



engage

Engage Society for
Risk Awareness and Resilience

Deliverable 7.4 – Final project report

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Abstract: ENGAGE aims at linking the informal resilience naturally inherent in citizens with the formal work of authorities to prevent, prepare for, respond to, and recover from disasters. It brings together 14 partners from 8 countries aiming to show how individuals and local practices can interrelate effectively with planned preparedness and response, practitioners, and technology.

This deliverable provides an overview of the project and its main results and achievements, referring interested readers to more specific resources (websites, deliverables) for further reading. It can be used as an introduction to different activities related to the development and validation of the project's results, especially the Catalogue of Solutions, its main output. This deliverable is primarily addressed and useful to an external audience constituted of practitioners, researchers and policymakers interested in disaster management and societal resilience – especially in relation to the participation of the population to these topics.

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Executive summary

Achieving societal resilience in the face of disasters and crises requires a better involvement of the population. When a disaster strikes, members of the population provide resources and information that contribute in critical ways to the response to and recovery from the event. Their involvement nonetheless introduces new risks and uncertainties in an already complex situation. Project ENGAGE is focused on improving the interactions between formal and informal actors in disaster management. Its primary objective is to make solutions to improve these interactions more effectively known and usable by authorities and emergency organizations. By “solutions”, we mean technologies, methods, guidelines, strategies or approaches, etc. Our main way of achieving this objective was to develop a publicly available catalogue in which solutions used successfully around the world are organized and presented in great details to facilitate their identification, selection and use by stakeholders.

This deliverable provides an overview of the project ENGAGE and its main outcomes, referring the interested readers to more specific resources (websites, deliverables) for further reading. The document is primarily addressed to an external audience, practitioners, researchers and policymakers interested in disaster management and societal resilience, especially in relation to the participation of the population to these topics.

After an overview of the project itself (societal relevance, objectives, path taken for the development of its main technical results), the document describes the main results, which are aimed primarily at the formal actors of disaster management (authorities, emergency organizations and NGOs).

Based on literature review, interviews, surveys and extensive analysis of cases, the first outcome of the project is the knowledge generated about the contribution of the population to disaster management, as well as the identification of needs and requirements to enhance this contribution. This knowledge constituted the basis for a theoretical model of societal resilience. Informed by this knowledge, the main outcome of the project is the Catalogue of Solutions, a resource aimed at providing inspiration and guidance to authorities and emergency organizations. The CoS is embedded in the Knowledge Platform, which provides additional informational resources that enrich the catalogue, such as a list of informal solutions that emerged primarily from citizens’ initiatives. In parallel, the project explored the use of AI in the development of an emergency communication chatbot. The chatbot developed is a functional prototype that instantiates a comprehensive blueprint informed by extensive literature review and expert input.

These results were developed through the involvement of a variety of stakeholders beyond the project partners, especially members of the KI-CoP (Knowledge Innovation Community of Practice), through increasingly realistic validation activities. The document provides some elements about the main validation activities (four exercises) and results, and some lessons learned about the involvement of stakeholders (including citizens) in the project.

The document concludes with some reflections on limitations and achievements of the project, paving the way for future work. The project results highlighted in this report are the result of 3.5 years of work carried out by 15 partners across Europe, representing many countries and fields of research and practice.



1 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

This deliverable presents the main results of the ENGAGE project to an external audience. It provides an overview of the project and its outcomes, referring the interested readers to more specific resources (websites, deliverables) for further reading.

1.2 INTENDED READERSHIP

This deliverable is primarily addressed to an external audience, practitioners, researchers and policymakers interested in disaster management and societal resilience, especially in relation to the participation of the population to these topics.

1.3 STRUCTURE OF THE DOCUMENT

Section 2 provides an overview of the project itself, its societal relevance, objectives, and the path taken from knowledge production to the development of its main technical results. Section 3 describes the main results, which are aimed primarily at the formal actors of disaster management (authorities, emergency organizations and NGOs). The document concludes with some reflections on limitations and achievements of the project, paving the way for future work.

1.4 RELATIONSHIP WITH OTHER DELIVERABLES AND WORK PACKAGES

As an overview of the project and its outcomes, this document is related to all deliverables produced in the project. References to the relevant documents or sources of information are made in the following sections.

1.5 ACKNOWLEDGEMENTS

The preparation of this deliverable was performed mainly by the project coordinator, SINTEF, and communication and dissemination leader, EENA. However, the project results highlighted in this report are the result of 3.5 years of work carried out by 15 partners across Europe, representing many countries and fields of research and practice. In addition to the formal role of partners, the project benefitted from the continuous involvement of the ENGAGE KI-CoP (Knowledge Innovation Community of Practice), which provided input and feedback at various stages of development of our results. In addition, various external experts, stakeholders and community members participated in project research, validation and dissemination activities, making them possible and meaningful. In particular, collaboration within the Societal Resilience Cluster provided insights from similar projects and fruitful synergies in building policy recommendations.

We are very grateful for your contributions to the various outcomes of this project.



