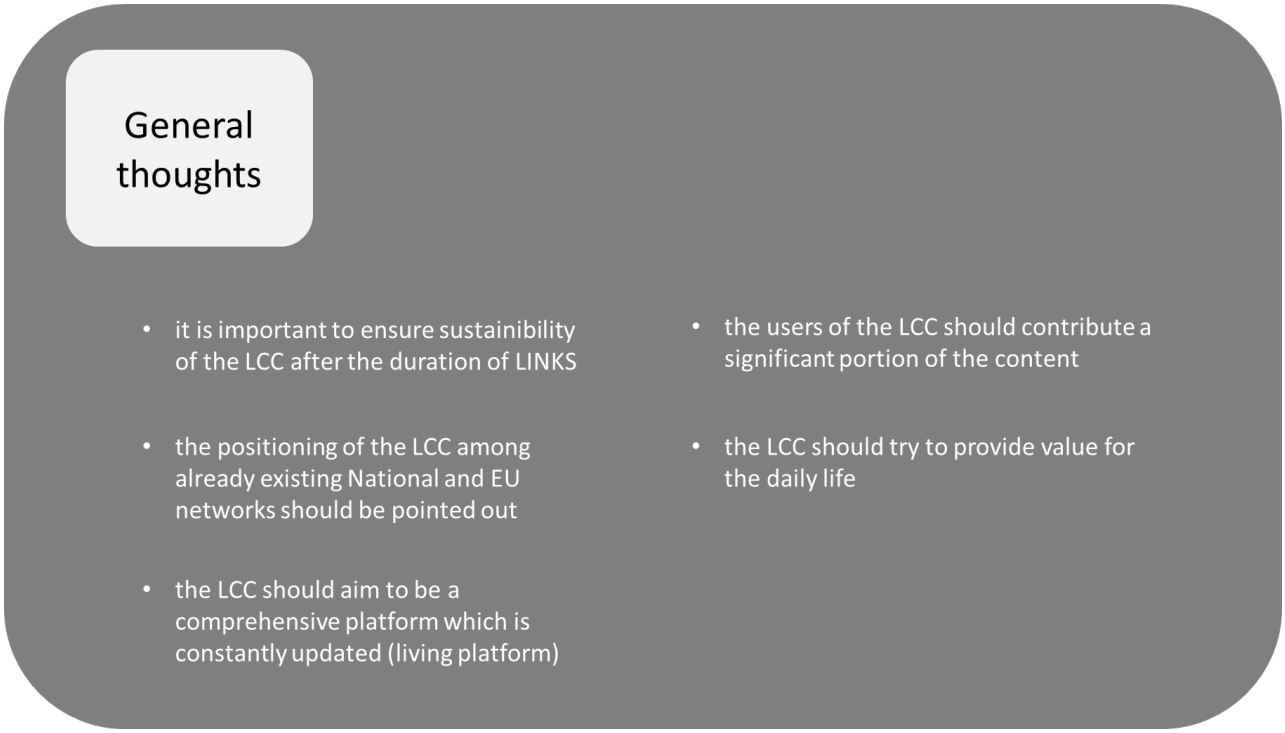
Thoughts and ideas of the participants, which could not be assigned to any category, are summarised under the next category 'general thoughts' in Figure 20.

Figure 20: General thoughts on the LCC



Source: Authors contribution

4.3 Follow-up Survey

To ascertain how important the collected needs and potentials are to the consortium members, a short survey, as described in Section 2.3.3 and shown in Annex I, was conducted.

A total of 16 answers were collected from the 22nd until the 27th of January 2021, a number of answers roughly equal to that of the workshop participants. The results of this survey are included in the list of needs and potentials presented in Section 5. Some needs and potentials were added after the survey was completed (i.e. because they were suggested by survey participants), hence not all needs and potentials were included in the survey. Nevertheless, the results present a good opportunity to actively engage the whole consortium on the design of the LCC and make sure that the developed platform matches actual needs and expectations. Therefore, such a survey might be repeated in the future and could include a broader audience, e.g. by using the LINKS social media channels.

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5. LIST OF NEEDS AND POTENTIALS

The following section will provide a brief overview of the schema used to document the needs and potentials and a list of the needs and potentials collected.

5.1 Schema

The needs and potentials, which are collected and presented in Sections 3 and 4 using the methods described previously must be documented and managed clearly and concisely. For this purpose, a documentation schema was created and is presented in the following. The schema is loosely based on user stories in agile development[12] but trimmed down and adjusted to be compatible with the development in LINKS.

