D8.5 SUSTAINABILITY REPORT

Project acronym: BuildERS
Project title: Building European Communities' Resilience and Social Capital
Call: H2020-SU-SEC-2018-2019-2020/H2020-SU-SEC-2018

This project has received funding from the European Union's Horizon2020 research and innovation programme under grant agreement No. 833496

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Project no.	833496
Project acronym:	BuildERS
Project title:	Building European Communities' Resilience and Social Capital
Call:	H2020-SU-SEC-2018-2019-2020/H2020-SU-SEC-2018
Start date of project:	01.05.2019
Duration:	36 months
Deliverable title:	D8.5 Sustainability Report
Due date of deliverable:	31 January 2022
Actual date of submission:	31 March 2022
Deliverable Lead Partner:	GEO
Work Package:	WP8
No of Pages:	**49**
Keywords:	Sustainability, co-creation, innovations

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Dissemination level		
PU	Public	info

Table 3. Version

History			
Version	**Date**	**Reason**	**Revised by**
01	26/01/2022	First draft for the deliverable structure	JKA
02	11/02/2022	First draft	CM, CK, JH, MR, TON
03	23/02/2022	Partners' contribution added	PJ, JK, AO, KO
04	05/03/2022	Second draft	PJ, TON, JK
05	09/03/2022	Third draft	TON, JK
06	29/03/2022	Internal Review	JLU, GL
07	30/03/2022	Internal Review	TP
08	31/03/2022	Final Version	JKA
		Technical check-up and some modifications	VTT
Final	31.03.2022	Submission	VTT

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EXECUTIVE SUMMARY

The aim of the Deliverable 8.5 – Sustainability Plan for the BuildERS project results is to transform them into concrete benefits for society by maximising their scientific, social, technological and policy value. It outlines the strategy and plan for making BuildERS project results sustainable after the end of the project. It builds on all the deliverables within the project, especially following the structure of BuildERS toolbox presenting innovations created within the project. The Sustainability Plan is the result of three tasks within Work Package 8:

- Task 8.5: Sustainability within and beyond the project – mainstreaming perspectives,
- Task 8.6: Sustainability through network building,
- Task 8.7: Sustainability through formulation of policy recommendations.

The tasks provided an assessment of the sustainability of BuildERS results and the ways and modes of how the consortium intends to prepare for creating the post-project legacy. It details the strategy and the specific actions for making the results usable for the relevant stakeholders, as well as defining the specific stakeholders for each of the innovation lanes.

The preparation for a roadmap on how to make BuildERS results sustainable has been an iterative process that has crystalised with the finalisation of project results and findings. The ways and modes the consortium plans to use for the creation of impact of each of the results are explained in detail following the project structure and division of results presented in the Deliverable 6.6 - Stakeholder Validation Of Research Findings And Co-Creation Of Innovations.

Impacts have been and will be created both by the direct further use of the results by the partners in the consortium, and/or promoting the uptake of results for use by stakeholders (practice, science and policy), and other actors outside the consortium. Contents and recommendations have been refined following sharing draft materials with target audiences in policy, practice and science throughout as well as in the final stages the project.

Scientific papers created within BuildERS are published through open access scientific outlets and Open Research Europe. These scientific results create the momentum for the exploitation of project outputs and findings, supported by the availability of new materials, outputs and recommendations (e.g. Zenodo) in line with Open Science and FAIR principles.

All of the results of the project once approved by the European Commission will be made available through the Horizon Results Platform, and on the dedicated project results page in the CORDIS website.

This report is divided into 9 sections. After the introduction and description of the sustainability strategy, the plan analyses IPR issues within the project and follows to explain sustainability of three types of innovative tools created within BuildERS, networking efforts and sustainability of results through policy recommendations and their dissemination.

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LIST OF ACRONYMS

BuildERS	Building European Communities Resilience and Social Capital project
COVID-19	Global coronavirus pandemic
D	Deliverable
NGOs	Non-governmental organisations
WP	Work Package
VTT	Technical Research Centre of Finland

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1. INTRODUCTION

Deliverable 8.5 outlines the final strategy and plan for making results of BuildERS sustainable after the end of the project. It details the strategy and specific actions for each set of innovations and recommendations, as well as information about particular results, and the expectations of partners and target groups when it comes to further using results of the project.

This report is divided into nine sections. After the introduction and description of the sustainability strategy, the plan analyses IPR issues within the project and follows to explain sustainability of three types of innovative tools created within BuildERS, networking efforts and sustainability of results through policy recommendations and their dissemination.

The plan focuses on each of the nine specific innovations, as well as network building and policy recommendations. The main idea is to have an impact on primarily first responders, but also policy makers and ultimately vulnerable groups.

The aim of the Deliverable 8.5 – Sustainability Plan for the BuildERS project results is to transform them into concrete benefits for society by maximising their scientific, social and policy value. It outlines the strategy and plan for making the BuildERS project results sustainable after the end of the project. It builds on all the deliverables within the project, especially following the structure of BuildERS toolbox presenting innovations created within the project. The Sustainability Plan is the result of three tasks within Work Package 8:

- Task 8.5: Sustainability within and beyond the project – mainstreaming perspectives,
- Task 8.6: Sustainability through network building,
- Task 8.7: Sustainability through formulation of policy recommendations.

The tasks provide an assessment of the sustainability of BuildERS results and the ways and modes of how the consortium will assure to prepare for creating the post-project legacy. It details the strategy and the specific actions for making the results usable for the relevant stakeholders, as well as defining the specific stakeholders for each of the innovation lanes.

1.1. Aims and Objectives

This deliverable describes the project approach to sustainability planning, which is relying on clearly defining how research results will be transformed into concrete benefits for society by maximising their scientific, social and policy value, and how they will impact the future practices in responding to disasters, social resilience building, decision making and technological solutions.

BuildERS has a dedicated Dissemination Work Package (WP8) to focus on the effective dissemination, communication and user uptake of project results. Both the various Dissemination materials and Sustainability plan developed in the Work Package have the overall aim of maximising project's impacts by facilitating the use of project outputs and findings.

The specific objectives of the Sustainability plan are to:
• outline sustainability plans and strategies;
• summarise the strategies for future promotion and use of individual innovations;

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• present a clear vision of the intended impacts of the project and a well-planned strategy for the protection and use of results.

The aims of sustainability activities are to create conditions for:
• sustaining project outcomes after the funding period to influence future disaster response and policy planning;
• maximising the exploitation potential of project activities, findings and outputs for scientific, social and policy benefits;
• supporting the use and benefits from the outcomes during and beyond the project lifetime.

1.2. Rationale

The planning of sustainability activities, led by GEO, with VTT, TOI, US and SU, as well as inputs from all partners, is a progressive, iterative process, co-developed with stakeholders in various co-creation and validation activities. These have happened throughout the result creation processes with external actors, as well as within the consortium, through continuous mapping of new stakeholders and finding new pathways to reach out to them.

All of the BuildERS project partners are involved in dissemination and sustainability activities to enable the creation of impact of results in partner countries, communities and sectors, as well as on the EU and even global level (e.g. USA, Indonesia) and in the countries that are otherwise not represented in the consortium - through classic dissemination activities, conference participation, interviews, networks, etc.

Relevant tables and dissemination plans and materials were shared with the partners and they were in charge of regularly updating them with all the planned and performed activities. Dissemination plans were updated and enriched on bi-monthly consortium meetings, as well as weekly meetings with WP5 and WP6 at the later stages of the project when innovation co-creation and co-design, as well as policy recommendation development were intensifying. Tables for Dissemination and exploitation, Future conferences and Media and Events were updated on a regular basis by the partners, while all the international days were followed by the adequate social media campaigns by the dissemination leader (GEO).

The table below is an example of just one (simplified and shortened for the purpose of this document) sheet extracted from the Stakeholder Mapping Table (example is from Finland). This table ensured that the partners from all the countries continuously considered new linkages that the project can have with its target groups. The messages and language were defined by Geonardo, to direct future efforts of both the project and individual partner institutions. Key messages were filled out by partners and have helped shape the dissemination materials developed.

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Table 1: Example of the Stakeholder Mapping Table

EU LEVEL	STAKEHOLDER REGISTER (FILL OUT)	KEY MESSAGES (FILL OUT)
A. Directorates-General *Examples: European Commission Directorate General for European Civil Protection and Humanitarian Aid Operations, DG ECHO*	European Commission Directorate General for European Civil Protection and Humanitarian Aid Operations, DG ECHO	Recommendations for building resilience in crisis, ethically acceptable key technologies to resilience building, investent startegies and resource allocation (ref.DoA WP5)
B. Executive Agencies	The Research Executive Agency REA of the European Commission, European Space Agency (ESA), European Environmental Agency (EEA), Joint Research Center (EC JRC)	Research results of WP1,2,3,4, Results of co-creation from W6 (policy, practice and technology innovation), Comments on hazards mapping by satellites from WP3.1 (policy, practice, technology innovation)
C. Networks *Examples: European network of crisis management professionals*	Crisis Management Innovation Network Europe CMINE	Research results of WP1,2,3,4, Results of co-creation from W6 (policy, practice and technology innovation)
NATIONAL LEVEL		
A. Central government *Examples: Prime Ministers Office, Ministry of Justice*	Security Committee of Finland/Turvallisuuskomitea Valtioneuvoston kanslia/Prime Minister's Office Sisäministeriö/Ministry of Interior Opetus- ja kulttuuriministeriö/Ministry of Education and Culture Oikeusministeriö/Ministry of Justice Sosiaali- ja terveysministeriö	Research results of WP1,2,3,4, Results of co-creation from W6 (policy, practice and technology innovation); assessed of applicability in Finnish context

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B. Agencies *Examples: The Swedish Civil Contingencies Agency*	National Council for Crime Prevention/Rikoksentorjuntaneuvosto CMC Finland/Kriisinhallintakeskus Poliisihallitus Liikenne- ja viestintävirasto Traficom Digi- ja väestötietovirasto/Digital and Population Data Service Agency	Vulnerable groups identified in Finland and their special needs in terms of crisis and risk communication; training principles for police interaction with vulnerable people, accessibility of crisis communication; management mis-and disinformation (good practises in Finnish context)
LOCAL LEVEL		
A. NGOs/NPOs *Examples: The Red Cross, faith based organizations, national associations for search and rescue*	Suomen Pelastusarmeija/The Salvation Army Kiipulasäätiö/ Kiiplua Foundation Monikulttuurijärjestöjen valtakunnallinen verkosto Moniheli ry Pelastusalan Keskusjärjestö SPEK Finnish Red Cross/Suomen Punainen Risti Finnish federation of Settlement Houses Omaishoitajaliitto Muistiliitto ja paikalliset yhdistykset (Pirkanmaan muistiyhdistys) Autismisäätiö Autismiliitto Mieli ry Ev.lut kirkko ja seurakunnat, Islamilaiset yhdyskunnat, muut uskonnolliset yhdyskunnat	Training material for the police to interact and communicate with vulnerable groups. Results fo WP4.1 and WP3
B. Authories (regional and local) *Examples: First responders, municipal agencies, social service providers*	Aluehallintovirastot (erit. Länsi- ja Sisä-Suomen AVI) Pelastuslaitokset (erit. Lapin, Oulu-Koillismaan, Pohjois-Karjalan, Pirkanmaan ja Helsingin kaupungin pelastuslaitokset) Poliisilaitokset (erit. Sisä-Suomen, Hämeen, Itä-Suomen, Itä-Uudenmaan, Lapin ja Oulun)	Practical guidance of interaction and communication with the vulnerable groups and individuals. Training material for the police.

