LINKS

Strengthening links between technologies and society for European disaster resilience

D7.5 First Report about the online community management and quality assurance

Research Report

Maximilian Kiehl – Safety Innovation Center gGmbH
Therese Habig – Safety Innovation Center gGmbH
Robin Marterer – Safety Innovation Center gGmbH

November 2022

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

LINKS
Strengthening links between technologies and society for European disaster resilience

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

DOCUMENT INFORMATION

Grant Agreement	No. 883490	**Deliverable Due Date**	30 November 2022
Project Starting Date	1 June 2020 (42 months)	**Actual Submission**	30 November 2022
Deliverable Number	D7.5 (WP7)	**Leading Partner**	SIC

KEYWORDS

LINKS, Online community, community platform, community platform implementation, knowledge management, quality management, quality assurance, community management

AUTHORS& CONTRIBUTORS

Author	**Institution**	**Authored Sections**
Maximilian Kiehl	SIC	Entire Document
Therese Habig	SIC	Entire Document
Robin Marterer	SIC	Entire Document
Contributor	**Institution**	**Contributed Sections**
Eugen Schmidt	SIC	Entire Document
Christoph Schwentker	SIC	Section 4
Richard Lüke	SIC	Section 4

REVIEWS

Reviewer	**Institution**	**Reviewed Sections**
Dieter Nuessler	FEU	Entire Document
Nathan Clark	VU	Entire Document
Chiara Fonio	VU	Entire Document
Nina Blom Andersen	UCC	Entire Document
Kristian Reeson	EOS	Entire Document

VERSION HISTORY

Release	**Status**	**Date**
0.1	Table of Contents	10 August 2022
0.2	Initial Draft	22 September 2022
0.3	Internal Review	28 October 2022
0.4	Consortium Review	18 November 2022
0.6	Internal Final Review	25 November 2022
1.0	Final Version - Submitted to EC	30 November 2022

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

DISCLAIMER

Responsibility of this publication lies entirely with the author. The European Commission is not responsible for any use that may be made of the information contained therein.

CITATION

Kiehl, M., Habig, T. & Marterer, R. (2022). First Report about the online community management and quality assurance. Deliverable 7.5 of *LINKS: Strengthening links between technologies and society for European disaster resilience*, funded by the European Union's Horizon 2020 Research and Innovation Programme (No. 883490). Retrieved from: http://links-project.eu/deliverables/

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

EXECUTIVE SUMMARY

About the project

Bringing together 15 partners and 2 associated partners across Europe (Belgium, Denmark, Germany, Italy, Luxembourg, the Netherlands) and beyond (Bosnia & Herzegovina, Japan), the project will develop a framework to understand, measure and govern SMCS for disasters. The LINKS Framework consolidates knowledge and experiences on the uses of social media and crowdsourcing in disasters, into products for relevant stakeholders. The Framework is accessible online through the LCC, and can be used by stakeholders to openly explore knowledge, or as a strategic planning tool for guiding disaster management organisations in their planning for using social media and crowdsourcing in disasters. 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) is a web-based platform for the LINKS Community, enabling the community to exchange information and experiences and to access, discuss and assess products developed by the project and contained within the LINKS Framework. This deliverable presents an integrated methodology for assessing the quality of the LCC and managing its community. This methodology includes many workshops and meetings to test and assess the LCC, tool-based evaluations and an internal task force. It also includes a motivational concept for the LINKS Community and a description of the process for ensuring the quality of user-generated content.

The application of this integrated methodology has provided helpful feedback and good indications for the future development of the LCC. The feedback received has been taken into account and the LCC has been adjusted accordingly.

This deliverable will have a follow-up, the final report about the online community management and quality assurance (D7.6), which is due in November 2023.

The LCC can be accessed online at https://links.communitycenter.eu/.

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

TABLE OF CONTENTS

1. Introduction 1
2. Methodology 3
2.1 Foundation – Design Science 3
2.2 Subject of the Integrated Methodology 4
2.2.1 Content 4
2.2.2 User Experience 4
2.2.3 Community 5
2.3 Approach of the Integrated Methodology 5
3. Quality Assurance 6
3.1 Initial needs and potentials identified in Task 7.1 6
3.2 Interim Review Meeting 11
3.2.1 Overall user experience 11
3.2.2 Subpages 14
3.2.2.1 Overview page 14
3.2.2.2 Profile page 15
3.2.3 Language 17
3.2.4 Accessibility 18
3.3 Workshops 18
3.3.1 Guidelines Workshop 18
3.3.2 LINKS Advisory Committee 19
3.3.3 LINKS Community Workshop: German drought case 20
3.3.4 LINKS Annual Meeting 2022 21
3.3.5 Danish and Dutch Site Visit in Paderborn 22
3.3.6 CERIS 22
3.4 Internal Taskforce and Workshops 23
3.5 Usage statistics 24
3.6 Tool-based analysis 25
3.6.1 Frontpage 25
3.6.2 List of Technologies 26
3.6.3 Technology Profile 26
4. Community Management 27

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

4.1 Motivational concept 27
4.1.1 Usability and Usefulness 28
4.1.2 Onboarding measures for new users 28
4.1.3 Improved Registration 29
4.1.4 Questions Section & Guides 29
4.1.5 Promoting the LINKS Community 30
4.1.6 Connection and integration with other sites and initiatives 31
4.1.7 Achievements and Badges 31
4.1.8 Suggestions 33
4.1.9 Highlights Section 34
4.2 Content contribution 34
4.3 Feedback process 34
4.4 Supporting tools 35
5. Conclusion and Future Work 36
Bibliography 37

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

LIST OF ACRONYMS

Abbreviation / Acronym	Description
D	Deliverable
DCT	Disaster Community Technology
DMP	Disaster Management Process
DRPV	Disaster Risk Perception and Vulnerability
LAC	LINKS Advisory Committee
LCC	LINKS Community Center
LCW	LINKS Community Workshop
SEO	Search Engine Optimization
SMCS	Social Media and Crowdsourcing
WP	Work Package

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

DEFINITION OF KEY TERMS[1]

Term	Definition
Case-based assessments	The case-based assessments (or case assessments) are joint efforts between WP2-4 and investigate the specific knowledge domains across different contexts while exploring interacting themes. The cross-based assessments are thus both an attempt to explore domain-specific questions through a comparative lens and an attempt to explore the interdependent questions cutting across knowledge domains.
Crowdsourcing	Describes a distributed problem-solving model where the task of solving a challenge or developing an idea get "outsourced" to a cloud. It implies tapping into "the wisdom of the crowd" (LINKS Glossary, builds on Howe, 2006).
LINKS Community	Community of multidisciplinary stakeholders working collaboratively hand in hand with the LINKS Consortium, learning and benefiting from the project development and results, and in turn providing their knowledge and expertise for the improvement of LINKS research and the validation of project's results.
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	The LINKS Framework consolidates knowledge and experiences on the uses of social media and crowdsourcing in disasters, into products for relevant stakeholders. The Framework is accessible online through the LCC, and can be used by stakeholders to openly explore knowledge, or as a strategic planning tool for guiding disaster management organizations in their planning for using social media and crowdsourcing in disasters.
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.
Social Media	A group of Internet-based applications that build on the ideological and technological foundations of the Web 2.0 and that allow the creation and exchange of user-generated content. Forms of media that allow people to communicate and share information using the internet or mobile phones. Web 2.0 is the Internet we are familiar with today in which people are not just consumers of information but producers of knowledge through social

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

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

	networking sites and services like Facebook, Twitter, and Instagram (LINKS Glossary, builds on Kaplan & Haenlein, 2010).

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

1. INTRODUCTION

A key objective of the LINKS project is to build a sustainable, multidisciplinary stakeholder community consisting of different actors from various countries, professions and schools of thought. It is intended that the members of this LINKS Community learn and benefit from the project development and outcomes while providing 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 gathering place 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 social media and crowdsourcing (SMCS) in disasters. (LINKS Glossary)

Through the LCC, stakeholders are able to access products included in the LINKS Framework (Fonio, et al., 2022), such as libraries on SMCS technologies and guidelines. The evaluation and practical application of the LINKS Framework are carried out through case assessments (WP6). The LCC, therefore, plays a vital role in creating and fostering a lively community around the LINKS project and its 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 assessments of the Framework.
- **Govern the diversity of SMCS in disasters (O3):** Providing visibility for and access to 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.

The needs and potentials of the LCC were described in Deliverable 7.1 (Kiehl, et al., 2021), and an architecture based on them was elaborated in Deliverable 7.2 (Kiehl, Tappe, Werner, Habig, & Marterer, 2021). A first version of the demonstrator was presented in Deliverable 7.3 (Kiehl, Habig, & Marterer, 2021) and a second version in Deliverable 7.4 (Kiehl, Habig, & Marterer, 2022).

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

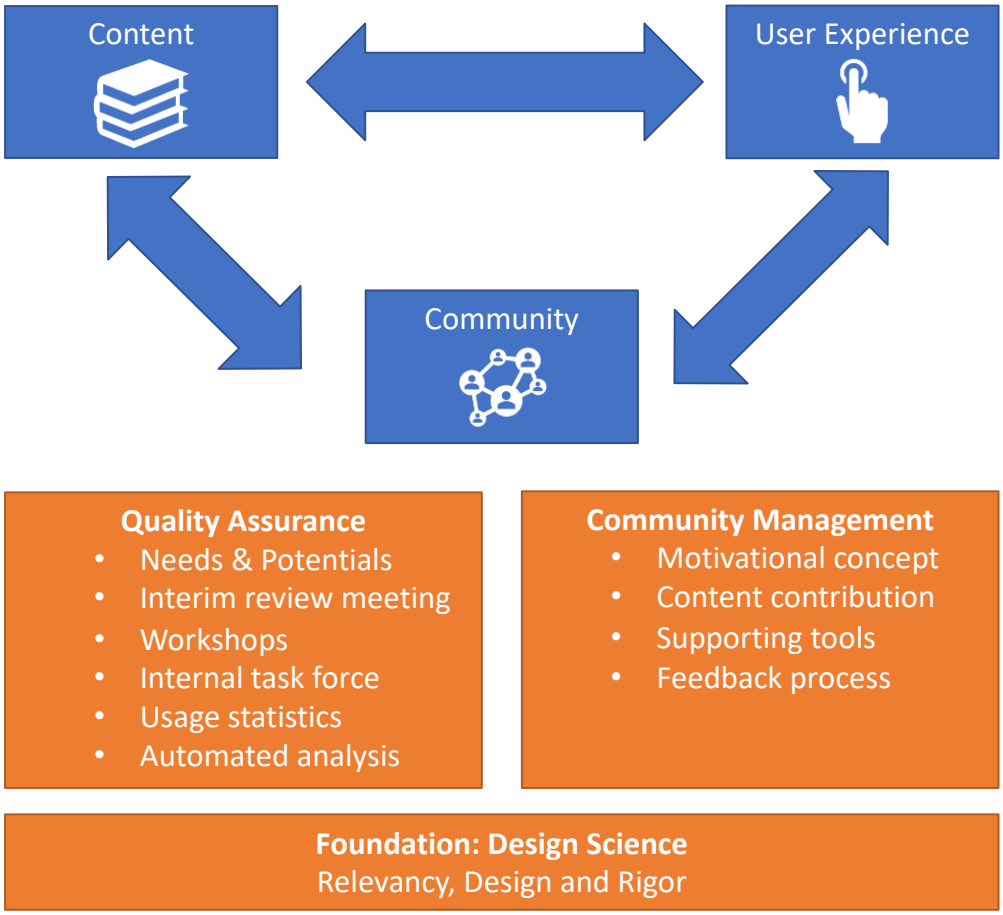
Based on the previous work, this document provides information on the quality assessment of the LCC and indications on the management of the online community. To this end, first the methodology devised for the quality assurance in described in Section 2 and embedded into the wider context of the LCC's development. This is followed by an explanation of the different quality assurance methods used and their application to the LCC (Section 3). This section also briefly describes the results of each quality assurance method conducted and the implications for the LCC's further development. A concept and various practical methods for the motivation and management of the online community are presented in Section 4. This document finishes with a brief conclusion and an outlook on future work (Section 5).