Each item included is classified as a **need or potential**, adding properties such as a unique **identification number (id)**, the **date of creation** and the **creator**. Furthermore, a categorisation is created to classify the needs and potentials in the following contexts:

- **Priority:** Each need/potential is assigned to a priority, indicating how important it is for development and embedding in the LCC. The ranking is based on a survey and divides the priority in ascending order of importance into 'not important', 'less important', 'important' and 'necessary'.
- **Source:** The sources of a need or a potential allow traceability to the original source. It is divided, in accordance with the structure of this deliverable, into 'workshop', 'literature', 'relevant platforms', 'interviews', 'surveys', and 'other'.
- **Stakeholder:** The stakeholder category indicates which stakeholders are affected by a need or potential. If no specific assignment to one or more stakeholders can be determined, the need or potential is marked with 'all (general)'. The stakeholders are derived from Section 2.2..
- **Groups:** Using the results of the literature analysis (see Section 3.1.7), the following four categories of functional needs and potentials were created and each need or potential grouped accordingly. An additional category is available for non-functional needs and potentials.
    - **Learning:** How the user can learn using the LCC (see also D5.1 on the learning levels in LINKS)
    - **Interaction:** How users can communicate and interact on the LCC
    - **Features:** Concrete technical features which could be implemented in the LCC
    - **Motivation:** Why a user might use the LCC

Note that this classification does not explicitly include dependencies between individual needs and potentials, as dependencies will be resolved dynamically during development using the agile software engineering methodology.

[12] https://www.atlassian.com/agile/project-management/epics-stories-themes

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5.2 Results

In total, until now (February 2021) 31 needs and potentials have been derived from research in relevant literature, other relevant networks and the results of co-designing in meetings and the workshop. These are divided into 21 needs and 10 potentials. A list of the needs and potentials collected can be found in Table 2.

The survey described in Section 4.3 (shown in Annex I) was used to prioritise the needs and potentials, with the aim to plan the development process of the LCC. The multiple-choice questions allowed the respondents to prioritise each need or potential according to the following categories:

- Not important (0 point)
- Less important (1 point)
- Important (2 points)
- Necessary (3 points)

To sort the final list according to the priority of each item, each category of importance is assigned a point-value on a linear scale (0-3) and a weighted sum is computed and normalized. For example, if 2 people had rated an item 'not important', 3 people 'important' and 4 people 'necessary', the calculated priority score would be 2 x 0 + 3 x 2 + 4 x 3 = 18 or normalised 0.66 (18 / 27, as 27 is the maximum score which could potentially be reached if all participants rated an item 'necessary').

Additionally, a normalised variance is calculated to indicate whether the participants agree or disagree on the importance of a given item with 0 indicating total agreement and 1 indicating total disagreement. (Habig, Lüke, Sauerland, & Tappe, 2020) (Philpot & Reuge, 2020)

The priority and variance are not hard criteria for the further development of the LCC but will rather be used as guidance on which aspects are most important for potential users and which aspects require more in-depth discussions due to a high variance.

An easy access to various project outputs for the purpose of learning seems to be of high importance to all respondents (high priority and low variance) with further discussion needed on the access to the knowledge bases (high priority but high variance). Conference tools for the purpose of communication or the ability to work on confidential content do not seem to be important at all (low priority and low variance)

The status of the needs and potentials is recorded at the time of this deliverable and shall be dynamically expanded and managed to take into account e.g. the needs emerging from other LINKS WPs and the potentials resulting from new technological innovations.

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Table 2: Summarising list of gathered needs and potentials

				Description	Groups/Tags					
Priority	Variance	Need	Potential		Learning	Interaction	Features	Motivation	Non-functional	Identification Number
0.833	0.276	x		Provide easy access to good practise examples	x					4
0.792	0.350	x		Provide easy access to the knowledge bases	x					2
0.792	0.165	x		Provide easy access to guidelines (e.g. SMCS in disasters, DCTs, DMP...)	x					1
0.750	0.154	x		Have access to a disaster data base with different types of disasters and lessons learned with regards to social media usage	x					9
0.729	0.222	x		Development of an intuitive user interface (symbols...)			x			16
0.708	0.199		x	Avoid technical dependence on third parties to ensure that the LCC can be available indefinitely and operate independently to achieve sustainability					x	29
0.689	0.422	x		Filtering and keyword search system	x					14
0.688	0.299		x	Have all information as publicly visible as possible to make it accessible					x	27
0.667	0.261	x		Provide easy access to real case studies	x					5
0.646	0.217	x		Offer different communication functions (bilateral -> chat, comment, forum, etc.)		x				11