1.6 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

Term	Explanation
KI-CoP	Knowledge Innovation Community of Practice. Community of Practice involving practitioners (e.g first responders, authorities, members of civil society organizations) and citizens supporting the project activity with the role of users and co-owners of its solutions
CoS	Catalogue of Solutions. ENGAGE project presents a list of solutions that could be implemented by emergency services and authorities to improve the interaction with the citizens. These solutions cover methods, apps, campaigns, guidelines, practices, tools, strategies etc.
DRR	Disaster Risk Reduction.
Formal Stakeholders	Public and private organized stakeholders, such as: local, regional and national authorities, first and second responders, law enforcement agencies, business companies and similar.
Informal Stakeholders	Non-public and non-for-profit organizations, spontaneous organizations, such as: civil society organizations, local communities, associations, groups of and isolated volunteers, and similar.

2 ABOUT ENGAGE

2.1 CONTEXT AND OBJECTIVES OF THE PROJECT

Achieving societal resilience in the face of disasters and crises requires a better involvement of the population. Recent years show vividly the increase in the frequency of, or extent of areas affected by disasters such as fires and floods related in part to climate change. In this context, the traditional actors of disaster management, authorities and emergency organizations, might not have the resources to manage risks and events by themselves, and need to better leverage the contributions of the population.

When a disaster strikes, members of the population provide resources and information that contribute in critical ways to the response to and recovery from the event. Their involvement nonetheless introduces new risks and uncertainties in an already complex situation. Understanding these dynamics and promoting solutions to these challenges is key in order to leverage a largely untapped potential and achieve a vision of resilience based on society as a whole.

Project ENGAGE is focused on improving the interactions between formal and informal actors in disaster management. Its primary objective is to make solutions to improve these interactions more effectively known and usable by authorities and emergency organizations. By “solutions”, we mean technologies, methods, guidelines, strategies or approaches, etc. Our main way of achieving this objective was to develop a publicly available catalogue in which solutions used successfully around the world are organized and presented in great details to facilitate their identification, selection and use by stakeholders.

Part of the project’s vision is the belief that a solution successful in some locations can be a source of inspiration but cannot necessarily be directly implemented elsewhere – some adaptations are likely necessary, or its implementation or use might even fail, because the context, the local conditions are different. Local, “contextual” factors influence the success of the implementation or use of a solution; this issue was apparent during the COVID-19 pandemic when similar solutions (e.g., regular communications to the population) were met with varying success across the world due to differences in factors such as trust in authorities or nature of information channels.

An important part of the project was therefore to build knowledge about societal resilience. In particular, this effort included better understanding the contribution of members of the population in past events, the perception (both from the population and from formal actors) of this contribution and the requirements for its success. Such knowledge influenced the fine description of solutions in the Catalogue of Solutions (CoS) and the development of accompanying content to facilitate its use, provided in the ENGAGE Knowledge Platform.

In addition to these efforts, experiments were conducted around the use of AI to develop an innovative emergency communication mechanism.

2.2 FROM KNOWLEDGE TO PRACTICE

The following figure represents the main steps the project took during its conduction, the essential sources of information and the various results of these different steps. In reality, the process was more iterative than purely linear (which the figure suggests), interactions with research and operational communities, activities with disaster management stakeholders and the production and early evaluation of initial results constituting a significant source of knowledge about societal resilience and needs to enhance it. The figure indicates some of the public deliverables and outputs, which will provide greater detail to the interested readers. They are all available through the project website (see References section at the end of this document).