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C. Citizen groups and events for general public *Examples: Sports associations*	Kotitalouksien omatoimisen varautumisen järjestötoimikunta (KOVA-toimikunta) 72 tuntia -konseptin kouluttajat/ 72 hours -concept instructors	Results from WP3.3, WP4.1, other cases in WP4, mis-and disinformation workshops result (D2.3, D6.3.)
EDUCATION		
A. Schools/networks of schools	Kiipulan ammattiopisto/ Kiipula Vocational College	WP4.1 results
B. Universities/research institutions	Emergency Services Academy Finland/Pelastusopisto Laurea University of Applied Sciences/Laurea amk University of Tampere/Tampereen yliopisto	Scientific articles, D1.2, D2.2, further devepment of training for first respondents (WP4.1)
C. Research projects/networks	Horisontti 2020 hankkeet: RESILOC, ENGAGE ja LINKS	
OTHER STAKEHOLDERS		
Examples: Media, businesses	Huoltovarmuuskeskus, Mediapooli/National Emergency Supply Agency, Media pool (network of media companies) Yleisradio Oy YLE Helsingin Sanomat Aamulehti Iso numero Kotimaa Tutka (poliisin henkilöstölehti) Kuntalehti Sosiaalialan ammattilehdet Turvallisuus & Riskienhallinta -lehti	Focused messages from important results for media in association with VTT and PUC communication departments. (WP3.3, WP4.1, technologies)

In addition to this, tasks related to sustainability were running from the beginning of the project. Especially focusing on possibilities of networking from the project's start, task 8.6 was aiming to build partners' capacities to integrate, adapt an apply experiences gained throughout the project. This resulted in building live and dynamic communities and networks within the organizations as well as in national and international contexts. This work has been relying in a large part on creatively utilizing different modes of communication in engaging a wide variety of stakeholders – which BuildERS was successful in doing.

Task 8.5 however, has been pertinent throughout all of the activities within the project. The idea of creating solutions that are realistically applicable in the actual first responder organizations, NGOs and vulnerable groups and communities has been underpinning all of the innovations created within the project. The discussion on how to make these results applicable and useful for different target groups was not just done within the consortium, but also through numerous iterations of co-creation, visible in the WP6 and the project's Stakeholder Forum.

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Finally, Task 8.7 is still ongoing and in its last and most impactful stage, engaging policy makers in the validation process and aiming at all levels of policy influence: local, national and EU. Transforming all the scientific findings from the project into practical solutions and relevant recommendations has been a task performed from the very beginning, as it was important to constantly revise applicability of our solutions.

2. SUSTAINABILITY: WHAT IT MEANS AND WHY IT IS NEEDED

A project is considered sustainable when "it continues to deliver benefits to the project beneficiaries and/or other constituencies for an extended period after the Commission's financial assistance has been terminated".[1] The key pillars that ensure the sustainability of the project include: the main findings and results of the project, key expertise of partners and related networks, network building, and the involvement of key stakeholders. Therefore, the sustainability of BuildERS is not only conditional to the project's main results, but it also depends on the extensive network building of partners and the integration of experiences acquired through building key partnerships. These activities are required to ensure the project's sustainability, through maintaining or even further developing project outputs after the end of the EU funding.[2]

Each beneficiary/project partner must take measures aiming to ensure the sustainability of their results, either by themselves (e.g. pursuing research, cooperation with sister projects and their results, networking activities) or by others (other beneficiaries, public, policy makers etc.). Beneficiaries must be proactive and take specific measures to ensure that their results are used (to the extent possible and justified).

In BuildERs, all project partners are involved in WP8 Dissemination, Communication and Sustainability to foster the long-term sustainability of project results and ensure awareness and the transfer of results for the highest possible impact.

3. SUSTAINABILITY STRATEGY IN BUILDERS

The overall aim of the sustainability of BuildERS project research findings and processes is to provide a roadmap on the future use of all the results produced within the project. The approach is to build on existing knowledge, networks and tools (as presented in the following chapters) and, through the further use by various partners, first responders, policy makers, crisis management authorities, data analytics technology developers, etc., develop or improve new tools and strategies in resilience building and crises response mechanisms. The Toolbox for practitioners, policy recommendations and networks established, all created through meticulous co-creation processes, will be used to extend knowledge on preparedness across different levels: academic, practical, policy and even industry. The plans for sustainability and associated data management have been designed to increase the impacts of BuildERS during the period of the project and as part of its legacy.

[1] European Commission Directorate-General Education and Culture (2006) "Sustainability of international cooperation projects in the field of higher education and vocational training - Handbook on Sustainability". Luxembourg: Office for Official Publications of the European Communities, ISBN: 92-9157-

[2] Ibid.

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The objectives of the Sustainability Plan of BuildERS are as follows:

• OBJ-01: mapping key results, deliverables and activities onto areas of application, prospective users and timescales;
• OBJ-02: clarifying and updating approaches to any issues relating to IPR;
• OBJ-03: providing an assessment of risks related to key results – methodological, financial, support mechanisms;
• OBJ-04: providing sustainability plans for each innovation and relating it to responsible partners that will use them after the project's end;
• OBJ-05: is a roadmap for roll-out, uptake and post-project exploitation, considering validation and standardisation issues;
• OBJ-06: identifying the mechanisms of the BuildERS Communications, Dissemination and Impact Strategy and Plan for use in achieving the aims of project Exploitation and legacy.

4. MANAGEMENT OF INTELLECTUAL PROPERTY RIGHTS

Each beneficiary[3] has an obligation to protect its results, and must adequately protect them for an appropriate period and with appropriate territorial coverage. This is if the results can reasonably be expected to be commercially or industrially exploited, and any other possible, reasonable and justified circumstance. When deciding on protection, the beneficiary must consider its own legitimate interests and the legitimate interests (especially commercial) of the other beneficiaries.

Effective sustainability of the results depends upon, amongst other issues, the proper management of intellectual property, which should be part of the overall management of knowledge in the project.

Throughout the BuildERS project, specific actions have been undertaken for addressing the issues related to Intellectual Property Rights. These include the pre-existing knowledge of the project partners and an assessment of the results generated during the project.

The framework of the IPR management is set out within the Consortium Agreement, which stipulates the rules related to the following IP issues:
• identification of the pre-existing knowledge (Background) and the specific limitations and conditions for its implementation;
• ownership of the Results;
• transfer of the Results;
• access rights to the Background and the Results;
• non-disclosure of the information.

[3] In the context of Horizon 2020 the term beneficiary (i.e. a "participant") is used to describe a legal entity which has signed the Grant Agreement and therefore is bound by its terms and conditions with regards to the European Union. www.iprhelpdesk.eu/printpdf/2549

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4.1. Protection of Results

Participants were required to assess the possibility of protecting their results once these were generated. If there was a reasonable expectation that the results could be exploited commercially or industrially, and their protection possible, reasonable and justified, then participants are required to provide adequate protection of the results during an appropriate period and in a suitable territory.

In principle, beneficiaries are free to choose any available form of protection of intellectual property. Standard forms of protection include patent, trademark, industrial design, copyright, trade-secret, confidentiality.

The choice of the most suitable form of IP protection, as well as the duration and geographical coverage, depends upon the results, and the business plans for their exploitation and legitimate interests of consortium partners.
Although not mandatory for one organisation to inform other partners about IP protection of activities, it is considered good practice to consult before deciding whether to protect results, particularly if dealing with potentially joint IP.

Although IP protection is vital for a prospective commercial or industrial exploitation, it is not always mandatory. No protection is necessary if: i) it is impossible under EU or national law, ii) not justified in view of the (potential) commercial or industrial exploitation, or iii) not required by the action's objective and other relevant elements, such as potential markets and countries in which competitors are located, whether additionally protecting a part of certain technology would bring significantly broader protection or not, etc.).

What to consider when deciding not to protect results

If a participant does not intend to protect a result, it is best practice to consider offering to transfer it to other consortium partners or third parties which may be positioned better to exploit the results and willing to seek their protection.

If such a transfer is not done, participants in receipt of European Union funding which do not intend to protect their results but are capable of industrial or commercial application for reasons other than legal impossibility, must be careful not to perform any dissemination activities without first informing the European Commission. This notification is mandatory for up to four years after the end of the project.

The European Commission may decide, with the consent of the participants to which the result belongs, to assume ownership and take the necessary measures to protect it. In this case, the European Commission must formally notify the concerned participant within 45 days of receiving the notification.

According to BuildERS Consortium Agreement, those partners developing various results have IPR, and the below table is showing the list of main innovations, partners with IPR and those partners that have agreed to continue using, developing and disseminating the result at question.

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Table 2: IPR and future use

Result	Partners with IPR	Partners that will continue using and developing the result
Vulnerability assessment tool	UTA, UiS, ERB	UTA, ERB, UiS, POS, PUC, TOI, UTR
Mobile positioning tools	POS, UI, UTA	ERB, POS, UI, UTA
Guidelines to use supportive technologies	VTT	VTT, POS, ERB, PAT, PUC
Crisis mapping tool	VTT	VTT, SAL, GRC
Guidelines to collaborate with social media influencers	PUC, SEI	PUC, SEI, UTA, VTT, ERB, PAT, UiS
Training programme	PUC, VTT, (outside the project consortium: Insta Digital ltd.)	PUC, ERB, PAT, UiS
Inclusive crisis communication canvas	PUC	PUC, ERB, PAT, SAL, GRC, UiS
Board game	GEO	GEO, ERB, PUC, GRC, SAL, PAT, UiS
Ethics assurance	EKU	EKU, UTA, UiS, SU, UTR, SEI, TOI, PUC

5. SUSTAINABILITY WITHIN AND BEYOND THE PROJECT – MAINSTREAMING PERSPECTIVES OF BUILDERS INNOVATIONS

5.1. TOOLS FOR VULNERABILITY ASSESSMENT

5.1.1. Vulnerability assessment tool

Based on the Estonian case study, Orru et al (2021) have developed a prototype for an assessment tool that brings together the varied factors of people's vulnerability in crises, and their representations in public datasets.[4] The vulnerability assessment tool was co-created with practitioners in crisis management and social care. It was presented to the practitioners at a virtual workshop with 35 participants from different levels of crisis governance (Ministries, Agencies, Local governments) in Estonia in May 2021, and further to six high level crisis managers from the Estonian Ministry of Interior in September 2021.

[4] For more information about the case study and cocreative development of the tool see: Orru et al. (2021) BuildERS D4.4. Reducing social vulnerability by innovative datafusion for moreinformed rescue prioritisation. BuildERS project report.

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In addition, 14 academic experts (from Denmark, Finland, Germany, Italy, Sweden and the UK) on disaster management commented on the relevance and applicability of the elaborated tool in a virtual workshop on the digital facilitation platform (HowSpace) from July to September 2021.

The tool's prototype has been piloted and tested with three types of crisis-scenarios: a large-scale disruption of electrical supply, the COVID-19 pandemic, and a cyber incident. All these pilots demonstrated the value of the tool in showing how the factors of vulnerability intersect and their impact may be amplified or attenuated by the situational characteristics.

The tool guides in scrutinising the relevance of a multiplicity of factors and their interrelations in order to avoid blind-spots and to get a comprehensive overview of the possible sources of vulnerability. The key analysis unit in the tool is the individuals affected by particular factors that influence vulnerability. Thus, the tool depicts factors of vulnerability and the individuals that are burdened with these specific vulnerability factors.

For example, in case of the disruption of electrical supply, in the "accessibility of vital services and means" dimension, one of the vulnerability factors is the electricity-dependent heating. The particular individuals that may be hampered due to this factor involve the clients of central heating and users of private electricity-dependent heating systems. Following the same row concerning particular individuals, next, other key factors that may aggravate these individuals' conditions (abilities to cope) are added in the analysis. Next, these individuals' coping capacities in scenarios are assessed. In the final cell of the row, the possible information sources depicting the vulnerability factor are brought out.

