RESILOC

RESILOC *Resilient Europe and Societies by Innovating Local Communities*			
Grant Agreement No.		833671	
Start date	01.06.2019	**End date**	31.05.2022

D2.8 – Building Resilient Communities – the Study Phase

Due date of deliverable: 10/11/2020

Submission date: 20/11/2020

RESILOC Consortium

Revision	Organization & Person	Date
Written by	IES, Uberto Delprato	18/11/2020
Checked and approved by	FhG, Karsten Uhing	20/11/2020
Validated and released by	FhG, Harald Sieke	20/11/2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 833671

I. Deliverable Information

Deliverable Number	D2.8
Work Package	WP 2
Date of Issue	20/11/2020
Version Number	V2.0
Nature of Deliverable	Report
Dissemination Level (PU / RE / CO)	PU

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Keywords	Comparative analysis, Resilience, Local Communities

Abstract

This report represents a summary of the research activities carried out in WP2 ("Comparative analysis of resilience in societies and communities") of the RESILOC project and describes what Work Package has been designed to achieve and which results have been achieved.
It is a deliverable originally not foreseen in the RESILOC Grant Agreement and it has been prepared further to the results of the First annual Project Review of 1st July 2020.
The document moves from the rationale of WP2 in the framework of the RESILOC project and defines the role of users in RESILOC. The challenges and the expectations are summarised describing the expected results, along with the organisation of the WP activities, highlighting the connection between them and how their results contribute to the overall results of the Work Package.
A summary of the activities carried out in each task is reported, along with conclusions and recommendations. The results of the tasks are also presented in comparison with the work to be carried out in the downstream WPs.
Finally, conclusions and recommendations from WP2 are reported, highlighting the identified challenges for the future implementation of the project, both in terms of research and for the implementation and demonstration of the RESILOC platform.

Disclosure Statement:

II. Document History

Date	Version	Modified by (first name, name, organization)	Remarks
20/08/2020	0.1	Uberto Delprato, IES	Structure for approval
15/09/2020	0.2	Uberto Delprato, IES	First Content
12/10/2020	0.3	Uberto Delprato, IES	1st release for internal review
26/10/2020	0.4	Uberto Delprato, IES	2nd release for internal review
02/11/2020	0.5	Uberto Delprato, IES	3rd release for internal review
09/11/2020	0.6	Uberto Delprato, IES	4th release for internal review
10/11/2020	0.7	Uberto Delprato, IES	5th release for quality review
11/11/2020	0.8	Uberto Delprato, IES	6th release for QA
16/11/2020	1.1	Uberto Delprato, IES Daniele Del Bianco, Ramona Velea, ISIG	Substantial reworking of the document structure
18/11/2020	1.2	Uberto Delprato, IES	7th release for internal review
19/11/2020	1.3	Uberto Delprato, IES	8th release for internal review
19/11/2020	1.4	Joe Cullen, Thomas Spielhofer, Kerstin Junge, TIHR	Enriched and proofread version
20/11/2020	1.5	Vassilis Papataxiarhis, NKUA	QA
20/11/2020	2.0	Uberto Delprato, IES	Final version for submission

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VI. List of Acronyms

Acronym	Meaning
ACID	Atomicity Consistency Isolation Durability
API	Application Programming Interface
BLE/BLL	Bluetooth Low Energy/Blue Light Link
BRIC	Baseline Resilience Indicators for Communities
CMINE	Crisis Management Innovation Network Europe
CP	Civil Protection
CSO	Civil Society Organization
DB	Database
DBMS	Database management system
DFID	Department for International Development (UK)
DRR	Disaster Risk Reduction
Dx.y	Deliverable x.y
EES	End-User Engagement Strategy
EU	European Union
GDPR	General Data Protection Regulation
IoT	Internet of Things
ISO	International Organization for Standardization
ISTAT	Italian National Institute of Statistics
JSON	JavaScript Object Notation
LA	Local Authority
LAU	Local Administrative Unit
LC	Local Community
LRT	Local Resilience Teams
LULC	Land Use and Land Cover
M&E	Monitoring and Evaluation
NERAG	National Emergency Risk Assessment Guidelines
NoSQL	Non-SQL
NRA	National Risk Assessment
NUTS	Nomenclature of Territorial Units for Statistics
PR	Practitioners' Representative
R&I	Research and Innovation

RDBMS	Relational Database Management System.
RECVI	RESILOC Community Vulnerability Index
SC	Scientific Coordinator
SDG	Sustainable Development Goals
SFE	Sensor Fusion Engine
SQL	Structured Query Language

The terminology used within this report is defined within the Base and Project Glossaries[1]. The terms and phrases used within this document have the meanings described by the glossary unless explicitly described otherwise in the relevant text.