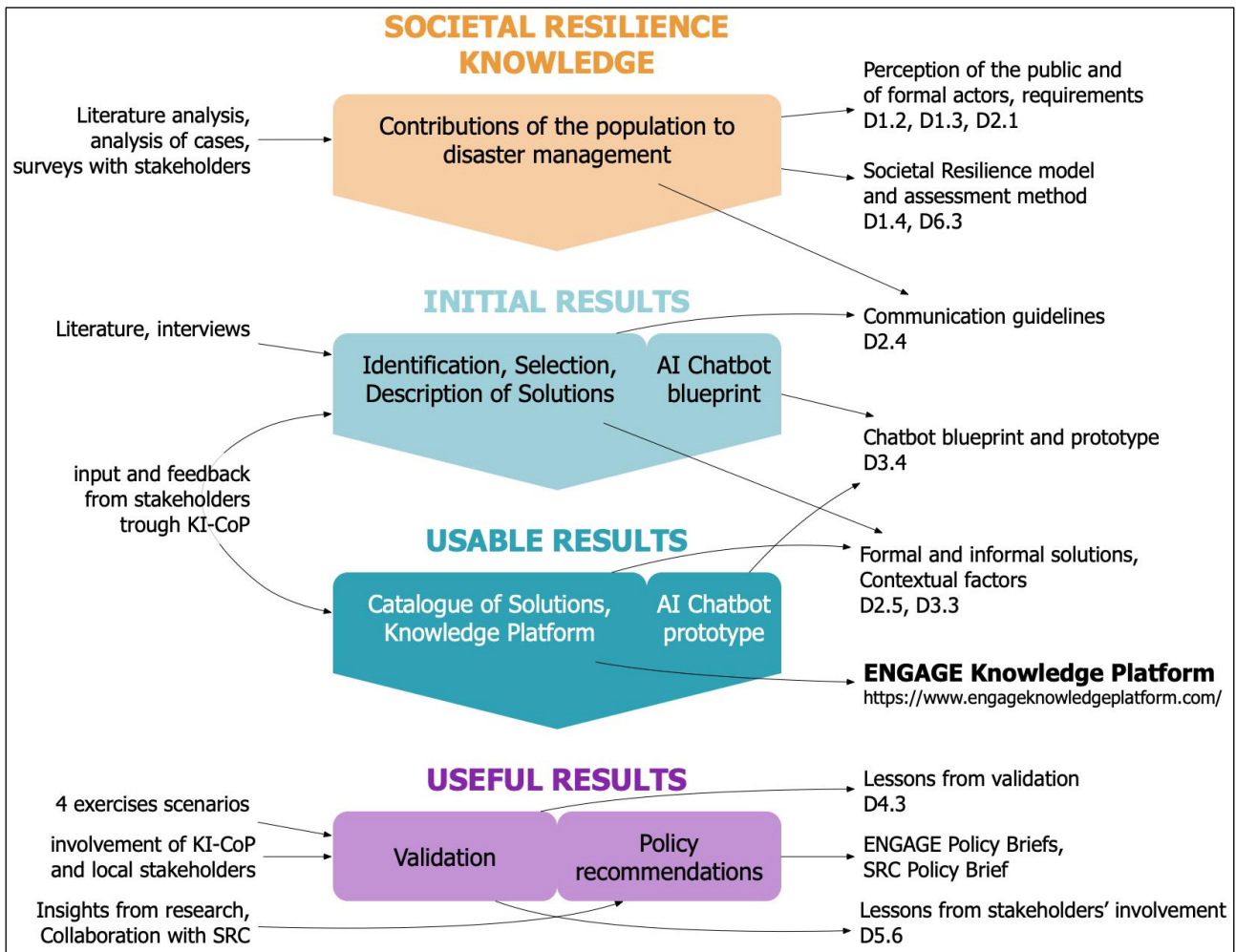


Figure 1 - ENGAGE project's path from knowledge to results

3 ENGAGE MAIN RESULTS

3.1 MODEL FOR ASSESSING AND ENHANCING SOCIETAL RESILIENCE

As indicated in the following figure, understanding the conditions of “societal resilience”, and the theoretical framework that was developed as a result laid the groundwork for which the outputs of the project were shaped. This theoretical framework, which underlying knowledge and development process are described in D1.4, understands resilience as a socially embedded potential of societies to withstand disruption. It also resulted in the development of a model for assessing and enhancing societal resilience (D6.3).

The first step when developing this model entailed carrying out a case study analysis, which began with two main case studies: the Thalys train attack and the terror attack on Utøya. Following a sequential strategy inspired by grounded theory (Glaser & Strauss, 1967), these cases were used to develop and refine the project’s theoretical and analytical model. However, in order to “test” the relevance and the generalization limits of the model, it was applied to events that differed from the Utøya and Thalys cases (see D1.4, ENGAGE White Paper). In other words, the cases differed in terms of the sources of the crisis, their onset and duration, as well as the crises’ scale. The subsequent case studies included the COVID-19 pandemic, the Fukushima Daiichi nuclear accident, the Tohoku tsunami, the Swedish wildfires, and the L’Aquila earthquake.