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0.583	0.265	x		Provide a forum			x			21
0.563	0.222	x		Provide a contact list of registered organisations in the LCC		x				8
0.542	0.222	X		Provide a full-text search for a document database (e.g. PDFs, Word documents)	x					28
0.542	0.356		x	Record user interactions (anonymously) for the evaluation and improvement of the LCC					x	13
0.521	0.083	x		Integration with other LINKS elements (Webpage, Framework, LCW/LAC, cases)			x			10
0.500	0.217	x		Provide contact information of users in the LCC		x				24
0.500	0.333		x	Provide an easy way to provide input and give feedback on basically everything		x				15
0.500	0.152	x		Use a motivation concept to activate and motivate the LINKS Community				x		7
0.458	0.217	x		Provide easy access to other project findings	x					6
0.458	0.261	x		Provide easy access to deployment reports	x					3
0.417	0.421	x		Provide a wiki			x			19
0.400	0.288		x	Enable collaborative research (clear idea missing)		x			x	23
0.375	0.288	x		Provide a chat			x			26
0.375	0.232		x	In addition to a local login, login with Google/Facebook/LinkedIn to simplify the signup process					x	20
0.354	0.188		x	Serve as a point of contact for problems / in disasters (from an organisational and citizens perspective)		x			x	18
0.354	0.276		x	Provide methods for the collection of quantitative data (e.g. surveys) on crisis-related issues			x		x	17
0.313	0.350		x	Define a clear positioning / demarcation between similar national and EU networks					x	25

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0.271	0.165	x		Offer the possibility to work on confidential content			x			22
0.271	0.154		x	Provide conference tools			x			12
-	-	x		Provide content in multiple languages	x					30
-	-	x		Offer compatibility with screen readers			x			31

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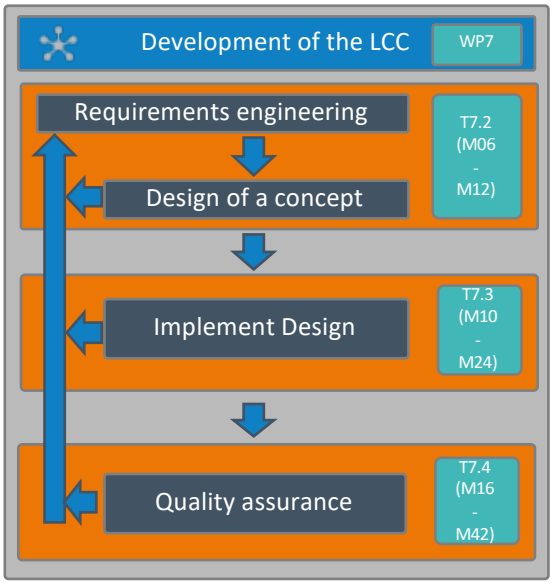
6. FUTURE WORK

This Section presents a brief overview of the follow-up work to this deliverable in the context of the LCC and the LINKS project as a whole.

6.1 Development of the LCC

The further development process of the LCC is based on the iterative nature of Design Science, visualised in Figure 21 and will be explained in the following.

Figure 21: The further development of the LCC



Source: Authors contribution

Although T7.1 established a methodology for the gathering and categorisation of needs and potentials and documents all currently known needs and potentials in Section 5, some needs (e.g. regarding learning, the case assessments and the LINKS Framework) are currently not known and will be further refined based on the actual needs of the concerning WPs once available. For this reason, a dynamic software design methodology (as described in Section 2.1.4) will be used and the requirements engineering of T7.1 will continue together with all relevant stakeholders, e.g. in the form of further workshops, brainstorming sessions or expert interviews. The list of needs and potentials is considered to be an evolving document and will be updated and maintained as the development of the LCC progresses (Design Cycle of Design Science).

In parallel to the ongoing gathering of more needs but based on the known needs and potentials, the design of the LCC is currently being conceptualized (T7.2) and will be published in D7.2 (M12). This design needs to be flexible enough to allow for the addition, removal or modification of features

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based on evolving needs from other WPs, such as the learning needs and objectives of the Framework (see D5.1).

T7.3 will implement the LCC based on the results of T7.2, taking into account evolving needs and direct feedback from the stakeholders (e.g. the LINKS Advisory Committee). V0 (D7.3) of the LCC will be online in M16 and V1 (D7.4) in M24 with intermediary versions allowing all project participants and other relevant stakeholders to provide feedback and influence the implementation of the LCC based on their needs.