[1] https://www.resilocproject.eu/publication/

Executive Summary

This Deliverable D2.8 presents the overall summary results of WP2, drawing on the findings from Tasks 2.1 to 2.6, and draws out key conclusions relating to the development of the RESILOC tools. It was not originally foreseen in the RESILOC Grant Agreement but has been prepared to meet the requirement identified in the first annual Project Review of 1st July 2020.

The RESILOC project is being implemented in a global context where the concept of resilience is now used widely in often quite different contexts. This speaks to a shift from traditional risk management and purely technical approaches towards a more positive concept of resilience as a strategic approach to be integrated with developmental goals representing a pro-active and essentially positive societal response to adversity. A number of prominent policies, strategies and initiatives exist, but it is the Sendai Framework for Disaster Risk Reduction 2015-2030 that represents a transition from understanding the interactions between hazard, exposure and vulnerability to a greater concern with how to act upon these risk factors through prospective, corrective and compensatory measures.

This study phase of the project has highlighted the complexity of the concept of resilience and has developed a definition of resilience of relevance to communities:

“Community resilience refers to the capacities of local communities as complex systems (involving the actions and interactions of local agencies, citizens, the built environment and critical infrastructures) to mitigate, withstand, and recover from the impacts of a disaster or emergency, as well as to adapt or transform themselves to be less vulnerable to future disasters or emergencies”.

RESILOC aims to support local communities to increase their resilience by developing a set of tools (the inventory, cloud platform, App, and potentially other support tools) to help them assess their resilience across up to 7 dimensions – building on a combination of proxies and indicators. These are seen predominantly as strategic tools for assessment and planning, with the aim of increasing resilience in local communities, and focus on supporting the ‘mitigation’ and ‘preparedness’ phases of Disaster Risk Management.

WP2 has helped to explore how to define relevant proxies and indicators via an analysis of existing data collected from project communities relating to exposed values, vulnerability, and hazard scenarios; and by exploring how to assess in terms of proxies and indicators those aspects of communities, relating to adaptive behaviour and risk perception. Further work will need to be carried out in WP3 to combine existing and new proxies and indicators into a new set of resilience dimensions.

The results of the first year of studies on resilience as part of WP2 have confirmed that using a set of pre-defined rules or algorithms to calculate a value of resilience will not by itself be sufficient to provide a definitive and absolute measurement of resilience. Even more sophisticated approaches involving machine learning do not guarantee success given the large number of proxies and indicators needed for a credible resilience assessment and the complex nature of communities faced by different hazards. This is not unexpected and simply confirms the complex nature of assessing community resilience. Therefore, the RESILOC project views resilience as a process – that evolves over time depending on many underlying and contextual factors.

This has led to a focus on comparing the resilience of a community over time, as a result of specific actions, events, or other developments – to determine a relative change in resilience using resilience ‘snapshots’. So rather than calculating quantitative change, this approach

relies on deriving qualitative information about the direction of the change in resilience (increase, decrease) and the intensity of the change (low, medium, high).

As a result, the RESILOC tools should not be limited by pre-determined weights or data combinations but should instead be adapted to the specific context of local communities and different hazards. This needs to be addressed by allowing community experts and representatives, via the LRTs to indicate their agreement with the weight, vector and relative importance of each proxy and indicator also taking into consideration specific risks.

The described approach confirms the RESILOC cloud platform as a system to be used during the preparedness phase. Dynamic data collection tools, such as sensors, social media, the RESILOC App and other crowdsensing solutions can however be used during real or simulated events (as part of field trials) to collect data on the relationship, for example, between risk perception, adaptive behaviour and resilience. This is of great relevance for RESILOC, given the complexity of linking personal behaviours with resilience.

Finally, while WP2 has already identified many proxies and indicators that can be used to assess resilience in communities, more work needs to be done in WP3 to define and validate the 7 resilience dimensions and the combination of proxies and indicators that can be used to assess them for different hazards. This will need to be explored through a review of other resilience frameworks and through further engagement with end users to ensure they are fully involved in the co-design of the RESILOC tools. It will require the active involvement of all identified users, including community leaders, practitioners, experts and citizens, to ensure that the tools are relevant and tailored to their needs and that any implemented actions genuinely increase resilience in their communities.

Guidance to the reader

The document has been designed to be a compact description of the results of a complex work of study and synthesis, that have involved all the RESILOC partners for more than one year. It is organised in seven sections, where the reader will find all the main information about the achievements of the Work Package, along with the key findings that will be used in the future work of the project.

Section 1 (Introduction) offers a brief presentation of the project and the context where it has been developing. In addition to the project objectives, this section clarifies the groups of **users** targeted by the project and the intended **use** of the RESILOC tools within the DRR cycle.