Table 3: Example of the operationalisation of the factors of vulnerability under the dimension "Accessibility of vital services and means"

Dimension of vulnerability	**Factors of vulnerability**	**Individuals**	**Most important inter-sectionalities to be considered**	**Scenarios**		**Datasets and other information sources**	**Resilience factors**
				Cold	**Remote areas**		
Accessibility of vital services and means - Upholding of electricity, heating, water, sewerage, communication networks	Electricity-dependent heating	Clients of central/communal heating	External help needed on everyday basis; Families with small children; Availability of means to evacuate	↑	↓	Client list of service providers	
		Users of private electricity-dependent heating systems		↑	↑	Register of Construction Works	
	…						

Potential end users and use contexts

The vulnerability assessment tool helps practitioners to identify individuals who may need external support during crises, and to use this information to improve the preparedness planning and provision of emergency relief, and the medical and social care services. The tool enables a scenario-based, crisis situation-specific analysis of the vulnerability factors. It is based on a dynamic and intersectional perspective on vulnerability, which means that the various vulnerability factors are combined for a more holistic and nuanced view.

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The tool can be incorporated into risk analysis and preparedness training: (table-top) exercises and simulations. In this it can use as a starting point a hypothetical “worst case scenario”: a hazard situation that evolves into a crisis.

Furthermore, the tool may be applied in an acute crisis with its real-life parameters determining the direct and indirect impacts from hazard, and the (number of) people affected. In this way it can speed up the decision making related to the crisis response. It will help to prioritize the allocation of resources that are often scarce – especially during extensive and/or prolonged disasters.

Be it real-life circumstances or the scenario-based modelling, the particular situational characteristics determine which factors of vulnerability play which role in inhibiting individuals’ resilience. To improve the representation of situational components, representatives of various stakeholders with their information on the geospatial, physical, as well as socio structural conditions need to be involved in crisis management decision-making during the planning phase as well as in times of disaster.

The assessment tool ca also be useful, when making the preparedness planning more inclusive, as is recommended in the Sendai Framework (UN 2015).[5] For a fair representation of possible impacts on varied groups, the perspectives of those most vulnerable should be included in the assessment process. The disaster management view is not able to cover the variety of lived experiences. The decision-making should be opened up to the members of a diverse society, particularly those who might be most affected by specific vulnerability factors.

Dissemination routes and further development

The practitioners’ instructions with relevant worksheets for the vulnerability assessment tool will be available in the BuildERS project website for two years after the project has ended (i.e. till summer 2024). In Estonia the tool will also be further developed with the Estonian Rescue Board and the University of Tartu. The material will be also shared via EU’s Horizon Results Platform. Here the aims are twofold:

a) To raise awareness of the related policy recommendations that emphasize the need for a more nuanced assessments of people’s vulnerability in crisis situations

b) Seek collaborative partnerships and funding for

    a. The digitalization of the worksheets for the analysis

    b. The development of solutions that use Artificial Intelligence (AI) to analyze data derived from several digital databases with the high standards of data security

    c. The development of technological solutions to collect data from locations that are geographically difficult to reach

[5] United Nations. (2015). Sendai Framework for Disaster Risk Reduction 2015—2030. United Nations.

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5.1.2. Development opportunities related to supportive technologies

In the BuildERS project, we made preliminary analysis of technologies that could be of help when collecting data for the abovementioned vulnerability assessment. Authorities also need technological solutions for quick and reliable information sharing between different stakeholders. For the latter, potential solutions are provided by *blockchain technology*: it enables the maintenance of a shared distributed ledger, called the blockchain, which can be simultaneously read and modified by all involved parties but is not owned by any party. It de-centralizes the data, builds trust in the data, and allows interacting directly with one another and the data.

Although the assessment process should start from the integration of relevant official data bases, it should continue with the collection of such data that is not yet available in official registries. Finally, a more advanced vulnerability assessment tool would benefit of using data that is collected with inclusive crowdsourcing methods. Inclusive crowdsourcing means engaging a large variety of people in the data collection, including the socially and economically marginalized. As many crowdsourcing methods require that people have devices like smart phones, engagement may need intermediaries, who do the actual data collection, coding and transmission.

The following technologies were considered as the most promising as they enable data collection from situations and geographical locations that are difficult to reach:

a) *Location-based services* (LBS) are mobile applications that provide information depending on the location of the user. LBS applications differ from other geographic information systems (GIS) and web mapping applications because they "know" the context where their users are and therefore can adapt the contents and presentation accordingly. One of the simplest examples is a Location Based Alert System used to send SMS to alert people about an upcoming natural hazard. It is also possible to use historical data that has been collected before the crisis: this helps to tackle challenges during power outages.

b) *Earth-orbiting remote-sensing satellites* and *meteorological satellites* provide information for hazard risk mapping, detection and monitoring. Typically, floods and wildfires can be mapped accurately from optical images, landslides and earthquakes from SAR images, and heatwaves and storms from meteorological satellites. For instance, the Copernicus Emergency Management Service (Copernicus EMS) provides timely and accurate geo-spatial information derived from satellite remote sensing and completed by available in-situ or open data sources.

c) *Internet of Things (IoT)* applications are especially ideal for natural disaster management since they can send alerts of potentially dangerous situations like fire, earthquakes or flooding. Applications feed data to a main server or centers and provide real-time information from different kinds of sensors, attached e.g., into people, vehicles, buildings, infrastructures, environment, on the ground etc. These sensors can monitor conditions that could trigger disasters dates back several years. Improvements in cloud computing, broadband wireless networks, the sensors themselves, and data analysis have led to the emergence of powerful preparedness tools.

d) *5G technology* has higher capacity, is faster and has lower latency compared with previous generations. It is an essential enabler for the more real-time communications with mobile assets such as vehicles, robots, drones, cameras, and other sensors that produce big amount of data and require low latencies in interaction with infrastructures.

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e) *The drones* are mostly unmanned aerial vehicles (UAV) but can also be applied to underwater or on-ground vehicles. They can be classified as robots and be fully or nearly autonomous. UAVs can fly in places where manned aircraft cannot; they can fly at low altitudes, and therefore the images are of higher resolution than satellite images. The positioning under water is challenging, and therefore the use range is limited. The drones also have the potential to collect information on locations that would be unsafe for a human user due to hazardous chemicals (e.g., gas), radiation, risk of fire or explosion or imminent threat of violence.

5.1.3. Technological solutions using mobile positioning data (MPD)

Within the BuildERS project two tools that use the abovementioned location-based services: *mobile positioning data* have been developed. They enable to assess where, when, how and how much people move and stay – of wide ranges of population more dynamically and in greater detail than traditional census-based approaches.

The first tool created by Positium ltd. uses *historical MPD*. It shows visually the number of people living in a particular area, those commuting or regularly visiting the area, and people having secondary homes. The dashboard can give daily, weekly and seasonal volume changes and movement patterns that other databases cannot do. Estimations of the amount of different population groups are made in a more precise time step than before.

The dashboard was validated by multiple Estonian end users, such as Estonian Rescue Board, Police and Border Guard Board, Defence Forces and others. The validation was done in a tabletop exercise where the dashboard was demonstrated and case scenarios were played through. Participants evaluated this dashboard as being a highly valuable for preparedness planning where they learn from past crises and events.[6]

The research carried within the 1st work package (WP1) of BuildERS project identified tourists as people that are at risk of becoming specifically vulnerable due to their lack of preparedness and local knowledge and inability to understand native languages. Moreover, the tourism industry often has limited integration with national disaster management systems, hence tourists are likely to lack the understanding and competency in knowing critical information and actions they need to take to protect themselves in the occurrence of disasters (Hystad & Keller, 2008; Uekusa, 2019).

The second tool developed within the BuildERS project and also by Positium ltd. uses near real-time MPD to analyze tourist's movement. The tool's dashboard presents how many tourists are in the crisis area, where they are from and if and where they are moving to.[7]

MPD in the context of this dashboard refers to passive mobile positioning, meaning the data that is automatically collected by the mobile network operator (MNO) based on customer billing, network maintenance and performance monitoring. There are many data points per person within a longer period, which gives the data consistency throughout the whole time period and does not only reflect

[6] For more information about the dashboard tool, see Võik, E.-J., A. Tominga, M. Klaos, S. Silm, K. Orru, T. Lusikka (2021) BuildERS D4.3 Practice & product innovation "Applying mobile positioning data for more precise rescue planning and emergency management under cyber-hazard in Estonia", BuildERS project report.

[7] More about the dashboard tool: Võik, E.-J., M. Sari, U. A.V. Salim, M. A. Berawi, T. Lusikka (2021b) BuildERS D 4.7 Indonesian Case "Using Mobile Operators' Data to Locate, Protect and Evacuate Tourists and Other Vulnerable Groups in Disasters, BuildERS project report.

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one day, week or a season, but the changes throughout a longer period as well. MPD is also not as expensive as surveys.

Potential end users and use contexts of MPD tools

Besides the Estonian Rescue Board, potential users of the dashboard that uses historical mobile positioning data are crisis management agencies, such as law enforcement (in Estonia for instance the Police and Border Guard Board), first aid, military forces, municipality officials, and ministries of interior. Crisis managers can for instance plan evacuation routes and accommodation more precisely. Based on this information it can be estimated and forecasted how people would behave and respond to crisis notifications etc.

In April 2021, a focus group discussion was held with end-users to validate the usefulness of the dashboard. The purpose of the validation was to gain more insight on how the dashboard could fit better into the local disaster management system, by taking into account the expertise and experience of relevant institutions. Participants were from different agencies to cover more parts of the emergency processes. Around 30 people participated. Among the participants were the Indonesian Ministry of Foreign Affairs, Ministry of Tourism and Creative Economy, Ministry of Development Planning, National Disaster Management Agency (BNPB), National Statistical Office, Ministry of Social Affairs, and Provincial Government, and representatives from the Non-Government Organizations, and Civic-Tech organizations.

Dissemination routes and further development

The dashboard that uses near real-time MPD to analyze tourists' movement was tested and piloted during the Indonesian case study: "Using Mobile Operators' Data to Locate, Protect and Evacuate Tourists and Other Vulnerable Groups in Disasters" (Võik et al 2021). The pilot showed that the tool can be used to:

a) Estimate the number of people potentially affected by the crisis and shared with the relevant embassies

b) Assess if crisis notifications reach vulnerable people understandably and on time,

c) Assess, how many tourists are moving out of the area (i.e. less vulnerable)

It was found that the above mentioned dashboard reaches its highest usefulness when combined with already existing databases and dashboards. There are different data sources already existing, e.g. one that shows the count of people found on-site, one shows with GPS the tourists that have asked for help. Positium's dashboard could fill in the missing view that shows how many tourists in general were in the area potentially affected by the crisis. Through more exact planning and knowledge of tourists' whereabouts during crisis, the processes of aid and relief during disaster can be faster and more effective. The main potential end users of the tool are different embassies, national, regional and local disaster management agencies and the ministries of foreign affairs.

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5.1.4. The Natural Disaster Mapping Tool

The Natural Disaster Mapping Tool developed in the BuildERS project gathers hazard information from public registers automatically with user defined query parameters and at user defined moment, and combines the data into one visualization. This data is visually presented on a map and information about demographics, economic circumstances, and operational locations of non-governmental humanitarian relief agencies is also combined to this map.