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

2. METHODOLOGY

In the following sections, an integrated quality assurance and community management methodology ("integrated methodology") will be presented. This methodology will combine both the community management and the quality assurance of the LCC, as both are inseparably linked with each other. Workshops (e.g., LINKS Community Workshops and LINKS Advisory Committee meetings) conducted for the quality assurance simultaneously stimulate the community as they are realized together with community members. Conversely, all community members also contribute to the quality assurance, i.e. by reporting or correcting incorrect or outdated information or by reporting usability issues. The combined methodology is shown in Figure 1 and will be described in the following.

Figure 1: The LCC quality assurance and community management methodology



2.1 Foundation – Design Science

The overall scientific research methodology for the LCC is Design Science as described in (Kiehl, et al., 2021). Design Science, therefore, also provides the foundation for the integrated methodology. As a short reminder, Design Science is based on the iterative design and testing of an artifact, in this

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

case the LCC or its components. It can be divided into three cycles as described (Hevner & Chatterjee, 2010). In the Design Cycle, the artifact is being iteratively designed and tested. This cycle was mostly completed with the publication of D7.4. In the Rigor Cycle, the design of the artifact is checked against the knowledge base (i.e. existing literature) and new information is contributed back to the knowledge base. For the LCC, this is achieved mostly through the continuing publication of deliverables and other scientific articles. In the third cycle, the Relevancy Cycle, the artifact is validated within its application domain and problems and opportunities are identified together with the intended users and their organizations. The work described in this deliverable mostly relates to this cycle, ensuring that all three cycles of Design Science are adequately covered.

2.2 Subject of the Integrated Methodology

During the development and testing of the LCC it has become apparent that there are three distinct but interrelated areas which need to be examined using the integrated methodology. These areas, described as content, user experience and community, all influence one another and are related to each other. They will be briefly described in the following sections.

2.2.1 Content

As described in Section 5.4 of D7.2, the LCC does not provide any content by itself but facilitates access to the content produced by the LINKS Knowledge Bases and the LINKS Framework. As the quality assurance of this content is the responsibility of the respective product owners, content quality assurance is not a main goal of the LCC quality assurance methodology. Nevertheless, the LCC supports the quality assurance being performed by the respective product owners. It provides facilities to report incorrect, outdated or missing content and forwards such reports to the responsible persons. Furthermore, product owners can use the LCC for their own quality assurance purposes. The LCC provides easy access to the developed products and can, therefore, be used e.g. in workshops to test the products together with relevant stakeholders. During workshops on the quality assurance of the LCC, participants sometimes mention content that would be interesting and relevant for them. Such requests are also forwarded to the respective product owners (see annex 1 of D6.3 (Larruina, et al., 2022)).

2.2.2 User Experience

Next to the content, an enjoyable and pleasant user experience is key to the LCC's success. Users who do not have fun using the LCC (i.e. due to technical glitches or an outdated design) are less likely to come back and vice versa. Additionally, parts of the user experience, such as the loading time of websites, can influence the site's ranking on search engines and are therefore important for search engine optimization purposes. The gathering and evaluation of data on the user experience and its subsequent improvement is, therefore, a key part of the quality assurance methodology.

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

2.2.3 Community

Although the overall LINKS Community and its management is part of WP8, the LCC is an important instrument for the community. The community needs to be assessed with regards to the quality assurance, but it also contributes to the quality assurance by participating in workshops or using the LCC. Therefore, a holistic quality assurance methodology also covers the community management and engagement by design. To this end, this deliverable contains an overview of the LCC's community management strategy in Section 4.

2.3 Approach of the Integrated Methodology

The quality assurance uses a wide array of methods to get a holistic view of the LCC's quality. As the starting point of the LCC's development were the needs and potentials identified in Task 7.1, this is also the starting point for the quality assurance (Section 3.1). This is followed by an overview of the feedback received at an interim review meeting (Section 3.2). The workshops conducted together with consortium members and external stakeholders on the LCC are described in Section 3.3. Additionally, an internal task force has been established with the aim of driving the continuous improvement of the LCC (Section 3.4). The findings of an analysis tool used to collect and analyse usage statistics on the LCC are described in Section 3.5. Finally, quality assurance results obtained using an automated analysis tool are presented in Section 3.6.

The main component of the community management methodology is the motivational concept (Section 4.1). This concept describes a variety of means which can be used and are being used to increase the community engagement. This is followed by a section describing how the community can contribute content to the LCC (Section 4.2). The process used to collect and process feedback from community members is described in Section 4.3. An overview of the tools available to the LCC developers and consortium members to aid with the community management is available in Section 4.4.

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

3. QUALITY ASSURANCE

This section will provide an overview of the quality assurance methods applied so far.

3.1 Initial needs and potentials identified in Task 7.1

The initial needs and potentials for the LCC were gathered in Task 7.1 and presented in D7.1 (Kiehl, et al., 2021). They are listed again in Table 1 along with a comment describing the status regarding their implementation. Out of 31 identified needs and potentials, 25 were implemented while the remaining six could not or should not be implemented, for example due to legal reasons or due to a different overall approach to the LCC. All high-priority items (as determined using a survey among the consortium members in Task 7.1) were implemented.

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

Table 1: The status of the LCC with regards to the needs and potentials identified in D7.1

ID	Priority	Description	Status	☐
4	0.833	Provide easy access to good practise examples	Mostly related to content, but the LCC provides access to the Use Cases Library which contains good practice examples.	✓
2	0.792	Provide easy access to the knowledge bases	The products of the knowledge bases which are suitable and mature enough to be presented online are available in the LCC.	✓
1	0.792	Provide easy access to guidelines (e.g. SMCS in disasters, Disaster Community Technologies, Disaster Management processes, ...)	Mostly related to content, but the LCC provides access to the Guidelines Library.	✓
9	0.750	Have access to a disaster data base with different types of disasters and lessons learned with regards to social media usage	Mostly related to content, but the LCC provides access to the Use Cases Library which contains information on various disasters and the lessons learned.	✓
16	0.729	Development of an intuitive user interface (symbols...)	Use Experience was a focus during the development of the LCC and symbols, colours, etc. are used to provide an intuitive user interface.	✓
29	0.708	Avoid technical dependence on third parties to ensure that the LCC can be available indefinitely and operate independently to achieve sustainability	The LCC is implemented using only self-hosted open-source software.	✓
14	0.689	Filtering and keyword search system	The search entry point provides access to the search system.	✓
27	0.688	Have all information as publicly visible as possible to make it accessible	All content inside the LCC can be accessed (read-only) without registration.	✓

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

5	0.667	Provide easy access to real case studies	Mostly related to content, but the LCC provides access to the Use Cases Library can be considered to contain case studies. In the future, this might be augmented by further information coming from the case assessments.	✓
11	0.646	Offer different communication functions (bilateral -> chat, comment, forum, etc.)	The LCC Forum provides various communication and commenting functions.	✓
21	0.583	Provide a forum	The LCC Forum is available.	✓
8	0.563	Provide a contact list of registered organisations in the LCC	Registration on the LCC is currently on a personal basis, therefore no organisations are registered. However, the Use Cases Library might in the future be extended to reference specific organisations and the Collection of Networks provides an overview of related organisations.	✗
28	0.542	Provide a full-text search for a document database (e.g. PDFs, Word documents)	Due to copyright concerns, no document database was implemented.	✗
13	0.542	Record user interactions (anonymously) for the evaluation and improvement of the LCC	Matomo is used to gather statistics on user interactions in a GDRP-compatible fashion.	✓
10	0.521	Integration with other LINKS elements (Webpage, Framework, LCW/LAC, cases)	The LCC is integrated with all other LINKS elements wherever it makes sense.	✓
24	0.500	Provide contact information of users in the LCC	Users inside the LCC can be contacted via the forum.	✓
15	0.500	Provide an easy way to provide input and give feedback on basically everything	Users are invited to provide feedback via the forum and via email.	✓
7	0.500	Use a motivation concept to activate and motivate the LINKS Community	A motivation concept was elaborated and implemented.	✓

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

6	0.458	Provide easy access to other project findings	This is mainly related to content as other project's findings might be part of the products available in the LCC.	✗
3	0.458	Provide easy access to deployment reports	Mostly related to content, but the LCC provides access to the Use Cases Library which can be considered deployment reports.	✓
19	0.417	Provide a wiki	The main component of the LCC is a wiki.	✓
23	0.400	Enable collaborative research (clear idea missing)	As a clear idea is missing, no concrete feature can be implemented. However, as the LCC is mainly based on a wiki, it supports various possibilities for collaboration by design.	✓
26	0.375	Provide a chat	The LCC Forum can be used to chat.	✓
20	0.375	In addition to a local login, login with Google/Facebook/LinkedIn to simplify the signup process	Login with Google is already available, login with Microsoft and Facebook was evaluated but is more complicated due to compliance reasons.	✓
18	0.354	Serve as a point of contact for problems / in disasters (from an organisational and citizens perspective)	The LCC is not being designed or developed to provide immediate assistance during a disaster.	✗
17	0.354	Provide methods for the collection of quantitative data (e.g. surveys) on crisis-related issues	There are already enough existing tools to collect quantitative data using surveys, so this feature was not re-implemented for the LCC.	✗
25	0.313	Define a clear positioning / demarcation between similar national and EU networks	The positioning and demarcation towards similar networks were described in D7.2. Additional descriptions of other networks are available in the Collection of Networks.	✓
22	0.271	Offer the possibility to work on confidential content	As the LCC is envisaged as an open and collaborative platform, it does not provide the possibility to work on confidential content.	✗
12	0.271	Provide conference tools	Although by now most organizations have access to conference tools by themselves, the LCC Cloud provides a virtual meeting room.	✓

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

30	-	Provide content in multiple languages	The LCC can provide its user interface in multiple languages. Additionally, a Google Translate-based translation feature was piloted but disabled due to GDPR-related privacy concerns. The translation of specific content falls under the responsibility of the respective product owners	✓
31	-	Offer compatibility with screen readers	The LCC is being developed in line with accessibility guidelines.	✓