Section 2 (Comparative Analysis of Resilience in Societies and Communities – the contribution of WP2 to RESILOC) clarifies the context in which RESILOC plans to bring added value with its **approach to resilience**. The relationship between 'perceived risk', 'preparedness', 'vulnerability' and 'resilience' is the core area of research and one of the toughest challenges faced by the project.

Section 3 (RESILOC end users: a co-production process) reports on the extensive effort the project put in **engaging with users** as part of WP2. It describes the strategy devised and adopted by RESILOC in approaching the project users for collecting inputs, needs and information that are of the highest importance for the definition of the project concrete targets. The interactions with the communities were developed along some specific lines of investigation, including:

- the collection of **inputs for the scenarios** where our users would like to use the RESILOC tools;
- the identification of their understanding of resilience;
- their **expectations** from the future RESILOC tools;
- the actual **availability of data** and resources for the assessment of resilience.

Section 4 (The RESILOC Scenarios) reports on the **co-creation process** for defining the **scenarios** the project will target for the trials. This activity brought clarifications about **the type of events** the users are ready to use the RESILOC tools for. The **implications** of these inputs on the design and development of the final products of the project are briefly reported.

Section 5 (RESILOC Research activities in WP2) is a compact compilation of the **results** from the project tasks, centred more on the interconnections between them than on the methods used to achieve them. A discussion of **synergies, contradictions and challenges** can also be found in this section, that represents a synopsis of WP2.

Section 6 (Conclusions and recommendations) wraps up the document and highlights the **added value** of WP2 in the context of the RESILOC project. **Recommendations** to the downstream Work Packages of the project, along with the limitations to take care of and critical issues to consider for the implementation of the platform, conclude this deliverable.

The list of documents in the Appendix include:

- Appendix II.: End-User Engagement Strategy
- Appendix III.: EES – Implementation of Phase 1 Report: Interviews with Project Local Communities
- Appendix IV.: Semantic Analysis

1 Introduction

RESILOC is a Research and Innovation project running under the Horizon 2020 Framework programme and specifically under the "Secure societies Protecting freedom and security of Europe and its citizens" line of the Work Programme. It addresses the topic: 'Human Factors, and social, societal and organisational aspects for disaster management'. The key expected impact of this topic is to produce recommendations and tools aimed at improving the adaptability and preparedness of societies to different disaster risks.

1.1 Brief presentation of the project

1.1.1 RESILOC in the context of resilience research and practice

The RESILOC project is being implemented in a global context where the concept of resilience is now widely spread and used, among others as a vehicle to apply the results of the disaster management cycle to increase resilience. This speaks to a shift from traditional risk management approaches that put vulnerability into focus and from purely technical approaches to application of deeper understanding of the conditions associated with human actions, economic and environmental change and needs related to institutional capacity building.

A number of prominent policies, strategies and initiatives exist (e.g. the City Resilience Framework, the UNDDR Making Cities Resilient Global Campaign, the Global Strategy for the European Union), but it is the **Sendai Framework for Disaster Risk Reduction 2015-2030** that leaves the largest footprint and represents a transition from understanding the interactions between hazard, exposure and vulnerability to a greater concern with how to act upon these risk factors through prospective, corrective and compensatory measures. Its transposition into actually implemented actions requires multi-level governance systems supported with open, interactive and inclusive platforms in place, which according to our observation, are still under development in many countries. Thus, supporting the application of the policy framework with innovative tools delivered at community level adds impetus.

A common theme across all of the current policy, practice and strategy initiatives, however, is a general cultural shift in perception of resilience, away from emphasizing vulnerability towards a more positive concept of resilience as a strategic approach to be integrated with development goals representing a pro-active and essentially positive societal response to adversity.

1.1.2 General objectives

In line with this H2020 topic, challenge, scope and expected impact, the overall objective of RESILOC is to identify new strategies to better prepare communities against disasters and to better support European and international policies on resilience in societies.

1.1.3 Specific objectives

The specific objectives of the project are to:

1. Increase the understanding of resilience in societies and local communities – it does this through studies involving literature reviews, expert interviews, a survey of citizens and case studies, to add to the knowledge base on resilience;
2. Innovate on the strategies for improving resilience – it does this by using the results from Objective 1 to develop indicators to measure community resilience; designing an interactive tool for knowledge sharing and developing processes to engage citizens in the co-creation of the RESILOC tools;

3. Innovate on tools and solutions for improving on resilience in communities - it does this by developing two main software tools – an Inventory of information on resilience and a Cloud-based platform to support the utilisation of this information to create local projects that increase community resilience;
4. Communicate, demonstrate and assess the validity of approaches, solutions and tools in field trials - it does this by implementing field trials of the tools in four different locations;
5. Have an impact and define concrete steps towards a more resilient society - it does this through an integrated communication, dissemination and sustainability plan that includes production of scientific papers; participation in conferences; meetings and workshops with policy-makers and wide dissemination of recommendations for improving community resilience.