The needs and potentials documented in this deliverable will be one input for the quality assurance conducted in T7.4 and documented in D7.5 and D7.6 (Relevancy Cycle of Design Science). T7.4, together with other tasks and WPs performing an evaluation (e.g. WP6), will be used to continuously improve and upgrade the LCC. This continuous improvement will be complemented by a sustainability strategy to ensure the long-term sustainability of the LCC.

Tools are only one aspect of a networking platform; an active community is also required. Therefore, T7.4 will also stimulate and foster the active use of the LCC by the LINKS Community, e.g. in the case assessments and by organizing events or workshops within and on the LCC.

6.2 In the Context of LINKS

The cooperation with other WPs will continue to assess their needs and provide them with potentials on how the LCC could help them achieve their goals and support their work. In particular, the following cooperations and discussions are ongoing:

- WP2-4: How to structure the knowledge bases so that they can achieve maximum visibility and usefulness in the LCC through the Framework?
- WP5: How to best structure and embed the LINKS Framework into the LCC (see also D5.1)?
- WP6: How the LCC can support the LINKS case-based assessment of the Framework (see also D6.1)? How can the LCC support the first iteration of case assessments while it is still under construction?
- WP8: How to identify, structure and motivate the LINKS Community and how to integrate the LINKS Community Workshops with the LCC?

Answers to these questions will be included in subsequent deliverables and are key to ensure that the LCC realises its maximum potential.

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7. CONCLUSION

This deliverable creates a solid basis for the development of the LCC. Together with the LINKS project partners, a first list of needs and potentials of the LCC regarding learning, interaction, features and motivation could be compiled and prioritized using a literature analysis, an analysis of related platforms, co-operative brainstorming sessions, a design thinking workshop and a survey. In cases where it was not possible to establish concrete needs, a methodology for taking them into account once they become available was established. This includes the usage of agile software development and DevOps as the software engineering methodology for the LCC. The list of needs and potentials will be further refined together with the LINKS project partners, incorporated into the design of the LCC and subsequently implemented.

A key takeaway of this first analysis is a strong interest in learning materials in the form of practical knowledge (e.g. case reports, proven lessons learned), a moderate interest in communication tools such as a forum and a desire to design the LCC as open and accessible as possible. Further discussions are needed on items with a high variance, such as access to the knowledge bases or a filtering and keyword system.

A tight integration between the content of the LCC focusing on the use of SMCS in disasters and the users of the LCC will uniquely position the LCC within the broad landscape of online communities and could serve as a blueprint for developing similar platforms in the future.

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8. BIBLIOGRAPHY

Abrahamsson, P., Salo, O., Ronkainen, J., & Warsta, J. (2002). Agile Software Development Methods: Review and Analysis. *VTT Publications 478*.

Bönsch, M. (2006). *Basiswissen Pädagogik - Unterrichtskonzepte und -techniken.* Baltmannsweiler: Scheider Verlag Hohengehren GmbH.

Beinhauer, M. (2003). Knowledge Communities. *Dissertation*. Saarbrücken: EUL Verlag.

de Valck, K. (2005, April). Virtual Communities of Consumption: Networks of Consumer Knowledge and Companionship. *dissertation*. Rotterdam.

de Valck, K. (2009). Virtual Communities: A Marketing Perspective. *Decision Support Systems 47(3):185-203*. doi:10.1016/j.dss.2009.02.008

Ebert, C., Gallardo, G., Hernantes, J., & Serrano, N. (2016). DevOps. *IEEE Software, vol. 33, no. 3*, 94-100.

Figallo, C. (1998). *Hosting Web Communities: building relationships, increasing customer loyality, and maintaining a competitive edge.* New York: John Wiley & Sons Inc.

Fonio, C., & Clark, (2021). First Work Plan for the Five Cases. Deliverable 6.1 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. (LINKS, Ed.)

Fonio, C., & Clark, N. (2021). Work Plan for the LINKS Framework. Deliverable 5.1 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:. (LINKS, Ed.)

Habig, T., Lüke, R., Sauerland, T., & Tappe, D. (2020). Deliverable 4.1: DCT Knowledge Base – A consolidated understanding of Disaster Community Technologies for social media and crowdsourcing. (LINKS, Ed.)