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

3.2 Interim Review Meeting

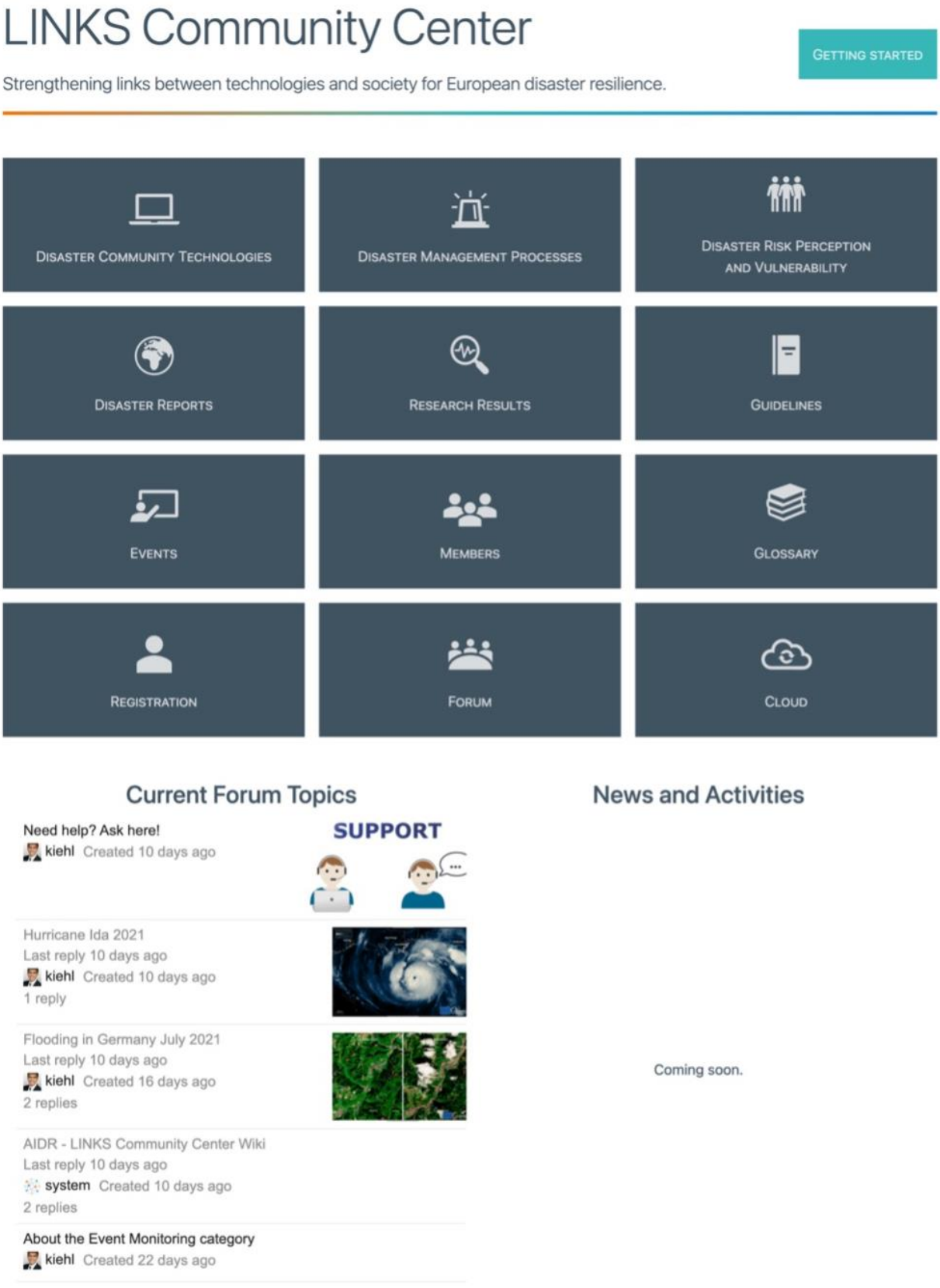
During an interim review meeting in February of 2022, several suggestions on future developments and improvements to the LCC were made by the expert reviewers. These suggestions have been summarized in the following subsections and will be presented together with the resulting developments.

3.2.1 Overall user experience

The initial version of the LCC was rather text-heavy and utilized standard elements provided by the underlying software MediaWiki. It didn't use a consistent design language and user interaction was primarily based on links and pages. This is best illustrated by the frontpage, which previously consisted of 12 uniform boxes providing access to various areas of the LCC (shown in Figure 2). This "tiles" design style is now somewhat out of fashion and the uniformity of the tiles provided the users with little visual cue or guidance. The new version of this page (shown in Figure 3) starts with a visually pleasing and animated figure using the overall LINKS branding. It also includes a link to a compass which can guide users to products according to their needs. For more information on the compass, please see D5.4 (Tzavella & Fonio, 2022). This is followed by a shortcut to the search function and access links to the LINKS Libraries. These links are animated and colour-coded, meaning that their colour (e.g. blue for the Technologies Library) is consisted throughout the LCC. This always allows users to orient themselves within the LCC as a page with a blue theme will always indicate that they are within the Technologies Library. Below the LINKS Libraries, various collections of other knowledge are linked. While libraries can be considered main products of the LINKS project and contain structured information, the collections contain additional information that might also be useful for visitors of the LCC. Previously, libraries and collections were visualized similarly in the form of blue-grey boxes, while now they are visually distinguished, and the importance of the libraries is emphasized. At the very bottom of the frontpage, the timeline highlights all recent activity inside the LCC. This timeline has been adjusted to use the same visual presentation (fonts, colours, etc.) as the other parts of the homepage.

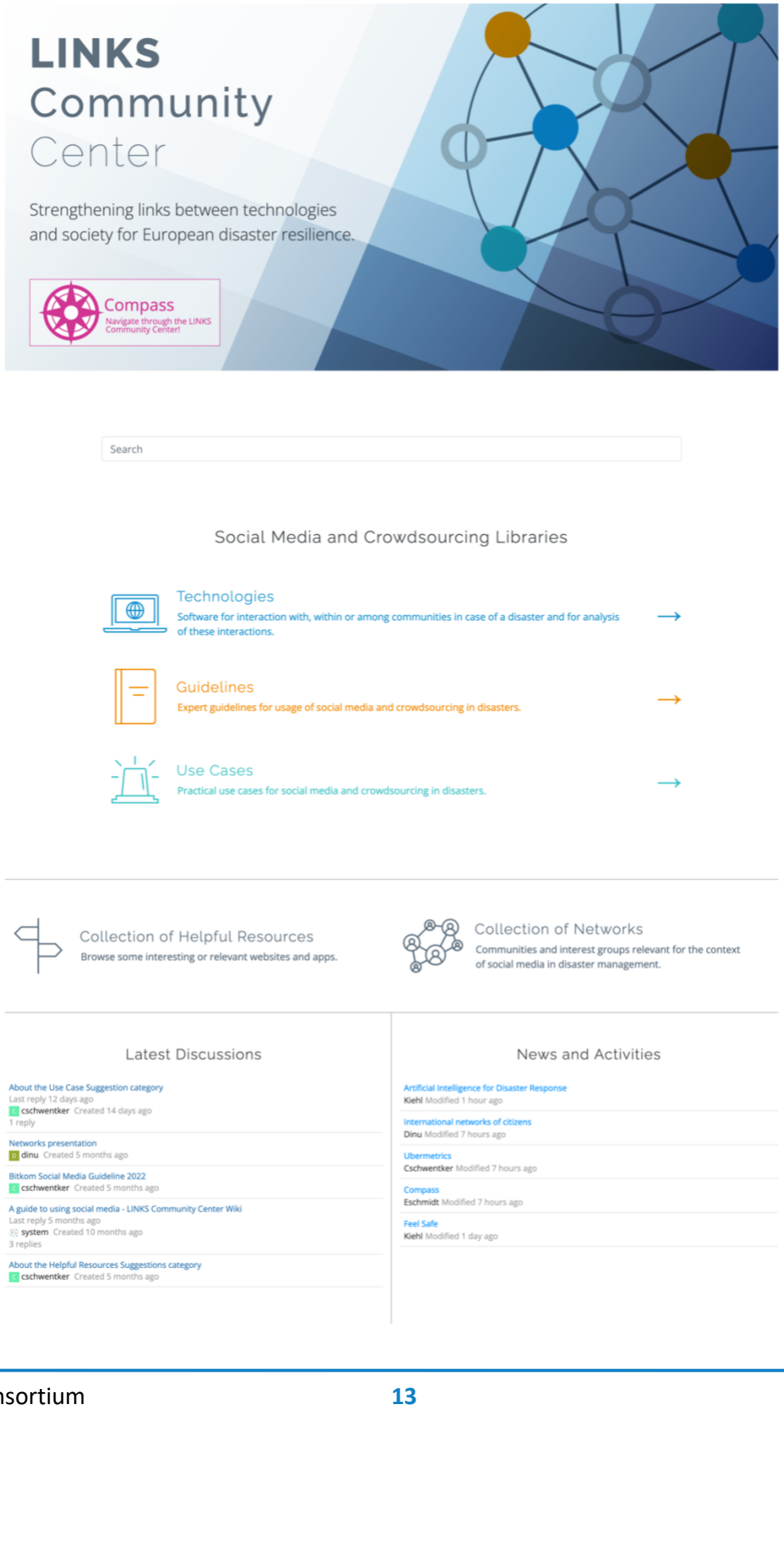
This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 883490

Figure 2: An early version of the frontpage



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

Figure 3: The current version of the frontpage



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

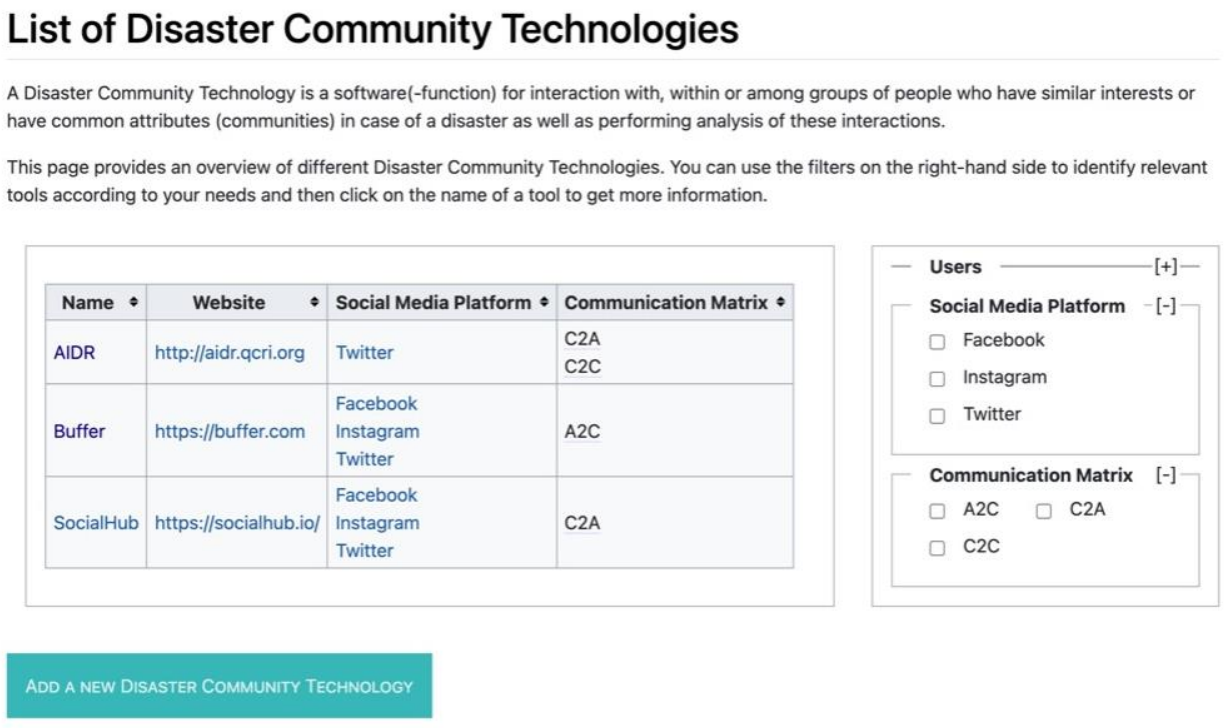
3.2.2 Subpages

Previously, subpages consisted of long lists with tables that contained little to no visual cues. The rework of the subpages will be showcased in the following sections using the example of the Technologies Library.