Potential end users and use contexts

This kind of information can help, especially non-profit sector organizations, to plan new response activities to manage the impacts of natural disasters. Secondary emergency response actors, such as social care organizations (often) do not have access to the security-sensitive or otherwise classified data. These organizations may not use for instance any client registers of social services providers – neither the ones maintained by public agencies (for example municipalities) nor private sector companies. Therefore, a tool that uses public open access data could help these organizations to identify people with a high risk of becoming vulnerable and plan their preparedness measures accordingly.

Dissemination and further development plans

The prototype of the Disaster Mapping Tool was demonstrated in the form of a video “Maps of the Severely Vulnerable Populations” for the external reviewers of BuildERS project in Spring 2020. This video recording is publicly available in the BuildERS website for further development until the end of year 2024.

The technical features of the tool have been described in more detail in the public report D3.4 Maps of the severely vulnerable populations. These will be also available in the BuildERS project website and Horizon Results Platform and in the CORDIS EU Research results portal of the European Commission.

This demonstration showed how data from public registers can be utilized in practice. The case country of this demonstration is Italy, which is a partner country in the BuildERS project and one of the European countries most affected by natural disasters. The demonstration of the tool includes the data collected from the hazards that took place in 2015-2019. The data for the demonstrator was received from two main databases: The Copernicus Emergency Management Service’s Rapid Mapping Activations feed of European Space Agency (ESA) and EU, and the Earthquake database from the United States Geology Survey (USGS). Regarding the natural hazards in Europe, these two databases cover most of the European natural hazards.

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5.2. Tools for building knowledge

5.2.1. First Responder Training Prototype

In every crisis-situation, the interface between the front-line emergency responders and the people at risk is critical for protection and survival. Consequently, the quality of the interactions between the front-line rescuers, law enforcement and the people in danger is crucial for preservation of safety and security. As demonstrated in the Finnish case study, one of the key sources of vulnerability in disasters is poor accessibility and difficult to follow communication due to official information provision's poor consideration of the diverse audiences (Hansson et al 2020). The research of police encounters with individuals who experience the aforementioned difficulties indicate that there is a need to increase knowledge, skills and positive attitude toward individuals with communicational vulnerabilities in general. (Jukarainen et al 2021: 20-21). These skills are equally and especially useful in crises.

Through co-creation, Jukarainen et al (2021) has innovated training for the first responders – especially for the police and the rescue services, aiming to improve their risk and crisis communication competencies. The development was comprised of several sequential and iterative stages of both innovation and validation/quality assurance/testing (cf. Jukarainen et al 2021 for details).

The training is built on an idea of competence-based learning. This means that the knowledge, skills, attitudes, and behavior that have relevance in the first responders' everyday work are more important than formal certificates. Although many associate competence as "just" practical skills, (truly) competent individuals can reflect upon their knowledge, their skills, and their functioning (Westera 2001). These competencies are both generic (communication and interaction skills) and profession specific (collaboration skills, understanding accessibility requirements for crisis-related information)

Key principles: Among the key principles developed is that, in an acute crisis-situation, first responders need to be able to identify also such vulnerabilities that are not visible or clearly communicated. In this context, the first responders' must detect and realize that they:

a) Need to adopt specific bodily and verbal communications to deescalate the situational tension, and manage the problem through providing appropriate assistance tailored to overcome the recipients' mental and cognitive challenges, and

b) Face a situation involving diverse members of society which have different capacities and needs in terms of social interaction and communication

c) Defuse the crisis at hand, restore the law and order and, increase the citizens' safety.

The training is comprised of two thematic modules, which teachers and trainers can integrate in their course content and to suit specific qualifications. In this way, the training concept will serve many different instances across Europe and be easily modified for the use of other first responder organizations. The two training modules are titled: 1) External communication and interagency collaboration, 2) Interaction and communication with people who have special needs in terms of communication.

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There are three main learning outcomes: first, students will learn how to interact and have face-to-face encounters with persons who have various kinds of difficulties in social interaction and/or communication. Second, students will gain knowledge of accessibility requirements for web contents and what are easy-to-read language and plain language. Third, they will learn to use the potential of an individuals' social network including their connections to the different service providers. In practice, this would mean that first responders (like police or rescue services) engage in multiagency and multi-professional work to reduce individuals' vulnerabilities. Besides developing practical skills, the training will increase learners' knowledge of common mental health conditions, neuropsychiatric disorders and intellectual disabilities, and their impact on communication and social interaction.

Potential end users and use contexts

The training is designed for practitioners at three levels:

1) For the communication specialists and duty commanding officers, responsible for communication. Those who would be activated in crisis communication within law enforcement agencies and possibly other first responder organizations; those responsible for all or most communication activities in a high pressure or crisis situation.

2) For the field operations officers, responding to emergencies and interacting with citizens. We may also refer to these as first responders, who are trained professionals who are among the first to aid in emergencies: firefighters, law enforcement officers, paramedics, emergency medical technicians EMTs.

3) For students of basic vocational training. Students in basic or bachelor level law enforcement educational setting who encounter the variety of the population in their face-to-face interaction while on duty.

For the first level of practitioners: communication specialists and duty commanding officers, the designed learning method is a simulation scenario-based preparedness drill. The drill prototype that was tested during the Finnish case study includes a half-day exercise with facilitated post-exercise discussions and structured feedback collection with a worksheet.

In this module a digital simulation training environment has a central role; it enables participants to assess their external communication capacities and competencies together by using a close to reality communication method (e.g. be interviewed by "journalists", share posts in "social media channels", publish information on "website" etc.).

In BuildERS we tested a training platform called *Trasim* designed by Insta Digital ltd. The Trasim platform can be used independently or to support facilitation of table-top exercises as was the case in our preparedness drills. As Trasim is already on the market, it has been used amply to support cyber security related functional exercises and major incident management, including testing of operating models between top management, communications units, service business management and Security Operations Centres (SOC).

Most of the pilot participants had neutral or positive perception on the tool, regarding its effectiveness in achieving its purpose, efficiency in terms of use of resources, willingness to take to tool to regular use, perceived ease of use and clarity of instructions, accessibility of the tool and its suitability for civil protection, crisis management and disaster risk reduction. The ethical risks were considered to be low. According to the pilot participants' opinion, the simulation platform will not compromise personal data protection, or collect non-essential personal data. The risk of stigmatization of people was also seen as low; in contrast, the majority of pilot participants saw that the drill exercise carried

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with Trasim-tool improved their skills to protect vulnerable groups against hate speech and online shaming.[8]

Dissemination routes and further development

The BuildERS project recommends that training *for the expert level* (for the communication specialists and managers of risk and crisis communication) uses advanced simulation platforms in a way that they train capacities to reduce communication related vulnerabilities. These are for example:

a) Ability to create accessible content online
b) Ability to protect people from hate speech and stigmatization
c) Ability to collaborate with intermediaries of people in vulnerable situations in order to reach those who do not use digital media for seeking crisis-related information

Besides Trasim there are several other potential simulation technology solutions that could be tested and piloted for further development. Thus, it would be good to continue the cocreation process, and search for new solutions that help to address communication related vulnerabilities.

Training for *the field level first responder practitioners* (field operations officers) should focus on improving social interaction skills and increasing awareness of various challenges in communication and social interaction. Within the BuildERS project we developed a training course titled "Challenging Interactions" that will be disseminated in the following ways:

There will be an e-learning course for the European law enforcement officers provided in English at the e-learning platform (LEEd) of the European Union Agency for Law Enforcement Training (CEPOL). This training is advertised via social media channels with a trailer video produced by the BuildERS project partner Geonardo. Information about training will also be shared also the national contact points of CEPOL.

Furthermore, the Police University College of Finland will seek collaborative partnerships with CEPOL members (law enforcement agencies), who will be able to help in preparing and organizing a training course in French or other European languages. Currently there are some learning materials ready in Swedish and French.

The Police University College will have the course available for the following student groups:

a) Erasmus+ exchange program students arriving at Police University College (the course will be in English)

b) Degree students and exchange students of Tampere University and Tampere University of Applied Sciences (the course will be in English; The Police University College is included in Tampere universities' cross-institutional studies program)

c) Bachelor of Police Services degree students (with native language Finnish or Swedish)

d) Bachelor of Rescue Services degree students (who study under the Police University College, and for whom the Police University College has the right to grant the degree; the

[8] For more detailed pilot results see BuildERS project reports: Bäck A. et a. (2021) D6.4 End-user assessment of the new tools and technologies for disaster management; Jukarainen P. et al. (2021) BuildERS D4.1 Managing chemical spill emergency and mis-/disinformation through simulated responses, BuildERS project report.

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Emergency Services Academy Finland has the responsibility for organizing the degree studies; the course will be available in Finnish and Swedish)

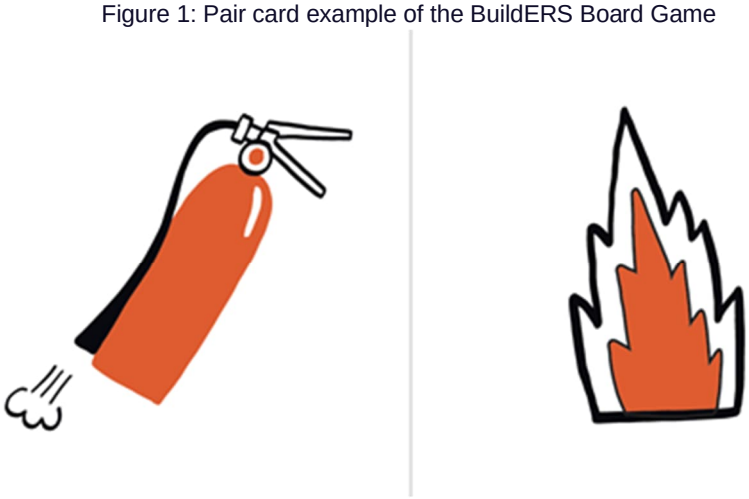
e) Continuing education course students for the field operations officers

5.2.2. Board Game: Preparedness Skills for Children

Relying on the main topics of the BuildERS project - risk awareness, social capital and vulnerability – the BuildERS Board game focuses on teaching children aged 5 to 10, who are likely to be vulnerable in case of disasters, how to react and how to spread information to their peers. In BuildERS D1.3: *Report on Segments of Vulnerability Country by Country Basis – Inside and Outside: the Official Data*, elderly, children, and people with disabilities are recurring groups impacted by crises in all the eight countries that were subject to analysis. This game is focused on explaining to children in lower grades of elementary school the steps to be taken in case of emergency situations focusing on natural disasters or other events. Four different scenarios have been developed, based on the disasters described by the case studies within BuildERS and most likely scenarios to happen in countries covered by the project - fire, earthquake, flood and pandemic.

Based on an extensive literature review of the pedagogical and didactical approaches in game-based learning, it was decided that the game should include questions with different levels of difficulty. Questions for younger groups of pupils (5 to 7 years of age) are based on visual card pairing (e.g. fire extinguisher – fire; face – mask; mobile with 112 – building on fire, etc.), whereas questions for the group 8 to 10 years of age are more complex and can also be in the form of challenges (either on paper or physical demonstration).

Figure 1: Pair card example of the BuildERS Board Game



This categorization of questions actually came as a result of co-creation after the game was distributed to one elementary school and one children's camp in Hungary to be tested. The first scenario that was developed – the fire scenario – was translated to Hungarian with instructions for teachers and all the levels of questions for pupils. The feedback received was mostly positive – the game was considered to be engaging, the visuals were interesting and the level of knowledge on the topic among the children increased.

However, there have been in both cases two important negative remarks. Namely, this first version of the game was confusing with regards to the level of questions and challenges and age groups they belong to. Educators/teachers could not differentiate in the instructions which questions to use

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for younger groups and which ones for older as it was left to their judgement to assess what the level of knowledge about issues at hand among pupils was.