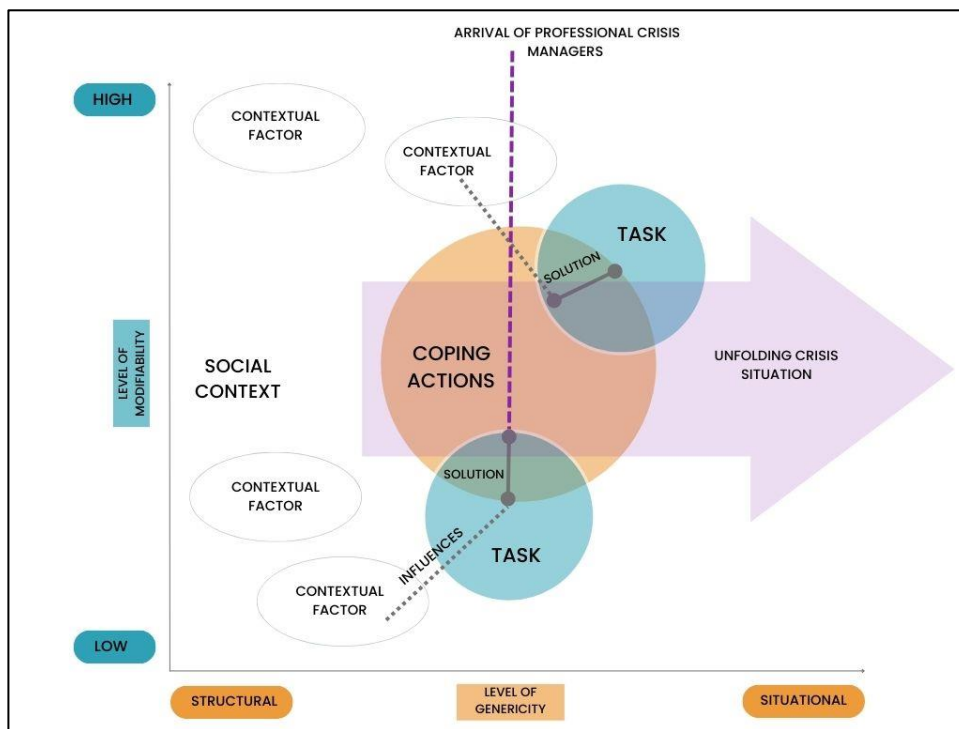


Figure 2 - Societal resilience model

The final model that resulted from the case study analysis involves a two-dimensional approach, which allows contextual factors to be mapped as either structural or situational, and as being modifiable or non-modifiable. The distinction between structural and situational as a continuum allows for time to be represented in this figure, since structural conditions produce the crisis that unfolds in the event of a disaster. This unfolding event can be represented by a time error on the genericity axis. The addition of coping actions, and the specific task to which they refer, can illustrate how citizen actions often take place before professionals arrive (for instance, getting somebody out of the water as a coping action and “search and rescue” as a corresponding task). Finally, the model shows that ENGAGE’s solutions, presented in the Catalogue of Solutions

described in the subsequent section, bridge the gap between coping actions and specific tasks, since official disaster management is organized by tasks (D1.4).

This final version of the model can assist in identifying what aspects could be targeted in order to enhance collaborations between citizens and authorities (e.g., building trust by changing the way that information is shared when a crisis occurs) or to gain a better understanding of the ways that informal actors contribute to disaster response and recovery and how certain factors unique to each particular context influenced these contributions (D3.3). Depending on how actors cope with the crisis and how professional disaster managers and informal agents interact, alternative outcomes of a crisis are conceivable (D1.4).

3.2 KNOWLEDGE PLATFORM AND CATALOGUE OF SOLUTIONS

3.2.1 CATALOGUE OF SOLUTIONS

The Catalogue is comprised of over 100 solutions and includes awareness campaigns, media, guidelines and incentives, ambassadors and communities of practice, alert systems and call centers, and means of providing psychological support. These solutions have been classified according to the type of capacity they contribute to strengthening, including communication with or alerting citizens; improving preparedness levels among citizens; improving autonomy, coping abilities, and proactiveness of citizens; improving involvement of and cooperation with citizens' and organizing and coordinating volunteers. This information is expected to be especially relevant to first responders and public authorities who wish to facilitate a particular kind of interaction with communities and citizens. In addition, for each solution, the Catalogue describes which type of organization is responsible for providing the solution or the service to the target population and the type of target population. For example, a solution may be provided by authorities or by NGOs to citizens at risk or to spontaneous volunteers (see also ENGAGE White Paper).

The ultimate goal of the platform is to contribute to interdisciplinary sharing of best practice examples, which first responders and public authorities can then utilize as a source of inspiration that they can draw from when further developing their disaster management strategies and planning, by modifying the solutions in order to fit their particular needs and contexts (D3.3).

3.2.2 INTERFACE

The ENGAGE Knowledge Platform is an online repository where visitors can gain a better understanding of societal resilience and can browse the Catalogue of Solutions, its main component. Elements below are described in greater detail in D5.12.

Various steps were taken throughout the project, in collaboration with external experts to develop the interface of the CoS, in order to facilitate access to its information. This includes ensuring the information provided is useful and relevant solutions can be found. The interface of the CoS consists mainly in (a) ways to browse the catalogue to identify solutions of interest, and (b) presentation of full details about a solution. Relative to (a), three different interfaces were developed:

- (1) A list of solutions, that can be narrowed down through filtering and search capabilities,
- (2) A visual interface that focuses the attention on the most relevant solutions based on filters and search words (see illustration below),
- (3) At the end of the project, an experimentation was conducted to introduce an AI-based interface to select solutions based on natural language queries and interaction (due to limited maturity, this interface described in D5.12 is not implemented in the released KP)



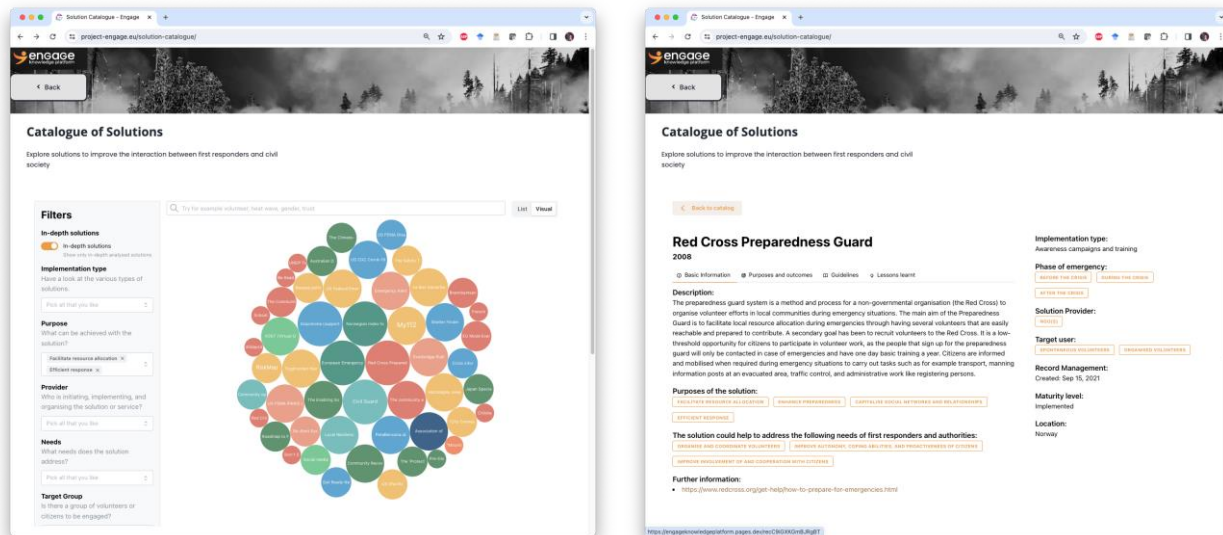


Figure 3 - Visual interface of the CoS (left) and details for one solution (right)