3.2.2.1 Overview page

The previous version of the overview page of the Technologies Library is shown in Figure 4. This page utilized a central table containing only textual information and used abbreviations extensively (i.e. for the Communication Matrix). The new version[2] (shown in Figure 5) is color-coded in the blue colour of the Technologies Library. It uses icons to display functions and the supported platforms are visualized using their respective logos. The new version also features additional information such as the number of results and has an improved compatibility with mobile devices.

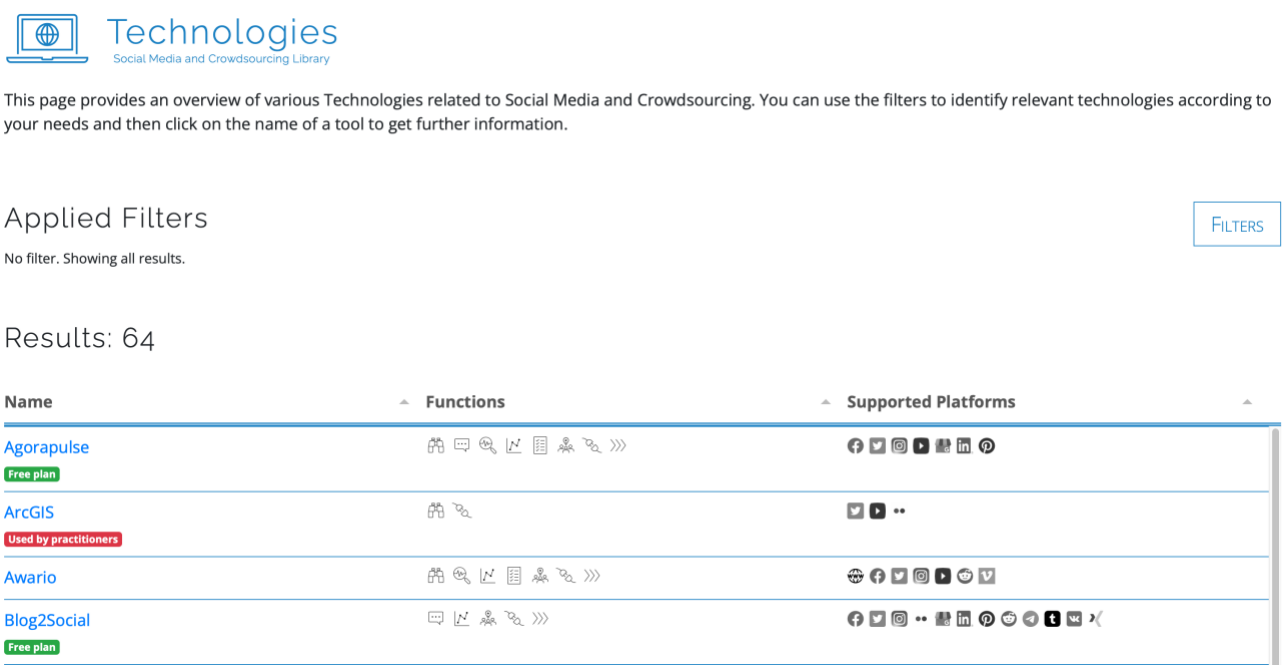
Figure 4: The first version of the overview page of the Technologies Library



[2] Available online at https://links.communitycenter.eu/index.php/List_of_Disaster_Community_Technologies

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

Figure 5: The current version of the overview page of the Technologies Library



3.2.2.2 Profile page

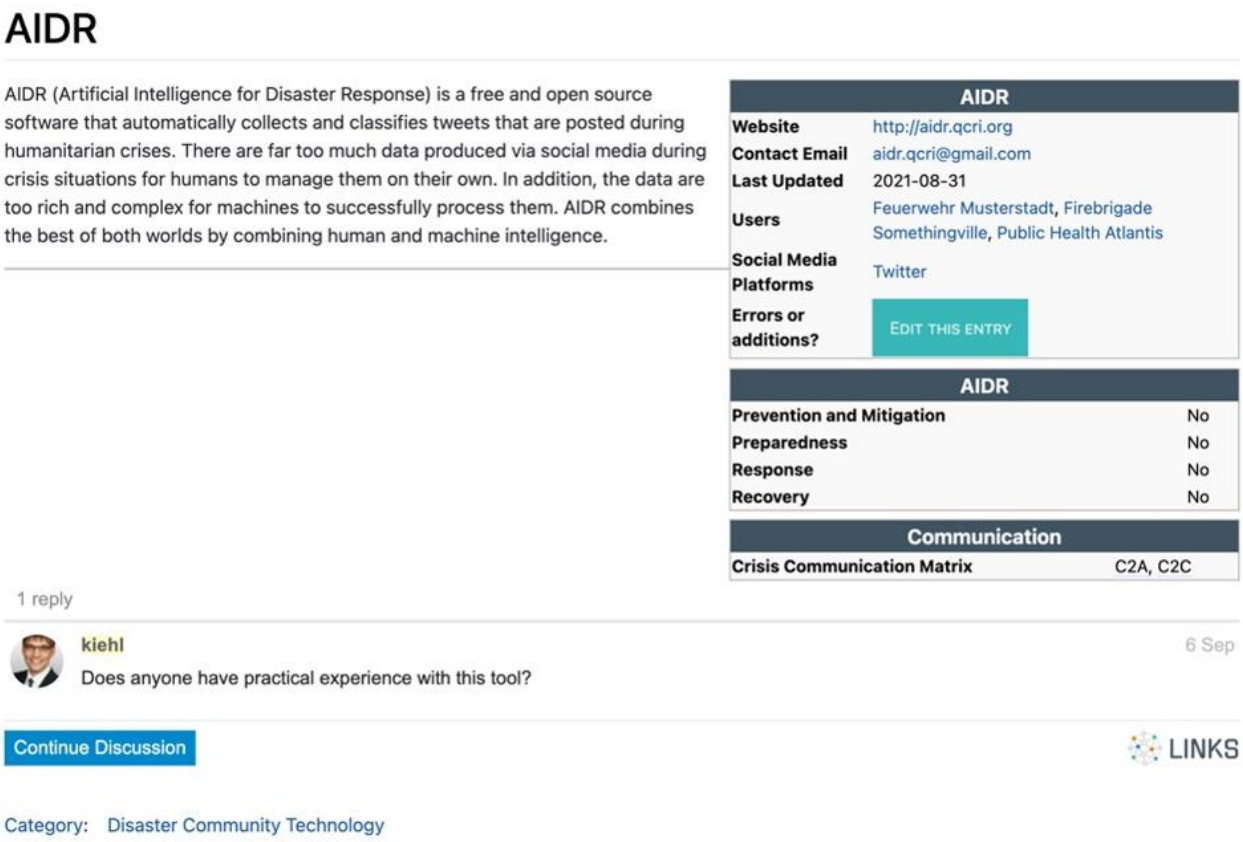
The profile page displays specific information on one technology. An example of the first version of this profile is shown in Figure 6. It was rather basic and contained only a description of the technology along with some information listed in a table. Some information was listed without further explanation (i.e. on the phases of the Disaster Management Cycle) and again abbreviations were used.

The current version[3], shown in Figure 7, again uses the blue colour of the Technologies Library. It includes an in-depth visualisation of the technology's functions along with accompanying descriptions. Visuals are used where appropriate, i.e. for the supported platforms or the provider's country. The page has also been amended with a preview on a "related content" feature, which is supposed to guide the user to further content from the products in the LINKS Framework such as the Guidelines Library and keep the user engaged with the LCC.

[3] Available online at https://links.communitycenter.eu/index.php/Artificial_Intelligence_for_Disaster_Response

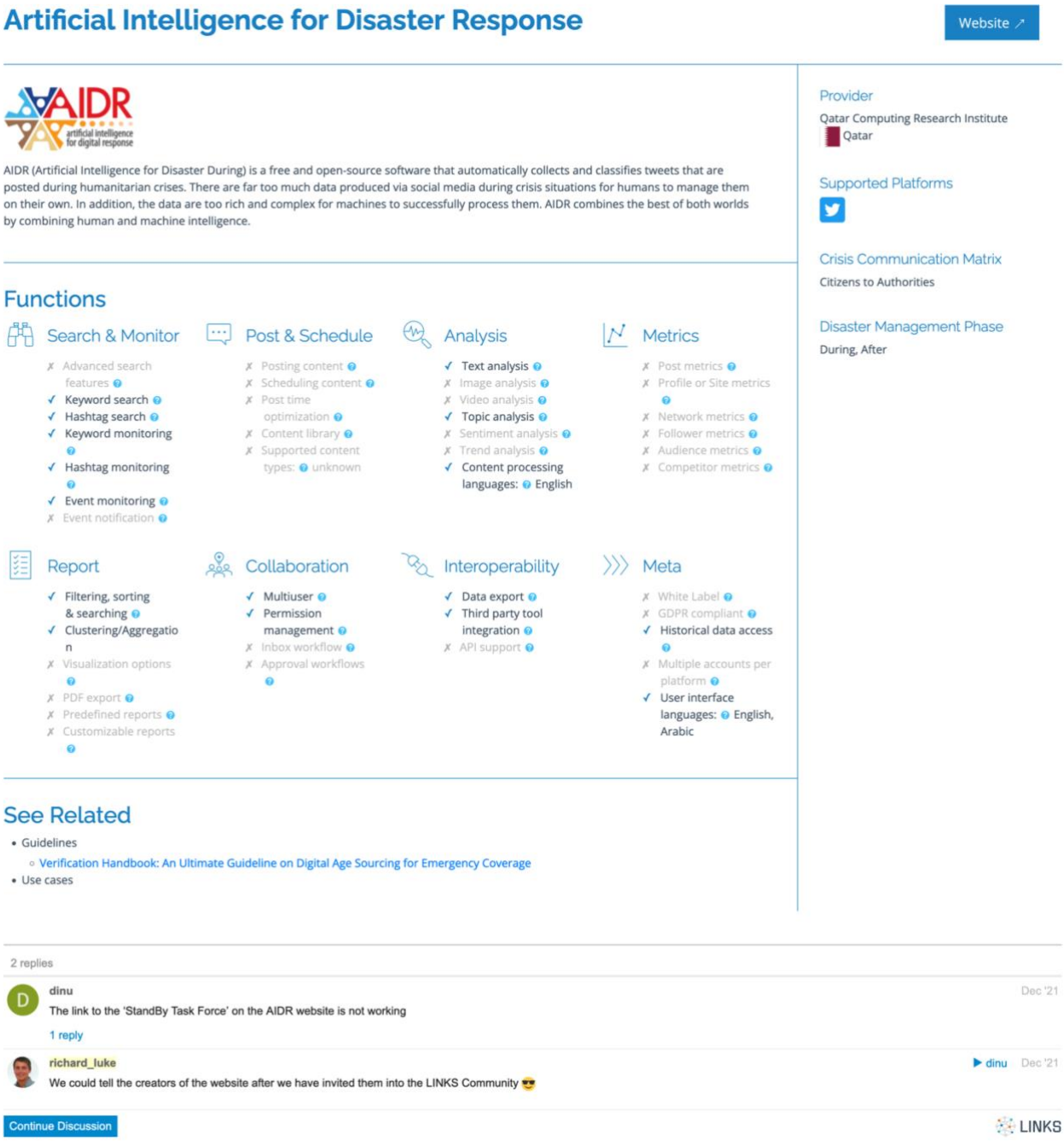
This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 883490

Figure 6: The first version of a technology profile



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

Figure 7: The current version of a technology profile



3.2.3 Language

Previous versions of the LCC featured a lot of LINKS-internal slang and made heavy use of abbreviations. Some of this has already been showcased, i.e. the usage of C2A (Citizens to Authorities) for the Crisis Communication Matrix. These abbreviations have been removed and the LINKS slang has been reduced to a minimum. Some content that was only included in the first

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

version of the LCC as a placeholder (i.e. a table on disaster risk perception and vulnerability) was also removed.