The second remark concerned the difficulty of original questions for the younger age group (5 to 7 years). Initially, it was planned for pairing images and questions to be for younger pupils, while challenges would be added for the older group (8 to 10 years). The feedback was that the questions were too complex on this level, and that children best responded and understood image pairing at this age and this was enough to keep their attention for the duration of the game.

The game was thus adjusted according to these comments and the instructions got a clearer form, while the image pairings are a starting point for younger players and the teachers are instructed to add on the questions and challenges as the knowledge of the pupils increases. The new version of the game was then tested in a new school and an additional camp for disadvantaged children, which was intentionally done in order to check applicability for this target group. The feedback received was positive, without any issues with understanding of either educators or children.

Additionally, the game was reviewed internally by the University of Tuebingen for ethics and by the University of Tartu for content and synchronicity with BuildERS. Remarks from these reviews were taken into consideration before finalizing the game and designing the last elements.

Moreover, the game was designed with co-creation in mind in another way – the visual elements. Each of the four boards is only partially coloured, so that the children playing can firstly connect to the game while colouring the town and investing a joint effort to make it “their own”. With this step, especially for the younger age group, it will be easier to engage and potentially make the board look like their own town, city, school, playground, etc.

In figure 30, one of the boards is presented (flood) and it is only partially coloured. Four different characters move down 4 different paths (children from school and the boy and grandma all go towards the evacuation centre, volunteers go towards the flood to build a dam and the flood going towards the town). The testing of the game showed that the game is interesting enough for children this age, as they are “competing” against the flood (or fire, virus, earthquake in other scenarios) while responding to the questions.

Figure 2: Game board of flooding scenario

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Potential end users and use contexts of board game

The game was produced in five languages (English, Finnish, German, Italian and Hungarian) in order to ensure the widest use possible. It will be distributed across the schools in the countries where these languages are spoken, while it is also planned to reach out to organizations dealing with non-formal and informal education of children 5 to 10 years of age.

The idea is to target organizations dealing with especially vulnerable individuals (migrants, disadvantaged children, children with development difficulties) and also local NGOs and community centres.

Dissemination plans for the board game

The game will be available primarily on the BuildERS website, but it is going to be distributed to specific platforms, namely Horizon Results Platform and School Education Gateway to specifically target teachers, as this is a popular platform for teaching materials and a hub for motivated educators.

In addition, eTwinning National Support Services (NSS) of these countries will be contacted to distribute news about the game. eTwinning is the largest network for school staff in Europe, with over 450 000 registered teachers. The NSS social media channels are extremely popular, and especially among teachers who are used to using innovative teaching methods and tools, which the BuildERS game represents. These outreach activities will put the game on the map with the relevant organizations and platforms that can remain a source of information even after the project is done.

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The game will also be distributed to Red Cross, as well as Salvation Army centres in Germany, Italy, the United Kingdom, Finland, and Hungary who provide services to families and children. Contact information will be provided along with the board game to receive feedback from users if they so wish.

5.2.3. Guidelines for Ethical Assurance in RDI -projects engaging people in vulnerable situations

Every technological and social innovation promotes a more or less formulated answer to the question “Which society/world do we want to live in?” (Ammicht Quinn 2014, 28). Values and beliefs are inscribed in the perspectives we expect relevant for technology development, the aims we want to achieve and the ways we use to get there. As the BuildERS project aimed for increasing the resilience of those persons who find themselves in the most vulnerable situations, from the beginning the consortium recognized the broad and various ethical questions which are aligned with achieving this aim, which, framed differently, is nothing less than promoting a more just idea of disaster management. This is an idea that should be achieved by the development of technological innovations and social strategies which included the diverse perspectives and living situations of European citizens.

Against this backdrop, the BuildERS project involved ethics into research activities right from the beginning, both as a counselling as well as a research perspective, in order take into consideration the (purposely) inscribed values of technological and social innovations right from the beginning in a threefold way. Not only was a specific focus to be laid on ethical standards of good empirical research which involves persons in vulnerable situation. Also, ethics was involved and actively understood by the consortium as an integral part and partner for developing results which were already be scrutinized against potential negative side-effects and implications, especially for those whom the project wanted to support.

Potential end users and use contexts

This way of involving ethics in the BuildERS project contributes to the sustainability in at least three ways:

First, the consideration of ethics in the research activities themselves helped to lower the threshold for and improve the willingness for participating of persons in vulnerable situations. To address potential harms, traumatization or power relations during the design of studies such as WP3 and WP4 for instance to consulting the development of the questionnaire, offer ethics trainings for the interviewers and a debrief of the interview process increased the trustworthiness of the research conducted. This helped to ensure that the perspectives and knowledge of persons in vulnerable situations who are often overlooked could be included to such a large degree and therefore a sound basis for developing BuildERS results could be built.

Second, especially the co-creation and recommendation development were supported by providing lists of questions that should help the partners to actively reflect on these processes, against six value related dimensions: (a) justice and participation, (b) responsibility and accountability, (c) freedom of choice and autonomy, (d) trust and transparency, (e) non-maleficence and beneficence as well as (f) privacy and data protection. This should allow to identify potential negative implications and side-effects already in the development phase and reduce distractions in the implementation phase. Examples of questions within each value-related dimension is provided in the table below.

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Ethical assurance of a co-creation process	
Justice and Participation	
PROCESS-RELATED: Who was not included in the co-creation process and on what reasons?	e.g. Did the co-creation process only include representatives of XYZ from one specific national context?
Who could be excluded by the co-creation process?	e.g. Who is not included in the co-creation process?
How is ensured that every relevant stakeholder is able to participate or are represented in decisions on or about them?	e.g. Does the co-creation process make sure that it is accessible for all relevant stakeholders?
Responsibility and Accountability	
Through which measures are people informed about the co-creation process?	e.g. Does the co-creation process include measures about ensuring that affected people or their representatives can participate?
Freedom of Choice and Autonomy	
How does the co-creation process ensure a certain freedom from external (including structural, systemic, peer) pressures?	e.g. Does the co-creation process take into account that structural pressures might hinder people from acting in their own interest?
Trustworthiness and Transparency	
How are rules of processes and power hierarchies made transparent?	e.g. How does the co-creation process consider that strategies and actions are made transparent and open for criticism?
How does the co-creation process support that mistakes or shortcomings are made transparent?	e.g. How does the co-creation process support self-reflection of the taken actions and a public involvement in the adjustment? If it doesn't why?
How does the co-creation process support the development of trustworthy actions?	e.g. Are there any supervision strategies or corrective mechanisms included in the processes and actions that stem from the co-creation process?
Privacy and Data Protection	
How is personal data protected?	e.g. Which standards and limitations are provided for their use?
Beneficence and Non-Maleficence	
Does the co-creation process ensure that it benefits the situation of the most vulnerable?	e.g. Under which conditions might the co-creation process not lead to an improvement to existing measures/procedures/strategies

Dissemination routes and further development

Finally, the structured ethics approach of involving ethics in BuildERS a complex and – even more important – ongoing discussion on ethics throughout the whole research and innovation process may itself be seen as a result of BuildERS which inspires other RDI projects. A first step in this regard was taken during the project when BuildERS provided an ethics training for the other DRS01 projects RESILOC and LINKS. A second step will be to disseminate the lessons learnt form ethics in BuildERS into a broader discussion beyond the scope of the project.

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5.3. TOOLS FOR ESTABLISHING COLLABORATION

5.3.1. Inclusive Crisis Communication Canvas

A communication strategy should be based on an up-to-date situational awareness: knowledge of the various information needs of citizens and communities. Situational awareness includes a critical analysis of the available resources, capabilities, and collaborative partnerships. As the Police University College (PUC) had previously utilised the Business Model Canvas[9] in the EU funded Unity project in order to strengthen the communication and collaboration between the authorities and vulnerable individuals, PUC decided to avail the previous good experiences and created a tool for the first responders for inclusive crisis communication. The aim was to create a practical and user-friendly tool that would connect the several outcomes of the BuildERS project in a digestible and understandable way. The tool was named 'Inclusive Crisis Communication Canvas'.

The benefit of utilising the Crisis Communication Canvas in the crisis communication strategy is in its inclusive nature. Among other things, the Canvas encourages the authorities to contemplate:

a) Which communities, minority groups, individuals, or localities will be beneficiaries of the communication services: for whom are the authorities creating value, for instance with their presence in social media?

b) What are the main communication and contacting channels with the above-mentioned stakeholders? (Such as various types of ICT tools, traditional arenas such as community meetings and the use of trusted intermediaries, social media influencers etc.), and which channels have worked well so far and will most likely work well in the future?

c) How good are the target audience and stakeholder relationships: what is the level of trust, how much collaboration and communication there are between the parties etc.?

d) Which partners are needed in order to reach everyone, especially minorities and marginalized individuals? Why are some individuals or audiences difficult to reach?

The strong point of the Inclusive Crisis Communication Canvas is that it can be outlined on one page, and it provides an overview of the target audience, stakeholders and communication channels. The Guidelines and the supportive questions help the first responders to fill in the Canvas in creative ways. Each building block of the Canvas have a corresponding question block in the Guidelines. The questions ask the first responder to analyse the operational environment, e.g. the stakeholders' ability to identify individuals who are in acute danger, without social networks or lacking trust towards authorities. Once the first responder has answered the questions of the Guidelines, filling in the Canvas should be easy. The Inclusive Crisis Communication Canvas consists of:

[9] The canvas template is based on the Business Model Canvas that is distributed under a Creative Commons license from StrategyzerAG and it can be used without any restrictions for modelling businesses. See more of Business Model Canvas on Strategyzer AG - website: https://www.strategyzer.com/canvas

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a) The Guidelines and the supportive questions

b) The Inclusive Crisis Communication Canvas worksheet

c) The Stakeholder Mapping Chart

Potential end-users and use contexts

Four of the BuildERS projects' first responder partners piloted the Inclusive Crisis Communication Canvas tool and its guidelines during October and November 2021. The pilot took place in Germany, Italy, Estonia and the UK. The partners evaluated the Canvas tool by participating in an anonymous online survey. In general, the participants strongly agreed that the Crisis Communication Canvas had the potential to improve the communication performance of their organisation in a crisis. On average, the participants agreed that the Canvas would be useful for their organisation and has the potential to improve the ability of their organisation to communicate inclusively with vulnerable people in a crisis.

On average, the participants agreed that the Canvas worksheet is relatively easy to fill in. Nevertheless, it needs to be emphasised in the marketing that the Canvas tool is meant to be only a supportive reminder of communication related vulnerabilities and of the need to address these when making preparedness planning.

The potential end-users are strategic level managers of crisis/disaster management agencies who are responsible of contingency or preparedness planning. Thus, the tool is not meant to serve only the communication experts or persons who are responsible of "only" risk and crisis communication. It is also recommended to use the tool in close collaboration with *intermediaries* of people in vulnerable situations and/or challenges in everyday life (like homeless, irregular migrants, individuals with mental health issues, substance users). These intermediaries are often non-profit sector care services providers; however, they can also be public agencies or unaffiliated citizen groups like spontaneous volunteer groups.

The original Business Model Canvas that has served as an inspiration for this Inclusive Crisis Communication Canvas (naturally) emphasises economic value and financial gain. Although cost-efficiency is an important aspect, the current version of Canvas -tool is missing the analysis of preferred cost structure. Thus, it would be essential to ideate, how the assessment of economic costs would be best included in the Canvas -tool.