1.2 Target groups

The RESILOC user typology is summarised in the Table below. This uses 'persona modelling' to 'tell a story' about a target group. [2] [3] Persona modelling creates a representational profile of the RESILOC Toolkit users through 'semi-fictitious' (archetypal) constructions of their background, motivations for using the tools, how they envisage the tools working and the concerns and challenges that might need to be addressed in developing the Toolkit.

As the Table shows, the **primary users** of the RESILOC platform are local authorities, represented by policy makers and the technical services operating in the community.

First responders and emergency services ("practitioners") are the **secondary users** of the platform, in their capacity of feeding the system with live information and with lessons learned in the many scenarios they operate.

Citizens and the civil society are the **beneficiaries** of the platform, as a result of living in a more resilient community and from being more represented in the process for improving resilience. They are also intended to help feed the platform with 'dynamic' information, for example on their risk perception.

Local Resilience Teams (LRTs). LRTs represent the connecting link between administrations (authorities) and society (citizens and functional communities). They act as channels for the flow of information to and from the platform and as 'champions' for RESILOC by supporting the adoption of the RESILOC platform in their communities.

Within this overall typology, specific ***user roles*** are envisaged including:

- Local managers - individuals charged with assessing and improving the resilience of their community and responsible for populating the Inventory by entering indicator and proxy data relevant to their community
- Resilience experts – assigned by local managers to implement tasks like preparing and maintaining risk registers, undertaking risk assessments and defining and developing hazard scenarios
- Inventory administrators – tasked to carry out configuration, modification and system maintenance, as well as user editing and management of user profiles.

However, the "community" lies at the heart of the RESILOC project. All of the user groups described above have an instrumental role in ensuring that the RESILOC tools are used to

[2] https://www.usability.gov/how-to-and-tools/methods/personas.html

[3] Nielsen, L., & Storgaard, K. (2013). Personas - From poster to performance. In Proceedings of the Participatory Innovation Conference (pp. 272–275). Lahti, FI.

benefit the community. In RESILOC we make a distinction between the 'formal' and the 'functional' community:

- The 'formal' community is defined as the administrative environment in which a local authority operates. Within this environment, the project primary 'using users', such as local mayors and local managers, will have the official authority, role and resources to collect information and implement actions to improve resilience.
- The 'functional' community is defined as the local 'lifeworld' in which citizens carry out their everyday lives. Within this lifeworld, local communities will contribute information to the RESILOC platform; they will be the target for awareness campaigns; their voice will be represented in the platform and they will benefit from increased community resilience.

As noted above the relationship between the "using users" and the "benefitting users" is bridged by the **Local Resilience Teams** (LRTs). LRTs represent the live connecting link between administrations (authorities) and society (citizens and functional communities). They support a more inclusive and comprehensive representation of needs and data and demonstrate its value for the communities. LRTs are therefore fundamental **empowering actors** in RESILOC.

	Sofia: Policy-Maker	Erik: Technical services	Letitia: First Responder	**George: Citizen**
				
Background	I am the Chair of the Emergency Planning Authority in a small city in Northern Europe. My main responsibility is to co-ordinate the emergency services and other agencies responsible for civil protection.	I am Head of Data Analysis in the Department for Communications in a town located in the mountains. We run a cross-agency team, working closely with the Safety Authority to develop strategies and tools for raising awareness about community resilience.	I live in a small town. In my 'day' job I am a lawyer. I am also on call for 6 hours a week as a volunteer. I took a training course in CFR that covered emergency first aid, communication, and people skills.	I am a farm worker in a rural community in an 'earthquake zone'. I sometimes worry about where and when the next disaster is coming from. I sometimes use social media to find out what is going on
Motivations	I want an overview of the 'resilience health' of the city, so I can identify areas for improvement that feed into future strategic emergency planning	Citizens in our community do not know enough about the risks they need to think about and how they can mitigate them. Emergency services need to work more collaboratively to have a shared vision of the risks.	I want to expand my CFR and volunteering skills to be a more effective resource for my community. I am worried that people do not have the knowledge or tools to prepare for a disaster	I would like to help make my community safer, and I would like more information about possible threats, but I'm not really interested in volunteering or anything 'formal'.
How I see the RESILOC tools	I want a strategic tool for resilience assessment and planning. I need the tool to identify risk and vulnerability areas that can act as a catalyst to co-produce forward planning strategies with key stakeholders	I expect the RESILOC tools to help me and my team identify the key 'risk messages' that need to be transmitted to citizens and to help me and my team work more closely with agencies and citizens in emergency situations	I want a tool that can collect the knowledge and experience I have about emergency situations, add value to it and feed it back so it helps the community become less vulnerable and more resilient	I do not fully understand what RESILOC does. I think it might be useful to have a tool that collects information from citizens about what makes them feel less safe
Concerns and Challenges	My concern is whether the tools can cope with the diversity of the different communities that make up the city. Also, how could I learn from the experiences of cities similar to mine?	The biggest challenge is quantifying risk and then making a connection between risk and resilience. How do I weight the different elements that contribute to risk and resilience in my community?	My main concern is whether RESILOC will create ways to make it easy for people like me to make an effective contribution. The challenge is to support team-working	I am not sure how RESILOC will make me feel safer about possible future disasters or that it will help me make a useful contribution in an emergency situation.