3.2.4 Accessibility

Although the first version of the LCC used standard MediaWiki features to ensure accessibility i.e. for visually impaired people, some of the developed pages were incompatible with screen readers. To alleviate this problem, tools are being used to assess and improve the LCC's compliance with international accessibility standards. More information on this work can be found in Section 3.6.

Further work was done and is being done to make the LCC more inclusive in line with the societal impact strategy. The LCC provides free and universal (via the internet) access to the project results for citizens all over the world, greatly increasing the accessibility of the results. It also contributes to a knowledge transfer and mutual understanding between the different stakeholder groups, as it is built as an open platform with equitable access for all. This is further underlined through the implementation of a community code of conduct[4]. Further information on the work being done on accessibility regarding the LCC can be found in the societal impact strategy (see D1.5 (Bonati & Morelli, 2020) and the follow-up deliverables).

3.3 Workshops

In line with the overall agile development approach of the LCC and the feedback received during the interim review meeting, several workshops (e.g. LINKS Community Workshops, LINKS Advisory Committee meetings, project-internal workshops) were conducted with the aim of improving the products presented inside the LCC and the LCC itself. The workshops as well as the changes to the LCC they led to will be elaborated in the following.

3.3.1 Guidelines Workshop

In January 2022, a workshop together with the consortium practitioner partners was organized by SIC and UCPH. The participants used the implementation of the Guidelines Library in the LCC to assess the current status of the library and give recommendations for improvements and future work. Participants used the various filters of the library to identify relevant guidelines and provided feedback on which filters they liked, or which were missing. The suggestions by the participants were considered by the guidelines task force and once decided on, were implemented in the LCC within a matter of weeks. Although the workshop focused on the content of the library, it demonstrated the value of the LCC as a research tool. A similar workshop would have been more difficult or impossible had the Guidelines Library only been available e.g. as an Excel table. The LCC therefore allows the LINKS product owners to test their products hands-on together with potential users and enables agile and rapid development cycles.

[4] https://forum.links.communitycenter.eu/t/links-community-rules-code-of-conduct/

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

3.3.2 LINKS Advisory Committee

The 2nd LINKS Advisory Committee (LAC) meeting was held in February 2022 and focused in large parts on the LCC. The meeting included 10 participants from practice, research, policy & decision making, civil society and media. The participants could work hands-on with the Technologies Library, Guidelines Library, Collection of Networks and the LCC as a whole and were asked to provide feedback and suggestions for improvements. Suggestions included improvements to the search function, additional categories for the forum and new content. For additional inspiration, participants were asked to provide their opinion on the added value of the LCC. This question was asked during a brainstorming session using a collaborative engagement software[5] and the results are shown in Figure 8 and Figure 9. A key takeaway is that something like the Use Cases Library would be hugely beneficial for the LCC and interesting for its users. This takeaway was forwarded to the relevant product owners for consideration.

For the follow-up on the LAC meeting, all suggestions were structured and collected in an Excel sheet. Each suggestion was considered and an action (i.e. if it has already been implemented, if it should be implemented or if it can't or shouldn't be implemented) was decided together with an explanation. The LAC participants were then informed of the result so that they have a follow-up on their suggestions and could provide additional input.

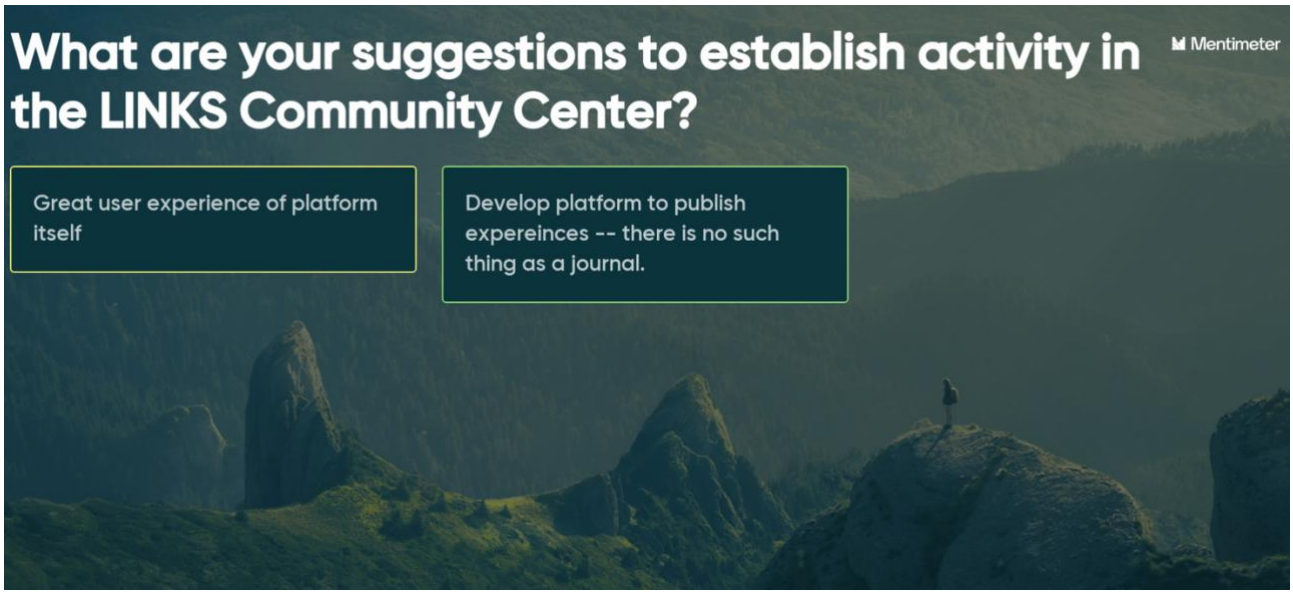
The complete report on the LAC meeting and the suggestions provided can be found in D8.5 (Giacinti, Reeson, & Nuessler, 2022).

Figure 8: Suggestions on the added value of the LCC (part 1)

[5] Mentimeter, https://www.mentimeter.com

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

Figure 9: Suggestions on the added value of the LCC (part 2)



3.3.3 LINKS Community Workshop: German drought case

In April of 2022, a LINKS Community Workshops (LCW) was organized in Germany (called "safety camp") with participants from the German Society for the promotion of social media and technology in civil protection[6] and local practitioners from the Fire Brigade and Municipality of Paderborn. This workshop focused on developing a SMCS strategy for an upcoming drought using the LCC as an information source. The goal was to ascertain which aspects of the strategy the participants would find most important or most difficult and then adjust the LCC so that the content providing input on these aspects would be promoted. A snapshot from the results can be seen in Figure 10. A key insight gained during the workshop was that there is currently a lack of knowledge about how to integrate SMCS into the overall command structure of the authorities. Relevant guidelines could solve this problem and the Guidelines Library has been promoted accordingly. Another key insight was that there seems to be a general lack of knowledge on how to apply or manage crowdsourcing activities. This insight has been forwarded to the relevant product owners for consideration.

The complete report on the LCW can be found in D8.5 (Giacinti, Reeson, & Nuessler, 2022).

[6] Deutschen Gesellschaft zur Förderung von Social Media und Technologie im Bevölkerungsschutz (DGSMTech) e.V., https://dgsmtech.de

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

Figure 10: A snapshot from the workshop on a social media and crowdsourcing strategy during a drought

3.3.4 LINKS Annual Meeting 2022

During the LINKS annual meeting in June 2022, the LCC was presented and demonstrated to experts from the associated partner Disaster Preparedness and Prevention Initiative for South Eastern Europe (DPPI SEE). Participants were handed printed out copies of pages in the LCC and were asked to provide any comments they might have on the pages. Alternatively, they could use the LCC directly on their laptops and provide the comments orally. The participants enjoyed testing the LCC and used various features. The workshop provided a good dissemination activity and served to promote the LCC beyond the consortium.

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

3.3.5 Danish and Dutch Site Visit in Paderborn

In October 2022, practitioner and research consortium partners from Denmark and the Netherlands visited Paderborn to discuss, among other things, the LCC and its usefulness for their work. Together, a walkthrough of the LCC (shown in Figure 11) with a focus on the Technologies Library and the Use Cases Library was performed. Several improvements to the content (i.e. missing or unclear filters) and usability (i.e. unclear button labels) were identified and are currently being worked on. This workshop once again demonstrated the LCC's usefulness by enabling the products to be presented, discussed and tested in an interactive and hands-on way.

Figure 11: Discussion using the LCC during the site visit

3.3.6 CERIS

LINKS was presented at the CERIS (Community of European Research and Innovation for Security) meeting in November 2022 during the Disaster Resilient Societies (DRS) State-of-Play Conference. The presentation demonstrated the overall Framework concept (themes, sub-themes and products), and how that knowledge is accessible via different entry points in the LCC. Then, examples of types of content/materials which can be accessed through the Technologies Library and Guidelines Library using different filters were presented. Finally, it was explained how those libraries will eventually link to other useful products such as the Use Cases Library. The immediate feedback was positive, one question was raised around the maturity level of the Use Cases Library as participants were already interested to view those materials. This workshop further

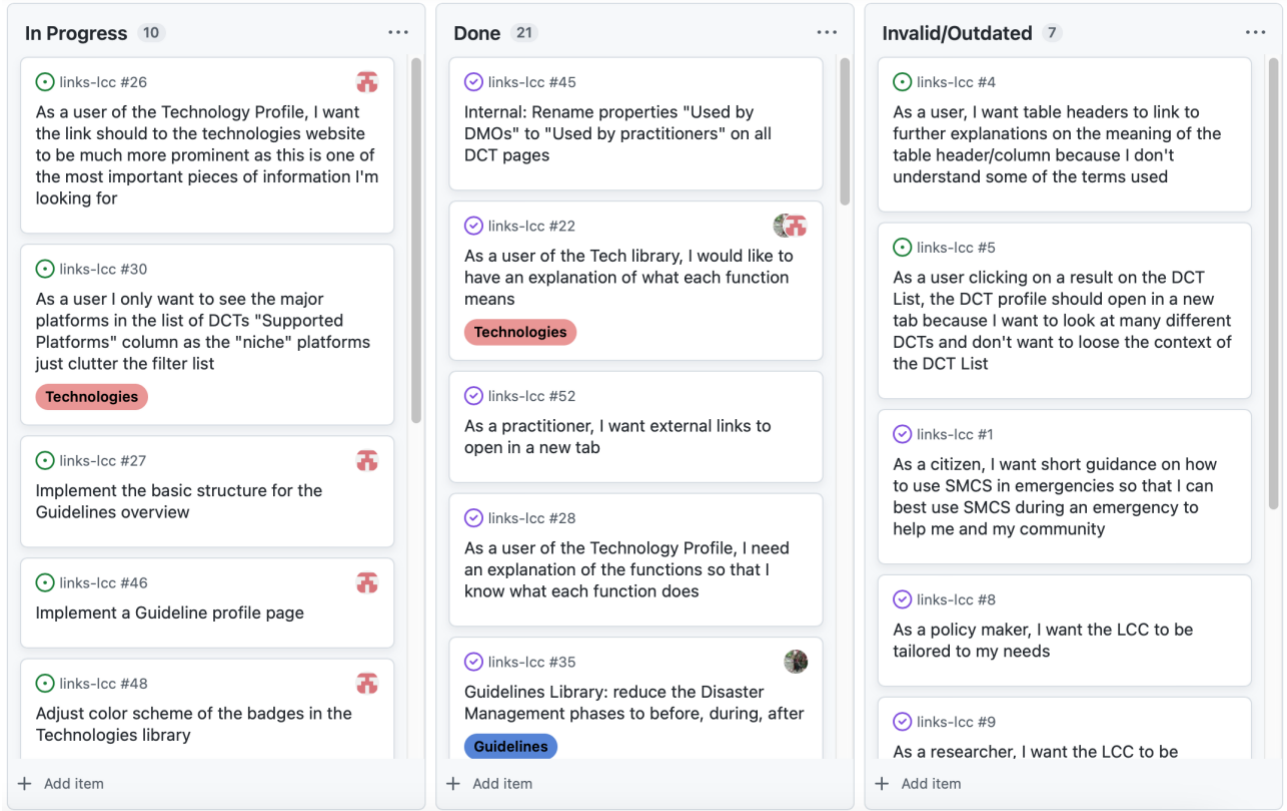
This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 883490

demonstrated the usefulness of the LCC, as it enables the interactive presentation of LINKS results without using e.g. Excel tables or other internal documents. Furthermore, the results presented were directly available to the participants as they are published on the web.