Visitors can also discover “informal solutions” in the otherwise known as citizen-based initiatives, which may arise, for example, when previously established formal disaster response procedures and rules are not suitable to handle the particular event. For each informal solution, visitors can gain an understanding of the context in which it was established and if it has been formalized or could be in the future. The ENGAGE perspective views informality as a sign of the resilience level of the community, which provides the means of improvisation and adaptation to new scenarios as needed.

The Model for Assessing and Enhancing Societal Resilience is also hosted on the Knowledge Platform, as well as in-depth descriptions of the fields of improvement that first responders and public authorities can target by using the various solutions hosted in the Catalogue of Solutions, and can delve deeper into terminology related to tools and methods used by disaster management to enhance the participation of citizens.

3.3 AI-ENABLED CHATBOT BLUEPRINT AND PROTOTYPE

Emergencies and disasters pose complex challenges to societal resilience. Traditional communication methods are often insufficient to handle the volume and speed of information needed during crises. AI-enabled chatbots, as innovative solutions, have the potential to provide a contextual, online, and zero-delay response in addition to having the ability to offer solutions for neutralizing false information. D3.4 describes in detail the processes and research that lead to the development of the ENGAGE AI-enabled chatbot blueprint and prototype, and excerpts from the chapters featuring these results in the ENGAGE white paper are provided below.

3.3.1 CHATBOT BLUEPRINT

A comprehensive blueprint for AI-enabled chatbots was designed to enhance societal resilience during emergencies and disasters. The blueprint outlines a roadmap for the creation and deployment of these chatbots and addresses the identified limitations and challenges.

The blueprint presents an innovative architectural design tailored to the unique demands of disaster management. It conceptualizes an AI chatbot system that is flexible, robust, scalable, and capable of being integrated within existing emergency systems. The architecture comprises several components: data processing, natural language understanding and processing, a dialog management system, a generation module, and an interface layer.



Recognizing the challenges of trust, rapidity, and effectiveness in disaster communication, the blueprint includes a detailed approach to address these issues. It emphasizes the chatbot’s role as an official and trusted source of information. It outlines mechanisms to provide quick, real-time responses to user queries and to direct users to relevant, accurate, and detailed information. The chatbot’s design is centred around effective communication, providing actionable advice, and offering personalized guidance based on user inputs and profiles.

By providing a clear blueprint for the creation of AI-enabled chatbots for disaster management, ENGAGE contributes to both the theoretical and practical advancement of this emerging field. The innovative design of this blueprint not only addresses current limitations and barriers but also paves the way for future innovations in the use of AI technologies for societal resilience.

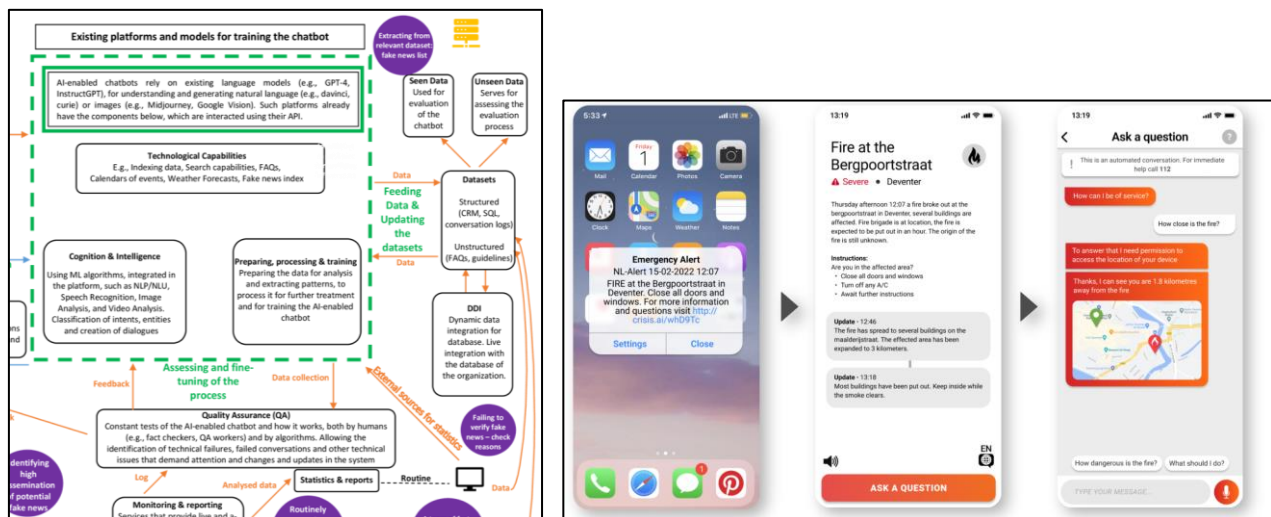


Figure 4 - Excerpt from the AI chatbot blueprint (left) and screenshots of the prototype (right)