Instead, based on the pilot testers' feedback, we complemented the Canvas with the Stakeholder Mapping Chart, whose purpose is to strengthen the authorities' capacity in identifying potential stakeholders and several communication channels. Its purpose is to remind the authorities to map all the potential strategic partnerships in creative ways. It also encourages the crisis managers to acknowledge that the different phases of the crisis (preparedness, response, recovery) may require different partners and collaborative relationships. Thus, the Stakeholder Mapping Chart aims to strengthen and complement the current stakeholder maps that are used in organisations so that the filling in of the Inclusive Crisis Communication Canvas is easier for the authorities.

The Stakeholder Mapping Chart supports the strategic planning before the crisis, while the Canvas can be used in the beginning and during an acute crisis.

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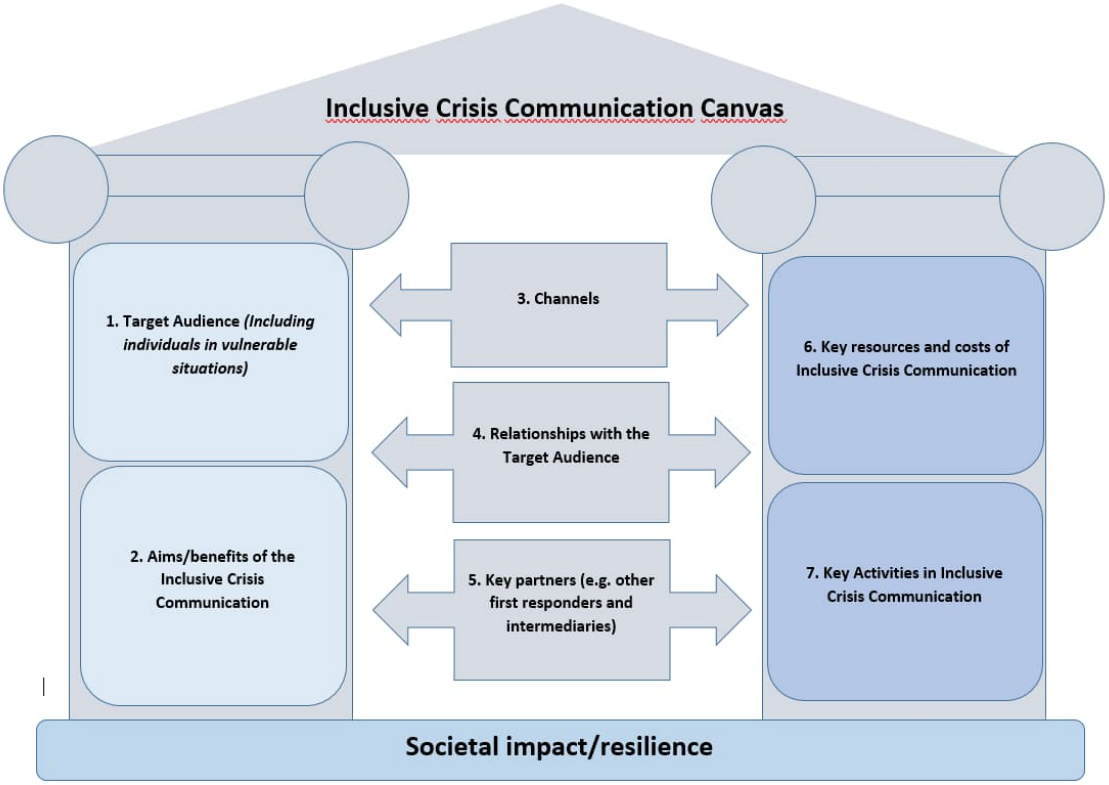
Figure 3: The Inclusive Crisis Communication Canvas



Dissemination and further development plans

The Inclusive Crisis Communication Canvas and the Stakeholder Mapping tool are products that are at the prototype level and can demonstrate its key features. Thus, in the future it would be beneficial to create, for instance, a *digital application* that would guide end-users and assist them in the analysis and documentation.

Especially the stakeholder mapping would need a technological solution that could store securely the personal data of intermediaries (their contact information). Furthermore, as any preparedness planning document, also the completed Canvas worksheet is defined as classified information and needs higher data protection measures.

Depending on the level of detail, the level of confidentiality may vary from CONFIDENTIEL UE/EU CONFIDENTIAL (information and material the unauthorised disclosure of which could harm the essential interests of the European Union or of one or more of the Member States) to RESTREINT UE/EU RESTRICTED (information and material the unauthorised disclosure of which could be disadvantageous to the interests of the European Union or of one or more of the Member States).

Worksheets only in paper form are neither sophisticated enough to serve the purpose of effective crisis management. In the future, there may be a need for a computer software that would allow and

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facilitate the stakeholder collaboration and information exchange, strengthening the identification of weak signals and guiding the authorities towards inclusive communication. This means that there is a large innovation potential with Canvas tool and its technological solutions.

The dissemination level of the deliverable that contained the results of pilot testing is classified: shared only withing the project consortium and with the EU Commission services. The reason for this was that the report contained worksheets completed by the pilot organisations. Although according to the Security Officer of the BuildERS project the information shared during the pilot was not security-sensitive, we saw that it was still confidential. However, the Inclusive Crisis Communication Canvas tool itself is public domain, and not protected by intellectual property laws. We only require that the EU Horizon 2020 funding and BuildERS project is mentioned as a reference, when implementing or developing the tool further.

The practitioners' guidelines with relevant worksheets for the Canvas tool will be available in the BuilDERS project website for two years after the project has ended (i.e. till summer 2024). We will also share them via EU's Horizon Results Platform. The dissemination activities aim at:

a) Raising awareness of the related policy recommendations that emphasize the need to collaborate with intermediaries in order make risk and crisis communication accessible;

b) Seeking collaborative partnerships and funding for the digitalization of the guidelines;

c) Seeking collaborative partnerships and funding for designing secure digital environments for the completed worksheets and personal data of intermediaries.

5.3.2. Guidelines for Collaborating with Social Media Influencers

Although there are citizens who do not search information from digital online sources (social media, websites, podcasts etc.) these have become important communication forums for the crisis managers. The role of social media as a source of information is controversial. At best social media channels and communities can serve as distributors of verified official information and spread it fast for large audiences. At the same time, there are producers of content that is misleading, irrelevant, harmful or even dangerous.

Social media influencers are central actors in social media communities with a specific quality to and influence on organizational stakeholders through content production, content distribution, interaction, and personal appearance on the social network. (Enke 2019). In the BuildERS project we cocreated guidelines for the crisis managers, that advise of the pros and cons of collaboration with the influencers in risk and crisis communication.

Social media influencers have already been active in working together with public organizations in raising awareness and sharing information on issues related to crisis/disasters. Social media influencers have also organized themselves and assisted public authorities in the coordination of civilian relief efforts. Being funded by tax-payers, serving all citizens and having to build and maintain public trust, public actors must take various additional aspects into consideration when collaborating with individuals instead of companies. That is why we included a section focusing on ethical considerations and risks.

We hope that our guidelines help public actors navigate the world of social media influencing and harness the field for risk and crisis communication. The goal was to create practical, concrete guidelines on how to collaborate with influencers and what to consider before, during and after a collaboration.

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The guidelines which consist of four sections:

a) What is social media influencing?
b) Why collaborate?
c) Getting started
d) Ethical considerations and risks

The first section (What is social media influencing?) provides an introduction into the subject. What is social media influencing? What types of influencers are there and how to choose the right influencer to work with? *In the second section* (Why collaborate?) the guidelines make the case for why public actors should collaborate with influencers to improve risk and crisis communication.

The third section of the guidelines provides concrete steps for how to get started: importance of having a clear strategy, building a long-lasting relationship with the influencer and finding the right influencers. This section also discusses compensation policy, laws regulating influencer marketing, and how to measure impact of a campaign.

The fourth section discusses various ethical considerations and risks that come with engaging with influencers. Much like all marketing efforts, public actors should think carefully about the ethical dimensions of their actions.

Potential end users and use contexts

The guidelines are designed foremost for the authorities, who are looking for intermediaries that could reach a variety of people. Influencers are good storytellers and able to touch people's emotions. If they are able to share verified information, they can debunk myths, rumors and misunderstandings and help to fight against harmful conspiracy theories that often emerge during crises. The EU has recognized that false information is a significant challenge for Europe and that inclusive solutions are necessary. Furthermore, in December 2020, the Council of the European Union noted that the current COVID-19 pandemic makes the EU and its Member States more vulnerable to intensified and more sophisticated spread of disinformation and manipulative interference. The Council called for a multidisciplinary and multi-stakeholder approach to tackle the increased spread of disinformation. (Council of the European Union 2020.)

Social media influencers can also serve as role models and advocates for risk awareness, promote preparedness actions and safety measures. They can share their experiences of doing their daily chores during (an earlier) crisis, tell narratives of being (once) a victim or survivor or providing support for others. In other words, they could be the "bonding social capital" of the individuals in a vulnerable situation. Influencers could support authorities in gaining acceptance of the restrictions and changing the unwanted behaviour, attitudes and values of people.

In autumn 2020 and early in 2021, we organized a series of online workshops on information disorder with risk and crisis communication experts from Estonia, Belgium, Italy, Portugal and Sweden. Workshop participants saw that due to their popularity, influencers have the potential to reach out to wide audiences, and especially those individuals, who do not necessarily follow "traditional" media. For example, the youth who regularly follow certain video bloggers, could be reached via these influencers.

Furthermore, participants stated that in crises like maintaining distance to other people and refraining from socializing in the case of the protracted pandemic. Influencers could for example share infographics and other awareness-raising material provided by the authorities and other responsible agencies. They could also share their personal experiences and everyday examples of

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the impacts of crises. With their face and voice, they could provide a necessary push in the right direction.

Influencers are an important messenger in the fabric of social media. They know their followers, including what people like and how to reach them. Thus, collaborating with them is also efficient because as experts they can help design an effective campaign.

Dissemination and further development plans

The practitioners' guidelines to collaborate with social media influencers will be available in the BuilDERS project website for two years after the project has ended (i.e. till summer 2024). We will also share them via EU's Horizon Results Platform. The dissemination activities aim at:

a) Raising awareness of the related policy recommendations that emphasize the need to collaborate with social media influencers in order make risk and crisis communication accessible
b) Seeking collaborative partnerships and funding for the further development and digitalization of the guidelines
c) Seeking collaborative partnerships and funding for designing secure digital environments to store and manage personal data

5.4. Sustainability through future scientific papers, special issues, book projects and supporting young researchers

The scientific results from various work packages are also presented in several papers, which are published, in review or soon to be submitted. These are resulting from surveys, interviews and research within the project, and several chapters in the present deliverable are based on these papers. They will continue to provide valuable resources for the researchers in this field and reach out to broader audiences even as the project comes to an end.

The papers go deeper into specific themes, and include multivariate analyses. These papers are:

Orru, K. et al (2021) Resilience in care organisations: challenges in maintaining support for vulnerable people in Europe during COVID-19 pandemic, published in Disasters, https://doi.org/10.1111/disa.12526

Nero K. et al (under preparation) Mechanisms behind COVID-19 scepticism among marginalised groups in Europe, to be submitted to Risk Research

Orru, K. et al (under preparation) Material impacts of the pandemic on the marginalised: COVID-19 as the final push to health-poverty trap?