3.4 Internal Taskforce and Workshops

An internal taskforce led by SIC has been set up to continuously improve the quality of the LCC. The taskforce meets regularly to identify usability issues or potentials for improvement and then monitors their subsequent implementation. It consults with various consortium members (e.g. FEU) and invites them to contribute. In accordance with best practices regarding agile web development, ideas from the taskforce are documented as user stories. These user stories are then elaborated on and added to the product backlog. A Kanban-style board is then used to continuously select user stories for implementation, implement them and document the work done. An excerpt of this board is shown in Figure 12. Overall, more than 60 potential improvements have been identified and document in this way and roughly half have already been implemented. This standardises process ensures that no suggestions are lost, and the overall state of development is transparent at all times.

Figure 12: A screenshot of the LCC taskforce progress board



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

3.5 Usage statistics

The web analytics tool Matomo is being used to keep track of the usage statistics of the LCC. Matomo records the number of visits, the duration of each visit, the pages visited, the filters used in the libraries and many more parameters. It has been configured to work in a GDPR-compatible fashion, e.g. by disabling cookies to avoid tracking users across visits. This also means that the figures presented here provide only a low estimate for the actual usage statistics, as users who use an adblocker to block tracking or who opt-out of tracking are not recorded.

For a full analysis of the usage statistics to be meaningful, an analysis would need to have a reference period to compare against. As the full version of the LCC was only released four months ago and new products are still becoming available for integration into the LCC, a comparison against previous time periods does not make sense. A full analysis of the usage statistics will therefore be presented in the follow-up to this deliverable, D7.6. Nevertheless, this deliverable already contains a brief overview of some statistics gathered since the launch of the first version of the LCC in October 2021.

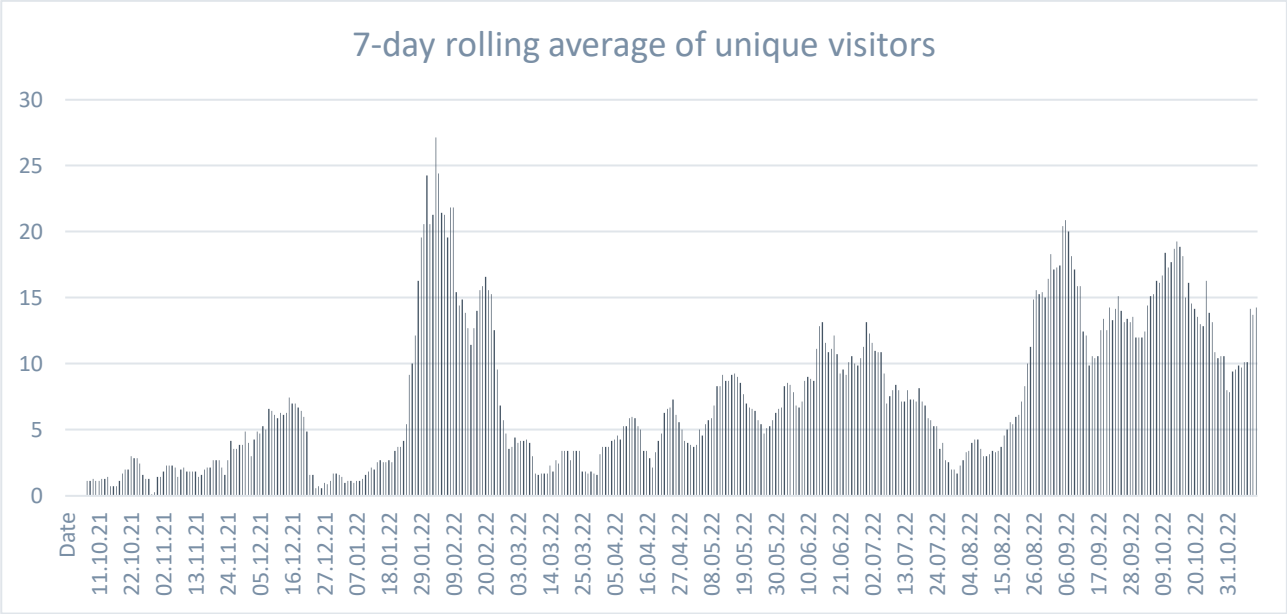
A key metric of a website is the number of users accessing it. Figure 13 shows a 7-day rolling average of unique visitors to the LCC. Overall, a positive trend with some variation can be observed. There are periods of low usage, e.g. during the Christmas break in 2021 or in August of 2022 (summer break). A notable exception with a large amount of activity can be seen in January and February of 2022, as these months featured the guidelines workshop, the LAC meeting and the interim review meeting.

Other metrics that can be analysed are the pages accessed and the amount of time spent by visitors on these pages. Preliminary analysis indicates that the list of technologies and the list of guidelines are the most accessed pages with visitors spending twice as long on the list of technologies (roughly 2 minutes) than on the list of guidelines (roughly 1 minute). Although not published here due to privacy considerations, this analysis also allows to discern which of the technologies listed are especially interesting to users and are accessed most.

Initial analysis indicates that the Collection of Networks seems to be a helpful resource for directing users from search engines to the LCC. Many users arriving to the LCC from Google arrive on the Collection of Networks page, indicating that they searched for one of the networks listed on this page. This provides the LCC a boost in the ranking on Google and gives the users further information that might be of interest to them.

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

Figure 13: 7-day rolling average of unique visitors since the release of the first version of the LCC



3.6 Tool-based analysis

The automated tool Google Lighthouse[7] is being used to assist in the development of the LCC. This tool automatically analyses several aspects of a website, such as the performance, the accessibility and the search engine optimisation (SEO). Each aspect is assigned a score from 0 to 100 with 0 being the worst and 100 being the best. Where relevant, the tool also gives recommendations on potential improvements. The tool's application to different representative pages of the LCC will be described in the following.

3.6.1 Frontpage

The frontpage receives a rating of 65 for the performance, 96 for accessibility and 85 for SEO. Lighthouse suggests reducing the loading time of the frontpage by using compression and caching, however, these changes are not easily feasible with the MediaWiki engine the LCC is based on. Further testing also indicates that the performance is satisfactory on mid-range laptops. The only suggestion regarding accessibility is to improve the contrast ratio between the background and the foreground of the page and the only suggestion regarding SEO is on adding meta tags to the page. It is currently being evaluated how these suggestions can be implemented while staying true to the LINKS visual identity. It is currently not planned to add meta tags to the page for SEO purposes as they seem to not be used anymore by search engines[8].

[7] https://developer.chrome.com/docs/lighthouse/overview/
[8] See https://developers.google.com/search/blog/2009/09/google-does-not-use-keywords-meta-tag

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

3.6.2 List of Technologies

The list of technologies receives a rating of 37 for performance, 83 for accessibility and 85 for SEO. Further testing has revealed that the performance can be slow on older Android devices (mainly due to the complexity of loading and displaying more than 30 attributes (8 functions, 23 platforms, additional information on licensing model and practical usage) for 65 technologies each) but is satisfactory on mid-ranged laptops. However, the performance will be further optimized by using pagination (showing results only in groups of 20 per page) or by optimizing the code used to render the page. Lighthouse also suggests some minor adjustments to improve the page's accessibility and SEO.

3.6.3 Technology Profile

The technology profile receives a rating for 72 for performance, 92 for accessibility and 85 for SEO. Performance improvements could be made mainly by reducing the size of loaded images. This would reduce the amount of bandwidth required to load the page and speed up the overall rendering process. This improvement is currently being implemented. Lighthouse also suggests some minor adjustments to improve the page's accessibility and SEO.

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

4. COMMUNITY MANAGEMENT

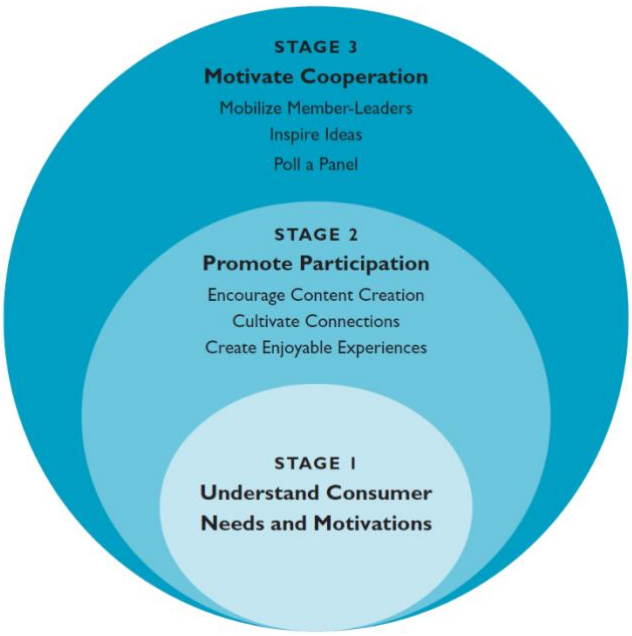
This chapter describes the community management process in the LCC that builds upon the groundwork laid out in D7.1 and D7.2. The first section (Section 4.1) focuses on the developed motivational concept to foster and sustain user engagement in the LCC. In the next section (Section 4.2), the community-based content contribution process for the LCC is described. The last two sections describe the implementation of the feedback process (Section 4.3) and supporting tools for the community management (Section 4.4).

4.1 Motivational concept

The scientific base of the motivational concept can be found in Section 3.1 of D7.1 with an extension provided in Section 5.1 of D7.2.

The LCC follows a three staged concept on how to foster and sustain engagement in online communities (Figure 14). The needs and requirements for the target group of the LCC (Stage 1) were discussed in the preceding deliverables. A concept for the promotion of the LCC (Stage 2) was presented as well and is described in further detail in Section 4.1.5. The following sections detail the measures that have been devised with a focus on measures on creating an enjoyable experience and to encourage content contributions. They adhere to the overall goal to promote participation in the LCC and to provide the basis for the transition to Stage 3.