3.3.2 CHATBOT PROTOTYPE

Based on the blueprint, a functional prototype of an AI-enabled chatbot was developed. Bearing the considerations outlined in the blueprint, it was decided that

- in order to ensure that a trustworthy message reaches the population the information must come from a trustworthy source (e.g a government agency in charge of alerting the population in the event of a crisis),
- information must be conveyed rapidly and effectively to bring people to safety and reduce the scale of loss and damage and
- that the information must be contextual and involve a zero-delay response.

With these aspects in mind, the idea for the chatbot prototype was derived – one that could be linked to a public warning message delivered through Cell Broadcast or Location-Based SMS technologies using a Public Warning System (PWS).

When a nature-derived or man-made hazard occurs, civil protection authorities can decide to send an alert using public warning technologies. One particular technology that is currently available to civil protection authorities is cell broadcast, which allows them to send alerts to the mobile phones of individuals who are present within a specific area where the event is either ongoing or likely to occur. These messages can be delivered within seconds and appear as a notification on the screen of a mobile phone along with a distinctive ringtone and vibration. The content of the messages includes information on the type of event that is occurring and instructions that individuals can take to protect themselves and others.

If the chatbot prototype were to be integrated within messages delivered by cell broadcast, it could be accessed by following a link at the bottom of the message, which would allow individuals to ask additional questions, such as: “How far away is the event from me?”. This development effectively makes the formerly “blind” public warning cell broadcast technology a way of facilitating multidirectional communication and enriches its capabilities to learn from human reactions. The questions received from citizens can be used to enrich the chatbot further using machine learning, making it increasingly capable of addressing societal needs in an emergency.

3.4 VALIDATION EXERCISES

Deliverable D4.3 describes in detail the conduction of and results from validation activities. Elements related more specifically to the exercises and main lessons learned are provided here.

The project used a set of exercises to validate the effectiveness and the usability of the Solutions selected and investigated during the activity. With the exercises the project could also validate the other outcomes and in particular the Knowledge Platform (e.g., its functionality, user friendliness) and how it effectively supports the decision process of the first responders when selecting relevant solutions. The project had four exercises selected to include a large variety of contextual characteristics such as population involved, risk culture, trust in authority. Exercises were fictitious events or disasters delineated in collaboration with the local stakeholders (e.g., authorities, emergency organizations) using their extensive experience with similar events, representing a real test bed for the solutions identified in the project. The 4 exercises were:

Heat Wave in Rome – The exercise applied ENGAGE Solutions to enhance health response by improving citizen awareness and empowerment. In particular, the exercise was based on social actions in support of the active heat surveillance in Rome, through setting up a collaboration network of stakeholders and an information campaign between health services and social action at community level. The exercise demonstrated the efficacy of building stakeholder networks and the importance of timely, consistent communication in crisis management, alongside the essential role of preparedness in mitigating health impacts during environmental crises like heatwaves. Suggestions from stakeholders pointed towards more granular dissemination of information, utilizing community touchpoints like general practitioners, pharmacies, and social centres to fortify the community's resilience to heat-related risks.

Cyber-attack in a Critical Infrastructure in Spain – A set of initiatives based on ENGAGE Solutions was put in place to enhance citizen risk awareness, improve communication between citizens and authorities, and improve response and recovery capacities of stakeholders. Part of the exercise simulated a cyberattack targeting the energy delivery sector. The exercise underscored the significance of comprehensive awareness campaigns against the menacing nature of social engineering. This is complemented by the importance of fostering a preparedness culture and the instrumental role of community cohesion, that provides support and assistance to vulnerable people in case of a CI disruption.

Quick clay landslide in Trondheim – The exercise and its preparatory activities involved members from the municipality, police department, fire department, Trondheim Red Cross, citizen organizations and local schools. Solutions implemented aimed especially at improving the interaction between organized volunteers and citizens, e.g., for physical or psychological care or for providing information, and at testing innovative public warning capabilities and information channels. The critical need for effective coordination among various stakeholders was underscored, as well as need for continuous improvement in risk assessment, communication, and community collaboration to enhance preparedness for such geohazards.

Migrant emergencies in Romania – The ENGAGE catalogue of solutions was accessed, tested and validated by international organisations' representatives, public authorities, first responders, civil society organisations, and consortium members. Lessons learned from the exercise were



discussed with experts in the field of migration, social and medical assistance, and representatives of civil society. Feedback highlighted the effectiveness of VR environments for training purposes in crisis contexts, the potential expansion of formal solutions for broader public preparedness and value of integrating volunteerism into the fabric of emergency response in Romania.

3.5 POLICY RECOMMENDATIONS AND WHITE PAPER

Since ENGAGE seeks to take a “whole of society” approach to enhancing the capacity of communities to prepare for, respond to, and recover from, nature-derived and man-made adversities, the project sought to delve deeper into two themes which, in their current state, could inhibit such an approach from taking place. The overarching themes in which the recommendations were developed included communicating with citizens in a crisis and the role of spontaneous volunteers in disaster management.