Olson, A. et al (under review) The Impact of COVID-19 on Migrant and Refugee Populations in Europe: Insights from 13 Countries, under review in Journal of Migration and Health

Olson et al (under preparation) The Impact of the Covid-19 Pandemic on Material and Mental Health Outcomes Among Socially Marginalised Women: Insights from Thirteen European Countries

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Nævestad, T.-O. et al (under review) Self-inflicted social isolation among clients of social care organisations in the COVID-19 Pandemic, under review in the International Journal of Disaster Risk Reduction

Nævestad, T.-O. et al (under review) Psychological impacts for socially marginalised groups in the COVID-19 Pandemic: A Study from European countries, under review in PLOS-ONE

Nævestad T.-O. et al (under preparation) Protective measures among socially marginalised people during COVID-19: Examining the influence of gender and homelessness on washing

Nahkur, O., Orru, K., Hansson, S., Jukarainen, P. Krüger, M., Max, M., Savadori, L., Nævestad, T.-O., Meyer, S. F., Schieffelers, A., Olson, A., Lovasz, G., Rhinard, M. (under review) "The engagement of informal volunteers in disaster management in Europe". in Journal of Disaster Risk Reduction

Torpan, S., Hansson , S., Orru, K., Jukarainen, P., Gabel, F., Savadori, L., Meyer S.F., Schieffelers, A., Olson, A., Lovasz, G., Rhinard, M. (under review). "Mitigating vulnerabilities with social media: a cross-national comparative study of European emergency managers' practices." in Disasters

K. Orru, M. Klaos, K. Nero, F. Gabel, S. Hansson, T.-O. Naevestad (under review) "Imagining and assessing future risks: A dynamic scenario-based social vulnerability analysis tool for disaster planning and response" in Journal of Contingencies and Crisis Management

Tominga, A., Silm, S., Võik, E-J., Klaos, M., Orru, K. (under review). Using Mobile positioning based population statistics in crisis management. in Journal of Contingencies and Crisis Management

Researchers Kati Orru and Tor-Olav Nævestad are also planning a to act as guest editors to develop a special issue presenting WP3 BuildERS results in the International Journal of Disaster Risk Reduction. The preliminary title of the special issue is: "Falling through the safety nets? The disaster experiences of the most marginalised in Europe". The current status is that the Editor in Chief is positive, and that a plan for the special issue is being developed. Other researchers (e.g. from DRS01 projects) have been contacted, and are positive to contribute. The mentioned researchers will also develop a book project presenting BuildERS results.

BuildERS had also been supporting the growth of young crisis researchers, thus ensuring that the effect of the project continues through strong academic potential. At University of Tartu, 3 PhD students and 4 Master students have been engaged in the project, doing their studies based on BuildERS materials and developing it further.

PhD students are as follows:

Kristi Nero "Coping and institutional support in crisis: experiences of the marginalised and homeless in Europe" supervisors Kati Orru (UTA), Tor-Olav Naevestad (TOI). to be defending PhD in 2024

Sten Torpan "Tools in support of overcoming communicative vulnerabilities in crisis management", sup Kati Orru, Sten Hansson (UTA). To be defending PhD in 2023

Ago Tominga "Using Mobile positioning based population statistics in crisis management" sup Siiri Silm (UTA). Defending in 2025

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6. SUSTAINABILITY THROUGH NETWORK BUILDING

A large part of BuildERS's sustainability perspective relies on consortium members' integration, adaptation and application of experience gained through the project. In this, the focus has been on building live and dynamic communities and networks within the organizations as well as in national and international contexts, for instance through European regions. The experience with BuildERS's communities has been serving as an important prototype for consortium members on how to establish and maintain generative and sustainable networks and communities of security practitioners which may simultaneously offer a platform for individual development and collectively result in creative and innovative solutions and possibilities extending beyond individual capacity. This work will in large part rely on creatively utilizing different modes of communication in engaging a wide variety of stakeholders.

In BuildERS, network and network building are considered in their broadest sense, as formal and informal interactions with individuals, groups, institutions, stakeholders outside the BuildERS consortium both through stable and ad hoc initiatives aimed at information sharing, knowledge transfer, development of new arenas for knowledge exchange and dissemination.

During the three years of BuildERS, the members of the consortium were able to engage with a wide variety of stakeholders, from academia to emergency organisations, from public agencies providing emergency services to public institutions, at local, national and international level. This engagement happened despite of the limits determined by the pandemic, which did not allow face-to-face meetings most of the times, but mainly on-line meetings, either via ZOOM or TEAMS. The members of the consortium were all aware of the positive aspects of face-to-face meetings: they allow better communication, off the record, more personal treatment and greater concentration compared to sitting and interacting in front of a screen, also for a full day of work. Virtual meetings were sometimes subject to technical failures and were more rigid and systematic. However, at the same time, they provide BuildERS with a wider audience, perhaps imaginable in face-to-face meetings.

Here, we present a series of these networks, divided according to the following categories: level of network (international, national, local), how BuildERS communicated with the network, the main output(s) BuildERS received from the network and the added values for BuildERS to involve or to be involved in the network.

Table 4: Sustainability through network building

NETWORK	LEVEL	COMMUNICATION	MAIN OUTPUTS	ADDED VALUE
DRS01 Cluster Established at the beginning of the BuildERS project in collaboration with H2020-DRS-01 Research Cluster (Disaster	International	Monthly meetings	EFDRR 24 November 2021 session on Strengthening disaster risk governance at local level: enhancing information exchanges through new technologies and assessment models The BuildERS project presented findings on Engaging the vulnerable in disaster management. The session was followed by 40 participants from academia and	Information sharing with other DRS01 projects Collaboration on common research topics Common initiatives to spread findings

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Resilience Societies).			stakeholders and organisations from across the globe. https://efdrr.undrr.org/strengthening-disaster-risk-governance-local-level-enhancing-information-exchanges-through-new Workshop presenting the BuildERS ethics framework and giving advice regarding how to incorporate ethics in other DRS01 projects	
Risk Perception & Behaviour network **Risk-SoS**	International	Monthly meetings with the DRS01 cluster projects which joined this network	Hybrid conference/workshop in Berlin 13-14 June 2022 Production of a joint Atlas DRS01 & Risk-SoS to summarise our efforts and case studies Survey of Surveyors Risk-SoS	Decrease the fragmentation of the research in risk perceptions and behaviours to cross-validate the results of the current collection of independent case studies. This should enable comparability and transferability across scales and contexts, and facilitate giving meaningful recommendations for policy and risk management
CMINE Crisis Management Innovation Network Europe	International	Meetings Posts on BuildERS activities	The DRS01 Cluster Participation in events facilitated by CMINE	Information sharing Updates on relevant activities for BuildERS
Society for Risk Analysis	International	Yearly Conference participation	BuildERS panel	Dissemination
ECPR European Consortium for Political Research	International	Yearly Conference participation	BuildERS panel	Dissemination
NEEDS **The Northern European Conference on Emergency and Disaster Studies**	International	Yearly Conference participation	BuildERS papers	Dissemination
The Salvation Army's Network in Europe	International	E-mails, workshops, qualitative survey with practitioners of care organisations	Resilience in Social Care organisations publication Policy recommendations	Sharing of experiences Understanding of how disasters impact social care organisations
European Union Agency for Law Enforcement	International	Meetings with the e-learning representatives	Pilot course for the practitioners to be launched in Spring 2022	Use of BuildERS results from on D1.4, D2.3, D4.1 and D6.6 to prepare the training

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Training (CEPOL)		and national contact points	Online training course for self-learning in English and French on CEPOL's learning platform LEEd	Dissemination on social interaction and communication with people in vulnerable situations and of first - responders' personal resilience and coping with challenging situations
ENBEL project (enbel-project.eu) **2020 - 2023**	International	Weekly communication with the project leaders and partners to facilitate collaboration across the representatives of research projects related climate and health where BuildERS is included	Workshops on climate change and health effects Consortium works towards establishing Belmont Forum Conference on Climate Change and Health	Findings from BuildERS (mainly WP1 – WP4) spread in the project
Creeping Crises Network	International	Hybrid events Email interaction	Major kick-off conference in October 2021 in Leiden, NL; Email group list for sharing opportunities and events	BuildERS findings provide input to discussion and offer outlet for group's work Possible Horizon Europe applications
Task Team of the UN Committee of Experts on Big Data and Data Science for Official Statistics – subgroup on disaster management statistics	International	Mailing List Online/Offline meetings	Finalized handbook on the use of mobile phone data for disaster management statistics	Proof of concept on the use of data for disaster preparedness Possible contribution to other areas of the disaster management cycle besides response and recovery
SPREAD project	National (Norway)	Project financed by the Norwegian Research Council, to spread BuildERS results	Seminar 06.10.21 at the University of Stavanger on BuildERS findings. Four additional seminars will be held in August 2022	Dissemination
Estonian authorities involved in crisis management: e.g. Rescue Board, Government Office, Ministry of Social Affairs,	National (Estonia)	Repeated contact points as informants in ongoing research Partcipation in validation of BuildERS results	Validation meetings (May 2021, August, 2021, September 2021) Meeting for planning further collaboration (January 2022)	Information sources Validation feedback Dialogue science-authorities

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Information System Authority, local governments etc				
Networks with journalists	National (Estonia)	Meetings to present BuildERS findings LSE blog COVID-19 blog	Contact with journalists	Dissemination
German Red Cross	National (Germany)	Internal Publication	Presenting the results and recommendations derived from BuildERS to people working and being active in disaster relief efforts	Dissemination Spreading key insights gained through the German Case study
Swedish MSB-funded 'cascading crises' project network	National (Sweden)	Hybrid events Email interaction	Regular meetings (both hybrid and physical)	Encourages further interaction of BuildERS participants (SU, SEI). Helps cross-fertilization of research results. Facilitates access to Swedish practitioner community.
Indonesian Ministry of Tourism and Creative Economy (MoTCE)	National (Indonesia)	Email Focus group Discussion via Zoom	Deliverable 4.6 (Validation on Mobile Positioning Data - MPD)	Additional inputs regarding other possible case studies for MPD. For example, crowd monitoring in tourists' locations.
Indonesian Ministry of Foreign Affairs and Indonesian National Board for Disaster Management (BNPB)	National (Indonesia)	Email Focus group Discussion via Zoom	Deliverable 4.6 (Validation on Mobile Positioning Data - MPD)	Information on their existing dashboard for foreign nationals' emergency assistance and potential integration
NGO Yayasan Peta Bencana	National (Indonesia)	Email Focus group Discussion via Zoom	Deliverable 4.6 (Validation on Mobile Positioning Data - MPD)	Information on the existing disaster map provided by Peta Bencana based on Social Media data, and the integration potentials between Peta Bencana and MPD Possibility to integrate mobile positioning data with other data sources (i.e. social media data)
Meteorology Climatology, and Geophysical Agency	National (Indonesia)	Email Focus group Discussion via Zoom	SaveMyLife Application	Providing disaster data and notifications Disaster data and notification could be included in the MPD

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				Dashboard and SaveMyLife app
Indonesian National Board for Disaster Management (BNPB)	National (Indonesia)	Email and Focus Group Discussion via Zoom	Deliverable 4.6 (Validation on Mobile Positioning Data - MPD)	Providing insight on current disaster management process, personnel allocation. Helping in determining the vulnerable groups Disaster preparedness and resilience could be improved using a fuzzy logic and decision tree method
Stakeholders in crisis management and stakeholders from social service providers	Local (Germany)	Qualitative interviews spreading of the factsheet	Information gathering	Contributions to the understanding of the situational nature of vulnerability in disasters, spreading awareness for people involved in crisis management
Citizen of the metropolitan area of Dresden	Local (Germany)	Online survey	Carrying out an online survey for the German Case Study and by doing so informing the participant about the existence of the project to at least 118 participants	Spreading awareness of BuildERS project to the general population and collecting valuable data for the German Case Study

As stated above, some of the networks were instrumental for the implementation and development of BuildERS during its three years of existence. For instance, the local networks established in Germany by the partners EKUT and GRD were relevant for fulfilling the tasks of BuildERS.