Figure 14: Three staged concept on how to foster and sustain engagement in online communities



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

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

4.1.1 Usability and Usefulness

Usability and usefulness have been introduced in D7.1 as key criteria for successful online communities and essential for the satisfaction of users and are therefore part to the aspect of "creating an enjoyable experience" (Figure 14).

Based on Feedback from the LCC workshops (Section 3.3) and other received feedback, the design of the LCC has been refined with a focus on usability and accessibility and will be improved further to optimize the user experience. For example, the list of technologies now uses badges to highlight key information, to indicate if the technology is already used by practitioners and if there is a linked use case in which the specific technology was used. Another change based on feedback received was the improvement of the display of the platforms in the filter. More common platforms are now listed first instead of all platforms being listed alphabetically. The goal is to provide users of the LCC with the most relevant information first and to reduce the number of interactions and decisions required to use the LCC for the most common use cases.

The usability is being evaluated regularly and is also part of the feedback process described in Section 4.3.

Usefulness describes the degree to which users can draw relevant information from the platform for themselves or their work (D7.1). As the users of the LCC can both consume content and contribute to it, an approach for ensuring the quality of user-contributed content is required. This community-based quality control approach is described in more detail in Section 4.2 as part of the content contribution process.

4.1.2 Onboarding measures for new users

To create an enjoyable experience for new users (see Figure 14), onboarding measures are required. The goal is to inspire new users to actively participate in the community. Based on literature, the following onboarding measure have been identified as useful for the LCC and are under implementation:

- Providing a clear mission statement, what the LCC is about
- Informing about the LCC on the LINKS Website and how to participate
- Encouraging receivers of the LINKS Newsletters to participate in the LCC
- Providing a Code of Conduct to inform new users about the community's culture and values and to provide a safe space for them
- Providing instructions on how to navigate and participate in the LCC by providing a Getting Started thread that can be amended with further questions and answers (see Section 4.1.4)
- Sending welcome e-mails to newly registered users with basic information and encouraging the user to participate and fill out their profile
- Registration with existing accounts (see Section 4.1.3)

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

- Providing the possibility to form subgroups for people with similar interests to "cultivate connections among members"
- Using the LINKS Compass and it's learning paths as entry point to guide users to relevant content

The onboarding process is tested and evaluated with external users and continuously improved. For the evaluation, users are asked to rate their experience with the onboarding process. Another important part of the onboarding process is to quickly react to questions from new users, so that these do not feel ignored or not welcomed (Bretschneider, 2012) and to support them in their onboarding experience where necessary. This is currently done by SIC as the provider of the LCC but could be handled by other community members in the future. Users are also granted achievements if they complete the registration process and login into the discussion forum to provide them with quick wins. This is described in more detail in Section 4.1.7.

4.1.3 Improved Registration

To consume the content of the LCC, no registration is necessary. Registration is only necessary if users want to actively participate in the community, e.g. by contributing content or discussing with community members. However, registration is part of the onboarding experience and contributes to the overall aspect of "creating an enjoyable experience" (Figure 14).

Research has shown that it is advantageous for users to register with an already existing account and to have the possibility to import their basic profile information, for example from a social media account. Alternatively, new users can register with only providing a username, their first and last name and a password.

To further ease the registration, the LCC also supports registration with an existing Google account. A registration option with an existing LinkedIn account is currently under development. LinkedIn was chosen because it is a popular social network among professionals, and many are already registered there. In addition, as described in Section 4.1.6, the possibility of a login with an existing CMINE account is currently being investigated.

4.1.4 Questions Section & Guides

As part of the onboarding experience and relevant for registered users as well, the LCC provides a Getting Started thread in the discussion board answering common questions about the usage of the LCC. This also contributes to the aspect of "creating an enjoyable experience". The Getting Started thread contains answers to questions a user might have, recommendations for potential starting points regarding content and points towards the questions section where users can ask for guidance if they need help. The implementation as a thread allows users to comment on the Getting Started thread directly and point out e.g. missing information that should be integrated into the thread.

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

4.1.5 Promoting the LINKS Community

Based on the high-level promotion concept presented in D7.2, the following measures are actively carried out in cooperation with WP8 (LINKS Community Workshops) and WP9 to attract new users and to "promote participation" (Figure 14) in the LCC by maximizing the reach and audience. The promotion campaign targets various dissemination channels like social media, conferences, events, and existing networks.

The campaign includes the following aspects:

- Present and highlight the key features of the LCC
- Inform about new and updated content in the libraries
- Inform about new features and usability improvements
- Call to action to actively encourage uses to join the LCC
- Highlight qualitative excellent content, e.g. in a dedicated forum section
- Mention activities in the LCC (e.g. Q&A Session with experts, upcoming workshops or conferences)
- Perform (online) workshops on functions or content in the LCC
- Create links from other websites to the LCC to direct users towards the LCC and improve the SEO of the LCC
- Publish a video about the LCC as described in Section 6.2.1. in D9.2 (Opromolla, 2021)

A key part of the promotion includes the LCWs that are organised in the context of WP8, where the LCC is presented, and users are actively using the LCC in the local case countries. Feedback from the LCWs is collected and used to improve the LCC.

Further promotion includes presenting the LCC at some of the following upcoming events and conferences:

- CERIS DRS Cluster Conference 2023[9]
- EENA CONFERENCE & EXHIBITION 2023[10]
- Information Systems for Crisis Response and Management Conference 2023 (ISCRAM)[11]
- Annual Conference 2023 vfdb (German Fire Protection Association)[12]
- Federal Office for Civil Protection and Disaster Assistance – Conference 2023 - Research for Civil Protection[13]

In addition, networks that represent practitioners, policymakers, as well as representatives from businesses and civil society with a focus on Disaster Management or Social Media and Crowdsourcing (D7.7, (Nuessler, 2022)) are being contacted for promoting the LCC. These include:

[9] https://www.cmine.eu/events/95716
[10] https://eenaconference.org/
[11] https://iscram.org/
[12] https://www.vfdb.de/events/jahresfachtagung
[13] https://www.bbk.bund.de/DE/Themen/Forschung/Forschungsfoerderung/Fachkongress/fachkongress_node.html

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

- ICRC (International Committee of the Red Cross)
- Crisis Mappers Net (International Network of Crisis Mappers)
- JOIFF (International Organisation for Industrial Emergency Services Management)
- CERIS (Community of European research and innovation for security)
- CMINE (Crisis Management Innovation network)
- DRMKC (Disaster Risk Management Knowledge Center)
- EØA (European Fire Safety Alliance)
- VOST Europe (European Virtual Operations Support Team)
- DPPI SEE (Disaster Preparedness and Prevention Initiative for South Eastern Europe)
- EENA-Researchers (European Emergency Number Association - Network of researchers)
- ESSN (EENA Emergency Services Staff Network)
- RAN (resilienceadvisors.eu)
- Røde Kors (Danish Red Cross)
- DEMA (Danish Emergency Management Agency)
- Vfdb (German Fire Protection Association)
- Vdf NRW (German regional firefighter association)
- THW (Technisches Hilfswerk (Federal Agency for Technical Relief))
- BKA (Federal Criminal Police Office (Germany))
- DGSMTech (German Society for the promotion of social media and technology in civil protection)

4.1.6 Connection and integration with other sites and initiatives

To allow users to participate more easily in the LINKS Community and to ensure its sustainability, an integration of the LCC with existing sites or initiatives is planned. Rather than be a stand-alone community focused on a niche topic, this could allow the LCC to become a sub-community or co-community within a wider network.

Details on how this could look in practice are currently under discussion. As the LCC is based on open software and open interfaces, it can be rather easily integrated with existing systems. One option that is currently being investigated is to add a “Login with CMINE” option where users could use their existing CMINE account to access the LCC. Other possible options for integration are on a more conceptual level (i.e. having the LCC be part of a meta-community that is connected by name or purpose but not technologically) or on a deeper technological level (i.e. mirroring content between connected communities). Further integration, i.e. within the Union Civil Protection Knowledge Network, is also possible and being considered.

4.1.7 Achievements and Badges

To further motivate registered users to contribute content (“Encourage content contribution”, Figure 14) to the LCC, a gamification-based approach based on achievements and badges is

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

implemented. This contributes to the aspect of "incentive systems for contributing content" as defined in D7.1.

The LCC provides three different categories of achievements:

- Trust-based achievements
- Activity-based achievements
- One-time badges

Trust-based achievements include different level of privileges that also have the side effect of spam protection (e.g. new users are only allowed to include one link per post). After a certain period of activity (e.g. created 5 topics in the discussion board), users are granted a new trust level with more privileges. Each trust level has different requirements that need to be fulfilled for users to be granted this level. In addition, users can also be manually promoted to a certain trust level or granted additional privileges (e.g. certain users can be allowed to directly add or to correct information in the libraries).

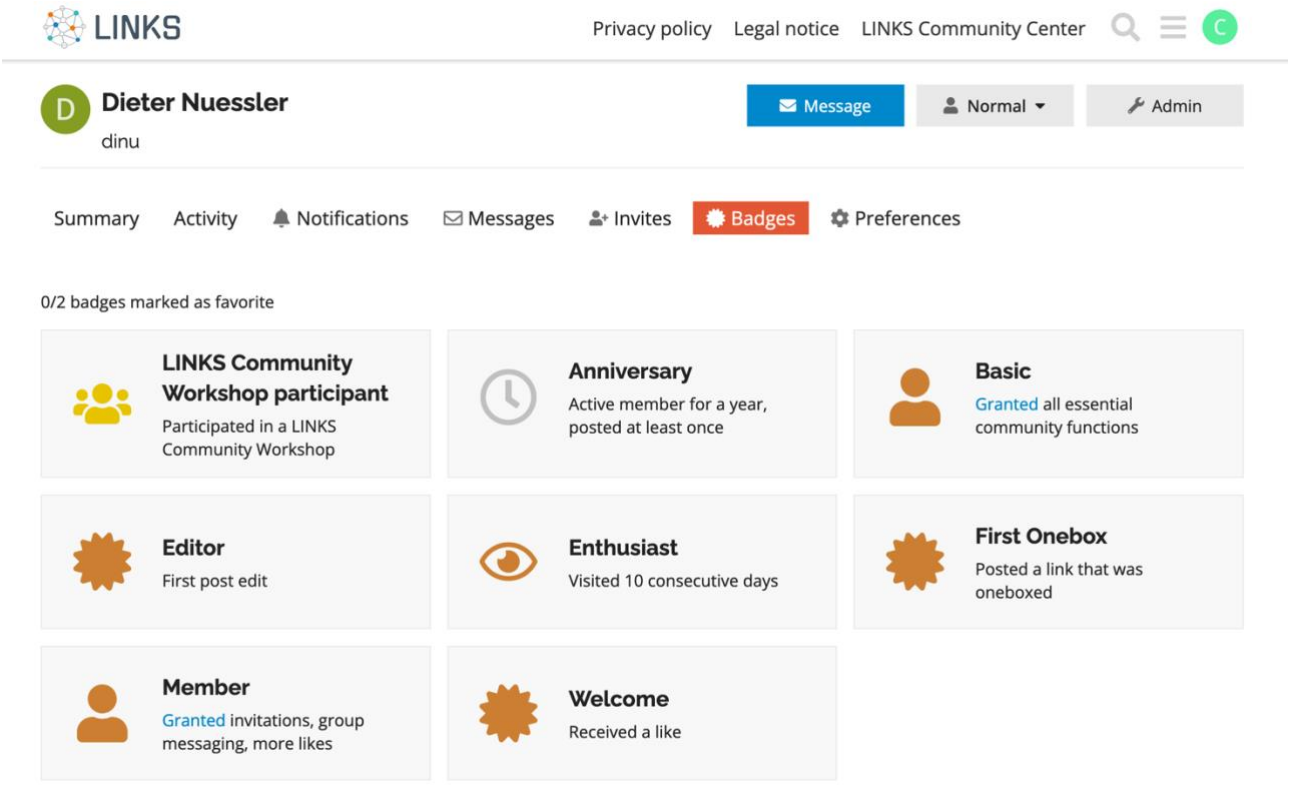
The category of activity-based achievements is based on activity in the discussion board (e.g. regular visits on consecutive days, posted topics or answers) and is expanded with achievements about the interaction with the provided libraries (e.g. a user suggested five new technologies, guidelines, or use cases) to promote content contribution.