Figure 1 - RESILOC users

1.3 Expected Results: a focus on RESILOC Tools

In a nutshell, RESILOC aims to increase the understanding of resilience in local communities and to produce strategic software tools that empower local actors to assess the resilience of their communities and identify actions to increase it.

To do this, RESILOC will develop a Toolkit that consists of four main components:

- The RESILOC Inventory – this can be described as a data 'shell' – or Repository – enriched with a set of services which store information on resilience that is provided by local community actors and classify data on the resilience of cities and local communities. The Inventory enables 'snapshots' of a community's resilience profile to be subsequently developed. In addition, during a disaster, the Inventory can collect 'dynamic' information that can later be used to re-assess the previously generated resilience profile. In this way, stakeholders will be able to analyse the impact of the crisis on the resilience of their community and identify possible new actions, choosing the most effective future intervention and communication strategy.
- The RESILOC Cloud platform – this can be described as a system that enables stakeholders to model and assess resilience for a city or a community, using the information from the Repository. This information is integrated and analysed to assess resilience along up to seven dimensions, combining the physical aspects (e.g. infrastructures) and social features (e.g. demographics) of a community with data on less tangible aspects associated with human behaviour and risk preparedness. The platform enables "what-if" scenarios to be developed so as to model which factors could decrease or increase resilience if they are changed. It includes a set of back-end services for data analysis, a set of GUIs for visualisation and other Software components
- Supplementary technical tools – these aim to supplement the core data collection functions of the Inventory and Cloud platform by enabling additional information to be collected through channels like citizen smartphone Apps, remote sensors and social media.
- Stakeholder support services – these aim to improve the effectiveness of the RESILOC strategic software tools through promoting 'bench-learning' between stakeholders, supporting community involvement and engagement in the resilience 'process' and providing guidelines and instruments for community-based data collection.

The RESILOC Toolkit can therefore be described as a "strategic tool" for assessment and planning with the aim of increasing resilience in local communities. Its main focus is on supporting the **'mitigation' and 'preparedness'** phases of Disaster Risk Management. It is also intended to be used in the 'response' phase – but not as a management tool. Instead, as noted above, the platform will enable the collection of information during a disaster which will then be used subsequently to re-assess a community's resilience profile and to explore potential improvements to future disaster management strategies.

The key results that lead to the development, implementation and pilot testing of the RESILOC Toolkit cover:

- A set of studies focusing on the relationships between risk perception, vulnerability, exposed values and resilience that feed into the specification of the Toolkit and, more broadly, add to the knowledge base on resilience

- A set of indicators to measure community resilience; a design specification for an interactive tool for knowledge sharing and a set of processes to engage citizens in the co-creation of the RESILOC tools

Following the development and implementation and pilot testing of the RESILOC Toolkit, the key results of the project are:

- A set of recommendations to improve community resilience that will allow policy-makers and policies to benefit from strategic foresight so as to better mitigate the vulnerabilities and strengthen the capacities and embrace the strategies of the Union Civil Protection Mechanism
- Communication, dissemination, standardisation and sustainability actions that include production of scientific papers; participation in conferences; meetings and workshops with policy-makers and wide dissemination of recommendations for improving community resilience.