In terms of communicating with citizens, it was important to rethink the ecosystem in which the crisis communications sector currently operates. For example, how could the ecosystem itself take strides to become more balanced and allow for more equitable contributions from citizens to communications strategies rather than relying solely on top-down messaging? The ENGAGE recommendations advocate for those with local or regional responsibility to find ways to further develop trust and connections within the community, since trust plays a role in the ways that messages are received and interpreted. ENGAGE also advocates for authorities to listen to the voices of the communities, hearing their concerns, what they’ve achieved, and their reactions in terms of emergencies. This collaboration will allow for the development of creative ways to communicate risk to citizens that are relevant for them (Wales & Olson, 2023).

In terms of spontaneous volunteers, the ENGAGE recommendations advocate for recognizing that, in order to effectively work with these individuals, the professional side and the informal side of disaster response need to be seen as two complementary systems rather than seeking to make spontaneous volunteers work within the rules and strategies in which professionals work. ENGAGE also advocates for a more nuanced approach to be taken to the ways that spontaneous volunteers are seen by professionals. For example, policies should reduce the emphasis on using divisive terminology which may contribute towards an “us vs them” culture, and they should recognize that volunteers contribute in a variety of ways and utilizing a “single model” or imposing particular restrictions may serve to enable volunteering less accessible to those who wish to contribute (ENGAGE policy brief).

Building on the two policy briefs, ENGAGE also published a white paper on societal resilience, which featured a chapter that delved deeper into the project’s policy themes. However, in line with the title of the white paper, ENGAGE recognizes that there is more than one “pathway to resilience” than just policy, and therefore sought to highlight how other aspects of the work of ENGAGE contributed independently and collectively to enhancing societal resilience.

3.6 EXTERNAL COLLABORATION

3.6.1 KI-CoP

The ENGAGE Knowledge and Innovation Community of Practice (Ki-CoP) is a special advisory board composed of over 90 members from 25 different countries who represent the research community, practitioners, NGOs, first responders and citizens’ representatives. These experts were integral to ENGAGE research, as they “ensured the validation and transferability of solutions, guidelines, and methods across different risk and disaster scenarios” (ENGAGE White Paper). The



Ki-CoP itself operated openly, meaning members could join throughout the project's lifetime and be as active as they wanted.



Figure 5 - Collaborative session at a KI-CoP workshop (2022)

ENGAGE hosted workshops and webinars to provide an opportunity for Ki-CoP members to share experiences, gather a critical view on project work, co-create, adapt, and validate the project's results (ENGAGE White Paper). Although not all members who joined the Ki-CoP at the beginning of the project were active by the end of the project, other Ki-CoP members took it upon themselves to continue the work of ENGAGE by implementing resilience-building initiatives within their own roles and organizations.

The collaborative relationships that have been built between members of the ENGAGE consortium and Ki-CoP members is one aspect that will ensure the legacy of the project is sustained after it has been completed. In this regard, KI-CoP members have suggested that continued learning and interaction could continue to be fostered through the planning of online and in-person events after the project has ended, and that the community that has been created through ENGAGE could be used in the future as a resource for forming consortiums and engaging experts in projects. Indeed, the latter suggestion has already come to fruition, with Ki-CoP members collaborating with ENGAGE consortium partners in the SYNERGIES project.

3.6.2 SOCIETAL RESILIENCE CLUSTER

Throughout the project's lifetime, ENGAGE has been actively collaborating with projects that focus on building disaster resilient societies. These collaborations not only involved working towards shared objectives, but ultimately amplifying and exploiting the benefits of the ongoing research in the field of societal resilience. Although these interactions were initially confined to online formats due to the COVID-19 pandemic, they gradually increased in scale and momentum as the research of ENGAGE became more mature. One particularly significant outcome of these interactions was the establishment of the policy working group, which was created with the aim of utilizing the policy recommendations that have emerged from each of the respective projects to feed into the production of joint outputs. In this regard, the policy recommendations of each project could complement each other by providing slightly different perspectives under common themes, such as "communicating with citizens" or "engaging society in disaster management". Building on this methodological framework, a joint policy brief resulted, which will be published in early 2024.

Additional noteworthy activities that resulted from these interactions included participation in the CERIS Disaster-Resilient Societies (DRS) cluster conferences, which allowed for the projects to provide updates in regard to their research and network with professionals and researchers working in, or focused on, the field of disaster management. The collaborative relationship between ENGAGE and the LINKS project was also particularly noteworthy, as the two projects gave joint presentations (e.g at the World Bosai Forum), hosted joint panels (e.g at the NEEDS 2023 conference), presented in each other's final events, and hosted a joint advisory board meeting in Rotterdam in June 2023, where common thematic topics and the exploitation of project results were discussed.

The cluster was created in September of 2020 with the endorsement of the Research Executive Agency (REA) and originally included the RESILO, BuildERS, LINKS, and RiskPACC projects. However, the cluster is regularly growing and now includes projects such as: SYNERGIES, CORE, MEDiate, PARATUS, Myriad, The HuT, Directed, and C2IMPRESS. While activities which fostered collaborations between the initial projects were only conducted on a semi-regular, if not ad-hoc,

basis, a few of the new projects that have joined the cluster have embedded these collaborations within the projects themselves- an action which speaks to the potential for enhanced innovation and opportunities for learning.