A third category of achievements are one-time badges, these are a special kind of achievements that are granted to users only on special occasions, for example for attending an LCC workshop in person or attending a webinar about the LCC. These are useful for establishing loyalty and improving the activity in the community (Cavusoglu, Li, & Kim, 2021). Figure 15 shows a user profile in the LCC with the activity and trust-based achievements, as well as the special Badge for participating in an LCW.

It should be noted that achievements and badges mainly refer to visual elements with limited impact on a user's permissions. Most importantly, all users have access to the same content and communication facilities regardless of their achievements or badges.

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

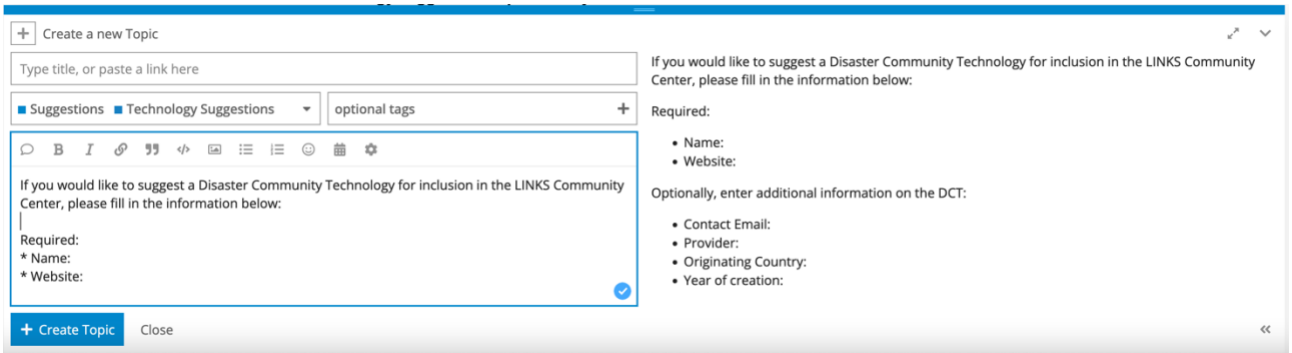
Figure 15: Achievements and Badges displayed on the LCC User profile



4.1.8 Suggestions

To further encourage content contribution, in each library in the LCC, there is an option to suggest new content. Users are redirected to the discussion board, where they can fill out a template form with basic information. Figure 16 shows the form for suggesting a new technology. The information will be reviewed by the specific product owners, and then a new entry will be added to the specific Library. Once this is done, the user will be informed through an answer. This last step is important, as the user feels that their ideas are considered, and they are motivated to contribute further. Depending on the trust level (see Section 4.1.7), the user could also be able to directly add a new entry to the specific library.

Figure 16: Template form for suggesting a new Technology



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

4.1.9 Highlights Section

To promote the content creation and the usage of the LCC, there will be a highlight section in the discussion board that highlights high-quality content. This section will contain links to excellent Use Cases, Technologies with complete and verified information or excellent Guidelines that were contributed by members of the community. It will also serve as an orientation for new users on what content is considered excellent and as an inspiration for contributing similar content.

4.2 Content contribution

The contribution of user generated content is a key feature of the LCC. However, as described in D7.1, the quality of the content is considered an essential factor for the satisfaction and loyalty of community members. The following two-folded concept is therefore used to manage community-generated content. Currently, content suggestions are reviewed and updated by the product owner. By considering the achievement system described in Section 4.1.7 as a basis, the trust and activity-based achievements allows identifying active users that can be promoted and granted the rights to modify and keep the library content up to date as well. This contributes to the concept of strengthening of the user's role and competencies.

Community users will also be subsequently integrated in processes of extending or streamlining the Library schemata. For the Technology Library, content updates are also performed in cooperation with technology providers to validate the information. Validated entries are marked and highlighted in the Technology Library. This work is being done by WP4 with the results being highlighted in the LCC. As a further mechanism of quality control, changes to the library entries are transparent and can be traced back in history and compared with older revisions. This also includes the option to restore older versions of the content, if needed. This is part of the integrated role and authorisation model mentioned in D7.1.

The upcoming case assessments (see D6.3) will also be used to test this process and to gather further content for the LCC. Participants will be asked to contribute content to the libraries via the means provided by the LCC. They will evaluate the content contribution process and their feedback will be used to further streamline this process. Furthermore, the participants will be asked to provide general feedback on the LCC and feedback on specific products using prepared feedback questions. This process is organized by the respective product owners.

4.3 Feedback process

As mentioned in D7.2., the implementation of feedback functions is an important factor for successful community management. It signals users that their feedback is valued and considered, and, in the end, will lead to more engaged users.

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

The feedback process follows the Plan-Do-Check-Act-Cycle (Scholtes, 1998), an established model for a continuous improvement process. Registered users can submit feedback directly in the discussion forum. Not yet registered users or those who do not want to post their feedback in public are invited to privately send an e-mail. The email address is as follows:

feedback@links.communitycenter.eu

The email feedback option can also be used to gather feedback from LCC workshops or presentations where users are not yet registered. The workshop host can collect the feedback, which is often given only orally and send it via e-mail. This removes the burden for the unregistered workshop participants and signals that their feedback is valued by establishing a low barrier for providing feedback. All feedback that arrives through the listed communication channels is categorised and evaluated (see Section 3.4). Changes in the LCC that are implemented based on received feedback are clearly communicated to enhance transparency and to further motivate the users by showing them that their suggestions are being taken into account and acted upon.

4.4 Supporting tools

The LCC supports the developers and consortium members with different tools to aid in the community managements process. MediaWiki provides an integrated right and roles management systems which allows granting users different rights. Product owners that are responsible for a specific library or users that have reached a certain trust level have the right to directly add or modify content in the corresponding libraries, while standard users are not allowed to do this. MediaWiki also records the editing history of all pages and provides the option to compare the current revision of a page with any older version. In addition, registered users can watch a page for changes. This is useful for the product owners to stay informed about all changes, either when logged in in the LCC or via email.

The discussion board also provides email notifications for new topics and newly registered users, as well a weekly summary of topics. This provides the means to quickly react and welcome new users.

Like in a mailing list, users can also directly respond to discussion topics using their email program. These answers are automatically displayed in the discussion board as well. This reduces the complexity for the product owners and consortium members.

All supporting tools are based on a push model, ensuring that partners do not have to constantly check the LCC for changes to their respective products. In contrast, they are informed by mail when content in their area of responsibility changes and an action (i.e. confirming or denying a change) is needed.

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

5. CONCLUSION AND FUTURE WORK

Various methods to ensure the quality of the LCC and help manage its community have been devised and combined into an integrated methodology. The application of these methods indicates that the LCC is of overall great quality. Almost all needs and potentials identified at the beginning of the development together with the stakeholders have been implemented and are ready for usage. A series of workshops and meetings, including a LINKS Advisory Committee meeting and an interim review meeting, have provided helpful feedback and good indications for the future development of the LCC. This feedback has been taken into account and the LCC has been adjusted accordingly.

The community management concept has been refined and various measures to engage with the community have been implemented. They are being tested in the second case assessment, which also seeks to contribute further content to the products included in the LCC. This case assessment is a key inflection point in the upcoming period, as it allows all stakeholders to engage with the LCC, to provide feedback and to contribute to the community. This will be accompanied by a publicity push using all available means, i.e. conference talks, social media and contacts to other networks. Additional focus will also be given to search engine optimization to ensure that users can find the LCC by inputting the relevant terms into common search engines. The ramping up of the community activity is foreseen to contribute to the long-term sustainability and quality assurance of the LCC. Community members can take over the role of content contributors and moderators in the long-term using the tools already integrated into the LCC.

The results will be published in the follow up to this deliverable, the final report about the online community management and quality assurance (D7.6), due in November 2023.

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

BIBLIOGRAPHY

Bonati, S., & Morelli, S. (2020). *Ethics and Societal Impact Strategy.* Deliverable 1.5 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).

Bretschneider, U. (2012). *Die Ideen-Community zur Integration von Kunden in den Innovationsprozess.* Gabler Verlag. doi:10.1007/978-3-8349-7173-9

Cavusoglu, H., Li, Z., & Kim, S. H. (2021, July). How do Virtual Badges Incentivize Voluntary Contributions to Online Communities? *Information & Management, 58*, 103483. doi:10.1016/j.im.2021.103483

Fonio, C., Clark, N., Bonati, S., Lüke, R., Graziani, F., Habig, T., . . . Raju, E. (2022). *First version of the LINKS Framework.* Deliverable 5.3 of LINKS: Strengthening links between technologies and society for European disaster resilience, funded by the European Union's Horizon 2020 Research and Innovation Programme (No. 883490).

Giacinti, F., Reeson, K., & Nuessler, D. (2022). *Second LINKS Community Workships abnd LINKS Advisory Committee Report.* Deliverable 8.5 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).

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.

Kiehl, M., Habig, T., & Marterer, R. (2021). *First demonstrator of the LINKS Cimmunity Center.* Deliverable 7.3 of LINKS: Strengthening links between technologies and society for European disaster resilience, funded by the European Union's Horizon 2020 Research and Innovation Programme (No. 883490).

Kiehl, M., Habig, T., & Marterer, R. (2022). *Final demonstrator of the LINKS Cimmunity Center.* Deliverable 7.4 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).

Kiehl, M., Lüke, R., Tappe, D., Gelhar, S., Habig, T., & Marterer, R. (2021). *Report about the needs and potentials of the LINKS Community Center.* Deliverable 7.1 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).

Kiehl, M., Tappe, D., Werner, T., Habig, T., & Marterer, R. (2021). *Concept for the LINKS Community Center.* Deliverable 7.2 of LINKS: Strengthening links between technologies and society for

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

European disaster resilience, funded by the European Union's Horizon 2020 Research and Innovation Programme (No. 883490).

Larruina, R., Clark, N., Tzavella, K., Graziani, F., Starmans, J., Lüke, R., . . . Hamachers, A. (2022). *Final work plan for the LINKS Framework and the five cases.* Deliverable 6.3 of LINKS: Strengthening links between technologies and society for European disaster resilience, funded by the European Union's Horizon 2020 Research and Innovation Programme (No. 883490).

Nuessler, D. (2022). *First Report about the relation to other networks.* Deliverable 7.7 of LINKS: Strengthening links between technologies and society for European disaster resilience, funded by the European Union's Horizon 22 Research and Innovation Programme (No. 88349).

Opromolla, A. (2021). *Updated LINKS Dissemination, Exploitation and Communication Strategy.* Deliverable 9.2 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).

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

Scholtes, P. R. (1998, January). *The Leader's Handbook: Making Things Happen, Getting Things Done.* New York: McGraw-Hill.

Tzavella, K., & Fonio, C. (2022). *Second version of the LINKS Framework.* Deliverable 5.4 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).