The illustration below uses 'storyboarding' to develop a simplified visual story for the RESILOC Toolkit that summarises our current thinking on how the RESILOC Toolkit might work (Manzini et. al., 2009).[4] It will be used in future development work – particularly in WP 3 - to engage users as 'co-creators' of the RESILOC tools, using a 'design thinking' approach (Gobble, 2014).[5]

[4] Manzini, E. Jégou, F., Meroni, A. (2009). "Designing Oriented Scenarios" in Design for sustainability, a step by step approach. United Nations Environment Program (UNEP), Paris (http://www.d4s-sbs.org/MB.pdf).
[5] Gobble, M (2014) Design Thinking, Research-Technology Management, 57:3, 59-62

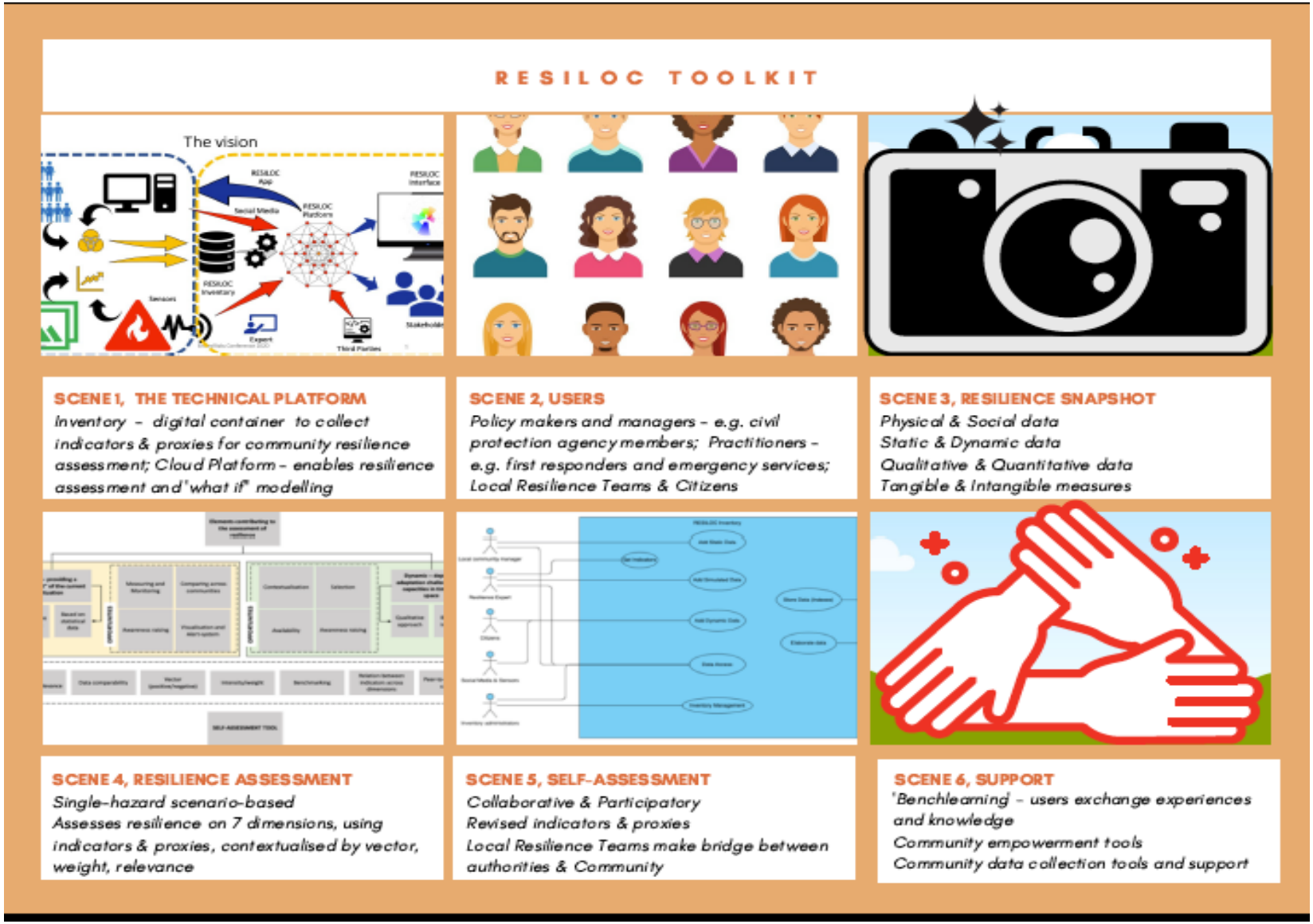


Figure 2 - The RESILOC storyboard

2 Comparative Analysis of Resilience in Societies and Communities – the contribution of WP2 to RESILOC

2.1 Situation of Work Package 2 in RESILOC

The position of WP2 within the broader RESILOC vision is shown in Figure 3.