Hamman, R. (2003). Computernetze als verbindendes Element von Gemeinschaftsnetzen. Studie über die Wirkungen der Nutzung von Computernetzen auf bestehende soziale Gemeinschaften. In U. Thiedeke, *Virtuelle Gruppen.* Westdeutscher Verlag.

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

Hevner, A., & Chatterjee, S. (2010). Design Science Research in Information Systems. In *Design Research in Information Systems. Integrated Series in Information Systems, vol 22* (p. 16). Springer.

Hevner, A., March, S., Park, J., & Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly, vol. 28, no. 1*, 75–105.

Kalson, D. (2015). *Pros and Cons of Social Media Before, During and After a Crisis.* Retrieved from https://preparedex.com/pros-cons-social-media-crisis/

Khan, S. M., Wahab, A., Herawan, T., Mujtaba, G., Danjuma, S., & Al-Garadi, M. (2016). Virtual Community Detection Through the Association between Prime Nodes in Online Social Networks and Its Application to Ranking Algorithms. doi:10.1109/ACCESS.2016.2639563

Kim, A. J. (2000). *Community Building on the Web.* Berkeley, CA: Peachpit Press.

Kindsmüller, M. C., Melzer, A., & Mentler, T. (2009, March). Online Communities and Online Community Building. 2899-2905. Retrieved from https://www.researchgate.net/publication/265891662_Online_Communities_and_Online_Community_Building?enrichId=rgreq-d03592547bc4dd48c870811144efd393-XXX&enrichSource=Y292ZXJQYWdlOzI2NTg5MTY2MjtBUzoxODUxNTc5NDAxNjI1NjBAMTQyMTE1NjUwMTc3OA%3D%3D&el=1_x_3&_esc

Kopf, M., Sauermann, V., & Frey, F. (2018). Implement Communities of Practice in an agile IT environment. *Proceedings of ACM EuroPLoP conference (EuroPLoP'18)*. doi:https://doi.org/10.1145/3282308.3282345

Kraut, E. R., & Resnick, P. (2011). *Building Successful Online Communities.* England: the MIT Press.

Lampel, J., & Bhalla, A. (2007). The Role of Status Seeking in Online Communities: Giving the Gift of Experience. *Journal of Computer-Mediated Communication 12(2):434-455*. doi:10.1111/j.1083-6101.2007.00332.x

Leimeister, J. M., & Krcmar, H. (2006). Community Engineering - Systematischer Aufbau und Betrieb Virtueller Communitys im Gesundheitswesen. *Wirtschaftsinformatik, Vol. 48*(48), pp. 418-429.

Leimeister, J. M., Sidiras, P., & Krcmar, H. (2003). *Erfolgsfaktoren virtueller Gemeinschaften aus Sicht von Mitgliedern und Betreibern – Eine empirische Untersuchung.*

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

Lin, H.-F. (2007). The role of online and offline features in sustaining virtual communities: an empirical study. *Internet Research*, pp. 119-138.

Markus, U. (2002). Integration der virutellen Community in das Customer Relationship Management. *Dissertation*. Deutschland: EUL Verlag.

Martakis, A., & Daneva, M. (2013). Handling Requirements Dependencies in Agile Projects: A Focus Group with Agile Software Development Practitioners. *IEEE 7th International Conference on Research Challenges in Information Science (RCIS)*, 1-11.

Nielsen, A., & Raju, E. (2020). D3.1 DMP Knwoledge Base - A Consolidated Understanding of Social Media and Crowdsourcing in Distaster Management Processes.

Philpot, J., & Reuge, E. (2020). Deliverabe 8.1: LINKS Community Strategy. (LINKS, Ed.)

Porter, E. (2004). A Typology of Virtual Communities: a Multi-Disciplinary Foundation for Future Research. doi:https://doi.org/10.1111/j.1083-6101.2004.tb00228.x

Porter, E., Donthu, N., MacElroy, W. H., & Wydra, D. (2011). How to Foster and Sustain Engagement in Virtual Communities. doi:https://doi.org/10.1525/cmr.2011.53.4.80

Preece, J. (2004, December). ONLINE COMMUNITIES: RESEARCHING SOCIABILITY AND USABILITY IN HARD TO REACH POPULATIONS. USA. doi:10.3127/ajis.v11i2.132

Preece, J. (2010). Sociability and usability in online communities: Determining and measuring success. *Behaviour & Information Technology*, pp. 347-356.

Rao, R., Plotnick, L., & Hiltz, R. (2017). Supporting the Use of Social Media by Emergency Managers: Software Tools to Overcome Information Overload. *Proceedings of the 50th Hawaii International Conference on System Sciences*.