3.6.3 LESSONS FROM INTERACTIONS WITH STAKEHOLDERS (INCLUDING CITIZENS)

Deliverable D5.6 provides lessons from the involvement of various stakeholders in project activities, including exercises implementing solutions from the CoS; some of the main points are highlighted in this section. The stakeholders involved in ENGAGE range from first responders and national authorities to civil society organizations, business entities, researchers, and various community representatives. Special attention was given to citizen engagement, classified as organized volunteers (i.e. within an institutionalized context) and non-affiliated members of the population (e.g., local population, crucial in responding to and recovering from disasters due to their proximity and local knowledge).

ENGAGE employed various methods, including case studies, surveys, workshops, public events with citizens, large-scale exercises, and serious games, to interact with stakeholders and identify key aspects of their interaction, showcasing the benefits of collaboration among formal stakeholders and organized and non-organized volunteers in disaster management (including resource sharing, information sharing and coordination through communication). Despite these benefits, the project identified challenges, such as communication barriers, lack of standardization, and resource allocation issues for formal stakeholders. Challenges for the interaction between formal stakeholders and volunteers include inconsistent training, limited volunteer availability, and legal and liability issues.

Solutions are available in the ENGAGE Catalogue of Solutions to address some of the identified challenges such as the need for improved communication and training of all stakeholders. The implementation of such solutions requires first the recognition of the valuable contributions of all members of the population, especially in the planning and organizing of recovery efforts, but also careful implementation of the solutions. For instance, with regard to their participation in project activities and exercises, citizens were very positive and willing to participate in further exercises and training activities. They all insisted (even more than the first responders) that the role of citizens is of primary importance in disaster management and interested in being better prepared for possible future events. They valued awareness raising and preparedness activities. Debriefings with participants also highlighted important factors for improving citizen participation, such as having a more active role in the exercise execution and being more able to understand what is going on during the exercise.

Collaboration between formal and informal actors is not just a goal but a necessity in the face of the complex and evolving challenges posed by disasters. These challenges are multifaceted and demand comprehensive solutions. Overcoming communication barriers, promoting standardization, addressing resource allocation challenges, enhancing interagency coordination, are essential steps toward creating a more effective and coordinated response system.

4 CONCLUSION

Recommendations and improvements for future research were gathered from the validation and dissemination activities. For instance, the project recognized a gap in the current CoS – the absence of legal frameworks as a contextual factor in the solution selection and application process. This omission signals a critical area for refinement, as legal considerations are paramount in the practical deployment of disaster management strategies. Overall, stakeholders involved agreed that the CoS was designed to be used as a source of inspiration and guidance for emergency services to identify and implement potential solutions rather than a fixed way to apply solutions. Solutions should be contextualized before they are implemented, and this requires a series of steps and decisions that the user needs to make before implementing them. The CoS should provide applicable, mature, and cost-effective solutions to guarantee its success in being used.

The ENGAGE project emphasizes how, in an approach to disaster management motivated by societal resilience, a wide variety of stakeholders need to be involved, as they represent different needs, capabilities and perspectives. The project highlights the importance of collaboration among these diverse entities, including formal actors such as government agencies or non-governmental organizations (e.g., Red Cross), and informal actors such as local communities' organizations, groups and individuals.

During the project's final dissemination event in November 2023, which was attended by about 30 external experts from KI-CoP and other European organisations, the closing session aimed to capture their general impressions about ENGAGE achievements. While they were interested in all results, they thought strategies discussed to engage citizens, and insights on citizen-based initiatives and informal solutions were especially relevant for their work. Overall, they emphasized limitations in the formal actors' knowledge and resources to involve citizens or in the maturity of solutions in the catalogue as significant obstacles for the implementation of solutions from the catalogue. Areas that remain understudied around this topic include the impact of political and legal frameworks, ways to address the diversity of needs in the population, the role of businesses or the necessary balance between population involvement in disaster management and the responsibility of authorities and emergency organizations. These areas constitute directions for future research and improvements of the ENGAGE results.



5 REFERENCES

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ENGAGE Knowledge Platform and Catalogue of Solutions:
<https://www.engageknowledgeplatform.com/>

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<https://www.project-engage.eu/outcomes-results/engage-white-paper/>

ENGAGE Policy Briefs: <https://www.project-engage.eu/outcomes-results/policybriefs/>

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- D1.2 – Local perceptions about societal resilience
- D1.3 – Communication, Social Media and Societal Resilience Among Citizens
- D1.4 – Model for assessing and enhancing societal resilience
- D2.1 – Expectations and needs to improve societal resilience
- D2.4 – Existing communication channels and guidelines
- D3.3 – Final catalogue of societal resilience solutions
- D3.4 – Directions for innovative communication and social media solutions
- D4.3 – Final Validation Report
- D5.6 – Collaboration and involvement of stakeholders in Disaster Risk Reduction
- D5.12 – ENGAGE Knowledge Platform release 3
- D6.3 – Final social impact report

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