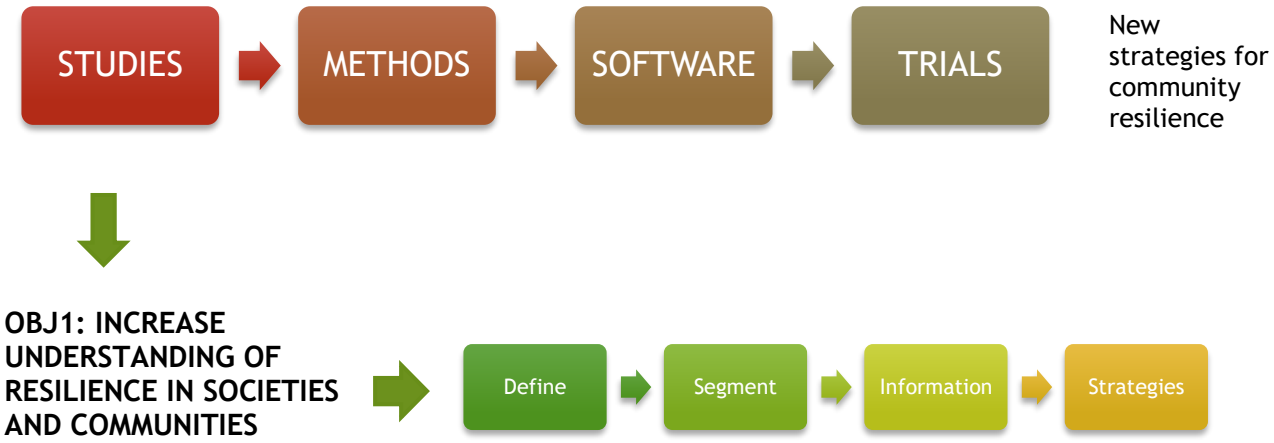


Figure 3 - Positioning work package 2 in the RESILOC 'project journey'

Figure 3 shows the project 'story' as it progresses from a 'presenting problem' to the expected change it hopes to make at the end of its journey. The 'presenting problem' RESILOC aims to address can be briefly summarised as follows:

> *Traditional threat management approaches struggle to cope with complex and unpredictable multiple hazard situations. This is partly because the 'human' element and the citizen perspective are not sufficiently well-represented in threat management strategies.*

The expected change RESILOC hopes to make to this presenting problem is to deliver new strategies for community resilience that improve understandings of resilience and which, ultimately, when applied in practice, increase community resilience before, during and after threat situations, and therefore improve the effectiveness of threat management strategies.

As Figure 3 shows, the RESILOC 'change journey' – from the 'presenting problem' it aims to address at project start, to the change it expects to make to this problem at project end – the project's key 'impacts' – can be defined by four main stages:

- **Studies** – entail collecting and analysing information to define a classification for the functions that are critical to the resilience of communities. They feed into:
- **Methods** – the definition of a set of new methods and strategies to allow the assessment of community resilience to be carried out, together with 'what-if' simulations of what is likely to happen to the resilience of a community if certain measures are taken. They in turn feed into:
- **Software** – the development of two software tools and supporting services: the RESILOC Inventory (a tool for collecting and classifying data on the resilience of cities and local communities) and the RESILOC cloud-based Platform (a tool for assessing and calculating the resilience profiles of any participating city or community, which in turn provides support for developing localised strategies and verifying their impacts on the resilience of the community)

- **Trials** – the tools are then assessed and validated in desk-top exercises and field trials that involve communities and other stakeholders. The results of the trials feed into the production and dissemination of guidelines and recommendations to support the free use of the tools throughout the EU and beyond.

The '**Studies'** element of this journey corresponds to 'Objective 1' of the project: 'Increase the understanding of resilience in societies and local communities and innovate on the strategies for improving resilience'. This in turn entails four activities:

- identifying, refining and adapting definitions of resilience within the context of civil protection and disaster management
- developing a structure for segmenting the collected knowledge that can be stored, shared, updated and be used for identifying the human, social and societal factors that have an impact on resilience
- collecting and analysing community-based information to produce a data structure that will subsequently be turned into the RESILOC inventory
- identifying successful strategies that have been used previously to support resilience and setting these against identified likely challenges and stakeholder needs.

WP2 is focussed on Objective 1 of the project and aims to support all of the above activities by carrying out "a comparative analysis of resilience in societies and communities". The specific objectives of this work package were to:

- collect global information – through literature and initiatives reviews – about approaches to resilience, so as to derive definitions and classifications that can help organize resilience data
- understand how citizens perceive risk in their community and how this relates to their awareness of local hazards and expected behaviours
- start to develop a tool to support communities to evaluate their resilience through self-assessment through highlighting major areas of vulnerability as well as the main resources for each community to address this vulnerability
- analyse vulnerability, exposed values and hazard scenarios in the communities included in the project
- feed the results of the above into the specifications for the RESILOC inventory.