Other networks, on the contrary, deserve to be sustained after the end of BuildERS and here BuildERS partners need to find concrete solutions on how make this possible. For instance, the Swedish MSB-funded 'cascading crises' project network allows BuildERS partners to cooperate beyond the lifetime of BuildERS. This means that the two BuildERS partners involved - SEI And US – can feed that project with BuildERS' findings. The same is said for the ENBEL project, where UTA is involved as partner. Or SPREAD, where UiS and TØI are partners. Research collaborations on potential papers has also been established between individual and groups of researchers directly involved in BuilDERS, which will continue for the foreseeable future.

In the DRS-01 cluster BuildERS results stay alive, hopefully, thanks to the established platform inside CMINE and get visibility within the new and ongoing DRS01 projects. All the BuildERS partners are members of CMINE, which provides tools and environment for collaboration within DRS01 community and beyond. In addition, CERIS can continue to be a good venue to present BuildERS findings and potentially affect the future funding on similar issues.

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7. SUSTAINABILITY THROUGH FORMULATION OF POLICY RECOMMENDATIONS

In this chapter, we reflect on how the policy recommendations developed by BuildERS will contribute to the sustainability of the project and its aims. In particular, we focus on how the policy recommendations can contribute to long-lasting positive impacts on society.

Each of the case studies, as well as the WP6 stakeholder workshops, yielded insights about the kinds of policies that could be implemented to achieve BuildERS' aims. Based on these insights, policy recommendations have been formulated by WP5 in order to ensure that BuildERS findings are translated into outcomes that are relevant and easily accessible for policy makers and civil society. The policy recommendations are aimed at three different governance levels: local, national, and EU. These policy recommendations are put forth in two separate reports: D5.2 on Innovation Policy Recommendations, and D5.3 on Resilience Policy Recommendations[10]. In broad strokes, the aim of these policy recommendations is to improve the effectiveness of existing efforts to reduce vulnerabilities, build social capital, and enhance risk awareness. Thus, the direct target group is policy makers at the local, national, and EU-level. However, the end goal is for the policies to be implemented in order to help the indirect target groups of:

- People in vulnerable situations
- Intermediaries of people in vulnerable situations
- First responders
- Practitioners responsible of disaster risk assessment, preparedness and contingency planning
- Experts in the fields of risk and crisis communication, disaster management, and civil protection
- Teachers and trainers of safety and security
- Academic communities and RDI-networks
- Technology developers (of data analytics, mobile positioning, crowdsourcing, unmanned aerial vehicles, satellite imaging, mobile applications)

The D5.2 report on Innovation Policy Recommendations includes specific recommendations for policies that can encourage the effective use of BuildERS innovations. The report concludes with some general guidance for formulating innovation policies at the national- and EU-level. The D5.3 report on Resilience Policy Recommendations offers concrete suggestions for improving the resilience of European communities in the face of disaster. These recommendations are sorted into three main categories: decreasing vulnerabilities, strengthening social capital, and improving risk awareness. These two reports complement each other. For instance, the D5.3 report recommends policies to improve and standardise the implementation of regular vulnerability assessments in order to gather data that can inform more effective disaster management; and D5.2 recommends that agencies use the BuildERS Vulnerability Assessment Tool in collaboration with intermediaries and representatives of vulnerable groups. The full reports will available on the BuildERS website after submission.

[10] We also published a Draft Report on Policy Recommendations in D5.1, which served as the basis for both D5.2 on Innovation Policy Recommendations and D5.3 on Resilience Policy Recommendations. From a long-term perspective, the Draft Report is not expected to have much of an impact, whereas D5.2 and D5.3 offer clear, concrete, and actionable recommendations.

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In order to develop the policy recommendations, WP5 analysed all of the BuildERS' findings (including deliverables and academic publications) and identified the clearly actionable items. The innovations on which the D5.2 recommendations are based have been validated with practitioners in WP6 workshops. These validation and co-creation workshops started an important dialogue and learning process between the BuildERS researchers and other relevant stakeholders, such as first responders and personnel of disaster management agencies.

To ensure the usefulness, clarity, and feasibility of the resilience policy recommendations in D5.3, WP5 has undertaken several rounds of validation with policy-relevant practitioners, as well as with the BuildERS advisory board. This validation process has included organizing workshops and participation in conferences (both scholarly and practitioner-oriented events including the Crisis Management Innovation Network Europe, C-MINE). These events have started a deeper discussion about the importance and relevance of BuildERS findings for practice and policy; a discussion we hope to continue fostering. A final round of validation for the resilience policy recommendations with policy makers and practitioners at different governance levels is planned for March 2022, before finalising the D5.3 report.

Furthermore, in order to facilitate dissemination, key recommendations will be condensed into 1-page policy briefs, which will link to the full reports. Geonardo will help make the design of the briefs as accessible and appealing as possible. These policy briefs will be presented for more feedback at upcoming events, including the DRS (Disaster Risk Societies)-01 Cluster meeting, the CERIS workshop, and the BuildERS final conference. The aim of presenting the recommendations at these events is two-fold: 1) to get valuable feedback and improve the recommendations, and 2) to ensure that they are brought into larger discussions about resilience and disaster management, and hopefully implemented by policy makers at the local, national, and EU-level.

The policy briefs can also serve as a quick reference to be disseminated among stakeholders and policy-makers both during the project through active dissemination, and after the project ends, via the BuildERS partners' mailing lists and the official website, which will continue to be maintained. These policy briefs and the full reports will remain available both on the project website as well as on even longer-lasting websites such as the C-MINE collective and EU-project archive website (CORDIS). Lastly, we plan on submitting the policy briefs to a variety of relevant websites that might be interested in hosting and disseminating this content, such as the UN Office for Disaster Risk Reduction's websites: PreventionWeb.net and eird.org.

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8. RISK ASSESMENT

A risk is any area of uncertainty that represents a threat or an opportunity to the project. To manage and mitigate risks, there is a need to identify them, assess their likelihood, and estimate the potential; impact they might have on the project. The identification and consideration of risks is an integral part of project management.

BuildERS has encountered many risks and barriers during the implementation, however, most of them were mitigated through adjustment of activities and cooperation between partners. The final results that are created have been in line with the project objectives and the largest risks related to the sudden pandemic emergence and haltering some of the research and dissemination activities, have been bridged.

8.1. The Risk Management Process

The process of risk management applied in BuildERS is set out below.

1. Risk identification – Risks should be directly related to the project objectives and agreed upon by the whole project consortium. Risk management means identifying and managing uncertainties to delivery of objectives, not managing issues that might be constant.
2. Risk evaluation – Key questions which were considered are: what is the impact of each risk should it occur? What impact might they have on benefits, time, cost, quality, reputation, people, etc. How likely is it that these risks will occur? The probability and impact of risks can be scored using scales (e.g. High/Medium/Low).
3. Risk prioritisation - Key questions which were considered are: what is the priority of each risk? The urgency and importance of a risk is not the same thing - deal with the urgent risks quickly, deal with the important risks comprehensively.
4. Risk management planning - A strategy was developed for mitigating the risks identified and preventing the project from being derailed. It considered questions of: What actions and resources will be needed to reduce the impact and/or probability of the risk happening?

   It also considered:
   a) how to prevent a risk from being realised, either by putting some counter-measures in place or putting the project in a position where it would have no impact;
   b) how to reduce the risk and the action needed to reduce the probability of the risk happening and/or to reduce the impact if it does occur;
   c) checking if the risk be transferred to a third party (e.g. take out insurance) or share it in some way (shared risk-shared gain);
   d) what to do to if the risk occurs and whether there is a contingency plan;
   e) the implications of accepting the risk, ensuring that all the stakeholders are aware of the possible consequences.
5. Risk monitoring - The overall exposure of BuildERS to risk was reviewed throughout its life and where necessary actions to mitigate risks were changed or revisions to the project business case or assumptions considered, if circumstances had altered.

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8.1.1. Risk Identification and Risk Assessment

There are various risks that could have affected the success and exploitation of project results. They have been defined at the proposal stage as such:

a) Failure to collect or access good quality data;
b) Failure to engage respondents;
c) Failure to deliver outputs or meaningful results;
d) Failure to engage stakeholders adequately;
e) Partners leaving the consortium.

Table 5: Impact Assignment

Consequences (impact)	Assignment	Note
1	Insignificant	Minor problems easily handled by normal day to day processes.
2	Minor	Some disruption or modification of correct execution possible.
3	Moderate	Moderate modification on the correct execution and results.
4	Major	Results severely affected.
5	Catastrophic	Results are under crucial risk not to execute or of heavy delay.

Table 6: Likelihood assignment

Likelihood (score)	Description (value)
1	Rare
2	Unlikely
3	Moderate
4	Likely
5	Almost certain

At the beginning of the project implementation, all the above mentioned risks have been assessed as “low risk” (low impact assignment and low likelihood assignment as seen in tables above) as the project started before the global pandemic. However, as the circumstances changed, several of these risks became likely or almost certain.

Failure to engage respondents was due to the fact that several vulnerable groups were not reachable for the planned interviews. The project, however, adjusted – analyzing the effects of the current situation on the most vulnerable, the project took a new course while maintaining its objectives. Resilience in the situation of the pandemic and all the connecting issues became more relevant and instead of lowering the expectations from the project results, the new and adjusted activities brought about pertinent and topical outputs.

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Engagement of stakeholders was significantly affected for several reasons, the main ones being:

a. first responders as the main target group were engaged primarily in the pandemic relief efforts thus reaching out to them became more difficult;
b. largest European events gathering target groups relevant in disaster resilience were canceled or postponed;
c. gathering for co-creation events in the same space became either difficult or impossible.

The efforts to engage stakeholders were re-shaped compared to the initial stages of project implementation. Namely, online presence of the project was enhanced and many activities were adjusted to the digital format. Questionnaires, virtual meetings and Howspace were introduced as new models of engagement and they resulted in quality feedback that did not affect the co-creation approach in BuildERS.

As for the dissemination and promotion materials, they were produced in a digital format and each of the nine innovations is promoted through a specific visual to increase visibility of the results on social media and better explain sometimes complex structure of the result, making it simpler and more interesting for the target groups, as well as wider audiences.

Overall, the project partners responded to the major risks as planned above – prioritizing, monitoring and managing the major risks and in some cases even barriers that occurred during the implementation.

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9. CONCLUSIONS

The aim of this deliverable is to present the Sustainability plan for the BuildERS project results aiming at maximising their scientific, social, technological and policy value. The Sustainability Report sets out the approaches to maximise the impacts of project results, and their promotion, for the creation of project legacy.

The sustainability strategy was regularly taken into consideration throughout the project to ensure dynamic and successful applicability of project results, to guarantee protection and avoid infringement of Intellectual Property Rights, and to mitigate risks that could endanger the sustainability of the results.

In the extensive co-creation processes and validations with stakeholders, the BuildERS partners have made sure that the results are relevant for the target groups. All of the project partners are also involved in dissemination, communication and sustainability to increase awareness of the project and topics associated, enhancing social capital, collaboration and synergies, and to share findings for the creation of impacts. Fostering awareness and transferring results for impact were the tasks performed not only in the countries, communities and sectors of the BuildERS partners, but through the co-creation and validation also in other countries that are otherwise not represented in the consortium, making the results not only widely visible, but also relevant on a wide scale.

The sustainability plan draws upon the experience of partners in the creation of impact for policy (Stockholm University), understanding practitioners' needs and co-creating with them (POLIISI), engaging stakeholders (TOI), risk management and societal safety and networking (UiS), increasing communal resilience (VTT), dissemination and uptake of project results (GEO), etc.

Key BuildERS results and Sustainability Plan provide shared efforts of project partners on maximising the benefits of the research findings to lever further funding (e.g. in Horizon Europe), and long-term engagement with actors at EU and case study levels.

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