Roser, M., Ritchie, H., & Ortiz-Ospina, E. (2019). *https://ourworldindata.org/*. Retrieved from https://ourworldindata.org/internet#the-rise-of-social-media

safety innovation center e.V. (2020). *Digitale Transformation in der zivilen Gefahrenabwehr*. Retrieved from https://www.blaulicht.digital/wp-content/uploads/sites/6/2020/09/Studie-Digitale-Transformation-in-der-zivilen-Gefahrenabwehr.pdf

Schwaber, K. (1997). SCRUM Development Process. In J. Sutherland, C. Casanave, J. Miller, P. Patel, & G. Hollowell, *Business Object Design and Implementation.* Springer.

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

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research, Volume 104*, pp. 333-339.

Teichmann, K., Stokburger-Sauer, N., Plank, A., & Strobl, A. (2015). Motivational Drivers of Content Contribution to Company- Versus Consumer-Hosted Online Communities. *Psychology and Marketing 32(3):341–355*. doi:10.1002/mar.20783

Zaglia, M. (2012). Brand communities embedded in social networks. doi:https://doi.org/10.1016/j.jbusres.2012.07.015

Zhou, T. (2011). Understanding Online Community User Participation: A Social Influence Perspective. doi:10.1108/10662241111104884

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9. ANNEX I: FOLLOW-UP SURVEY

Figure 22: Screenshot of the follow-up survey

Purpose of the Links Community Center (LCC) according to the Grant Agreement:

1. Bring together LINKS Community members and project partners on the LCC, enabling them to exchange information, discuss and plan activities like the LCWs.
2. Enable the exchange of experiences and the learning from the cases
3. Offer the LINKS research results in a user-friendly way, make them available to the relevant stakeholders.

Please indicate how important each of the aspects mentioned below is to you in your professional capacity

	Not important	Somewhat important	Important	Necessary
#01 Provide easy access to the knowledge bases	○	○	○	○
#02 Provide easy access to guidelines (e.g. SMCS in disasters, DCTs, DMP...)	○	○	○	○
#03 Provide easy access to other project findings	○	○	○	○
#04 Provide easy access to good practise examples	○	○	○	○
#05 Provide easy access to real case studies	○	○	○	○
#06 Provide easy access to deployment reports	○	○	○	○
#07 Provide contact information of users in the LCC	○	○	○	○
#08 Provide a contact list of registered organisations in the LCC	○	○	○	○
#09 Have access to a disaster data base with different types of disasters and leassons learned with regards to social media usage	○	○	○	○
#10 Integration with other LINKS elements (Webpage, Framework, LCW/LAC, Cases)	○	○	○	○
#11 Offer different communication functions (bilateral -> chat, comment, forum, etc.)	○	○	○	○
#12 Offer the possibility to work on confidential content	○	○	○	○
#13 Provide a full-text search for a document database (e.g. PDFs, Word documents)	○	○	○	○
#14 Filtering and keyword search system	○	○	○	○
#15 Provide an easy way to provide input and give feedback on basicly everything	○	○	○	○
#16 Development of an intuitive user interface (symbols...)	○	○	○	○
#17 Serve as a point of contact for problems / in disasters (from an organisational and citizens perspective)	○	○	○	○
#18 Provide methods for the collection of quantitative data (e.g. surveys) on crisis-related issues	○	○	○	○
#19 Provide a wiki	○	○	○	○
#20 Provide a chat	○	○	○	○
#21 Provide a forum	○	○	○	○
#22 Provide conference tools	○	○	○	○
#23 Enable collaborative research (clear idea missing)	○	○	○	○
#24 Use a motivation concept to activate and motivate the LINKS Community	○	○	○	○
#25 Define a clear positioning / demarcation between similar national and EU networks	○	○	○	○
#26 Login with Google/Facebook/LinkedIn to simplify the signup process	○	○	○	○
#27 Have all information as publically visible as possible to make it accessible	○	○	○	○
#28 Record user interactions (anonymously) for the evaluation and improvement of the LCC	○	○	○	○
#29 Avoid technical dependence on third parties to ensure that the LCC can be available indefinately and operate independently to achieve sustainability	○	○	○	○

Do you have any comments regarding the sharing of knowledge in the LCC?

Do you have any comments regarding the facilitation of interactions in the LCC?

Do you have any comments regarding specific features in the LCC?

Do you have any comments regarding the motivation of users of the LCC?

Do you have any other comments or ideas you would like to share?

Source: Authors contribution