Within the RESILOC workplan, WP2 is providing inputs to the following WPs:

- WP3 ("New strategies for Improving Resilience") – in terms of the definition of the "Resilience Indicators and Matrix" (Task T3.1) that will ultimately define the RESILOC resilience dimensions and the specification for the RESILOC Platform.
- WP4 ("Implementation of RESILOC platform") – in terms of the "Implementation of the RESILOC Inventory" (Task 4.1 and T4.3), that is concerned with the production of the Inventory, applying an Agile approach which involves end users in successive 'co-created' iterations of development .
- WP5 ("Communities involvement and field trials") – in terms of the "Field trials Design" (Task T5.2 and T5.4) that will test the scenarios identified in T2.4 in practical exercises.

2.2 Tasks implemented in WP2 and their contribution to RESILOC objectives

The WP2 Tasks and their associated deliverables support the objectives of work package 2 and the broader project objectives as follows:

- T2.5 and its Deliverable D2.6 support the **analysis of resilience strategies and actions in any kind of environment** - the analysis provides a broader global context and benchmark for the activities of T2.1-2.4.
- T2.1-2.4 and their Deliverables D2.1-D2.5 contribute to the definition of a **method for classifying the elements for the assessment of resilience** and to the **elaboration of a self-assessment tool** - their results represent what T2.6 – specification of the RESILOC Inventory - has to capture and structure in the RESILOC Inventory. Deliverables D2.1 to D2.5 support the production of the WP2 Analysis Framework, where the elements contributing to the assessment of resilience are identified and associated in a consolidated method. These elements shape the concept of a self-assessment tool for the assessment of resilience at community level. D2.5 – RESILOC Hazard Scenario Analysis - plays a specific role in this Resilience Analysis Framework by proposing a hazard-specific focus for each of the communities involved. It also paves the way for the definition and organisation of the Trials.

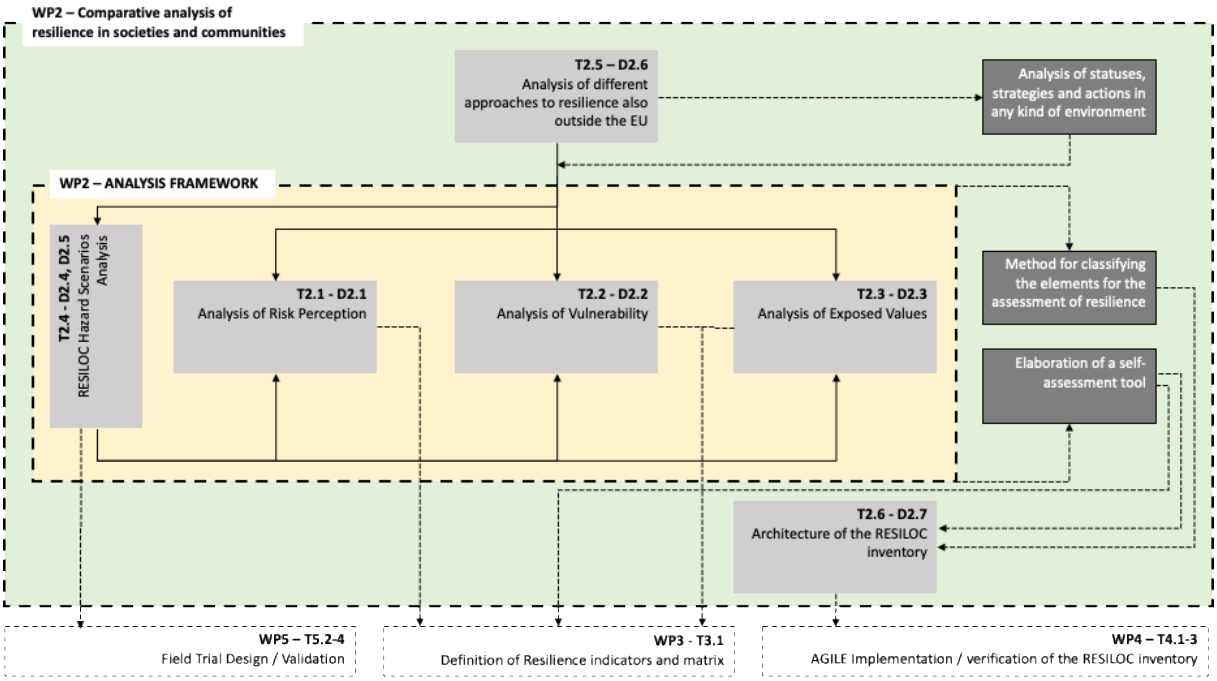


Figure 4 – RESILOC WP2 – Relations between tasks

The interconnections and dependencies between tasks aim to reach a more comprehensive understanding of the mechanisms that shape resilience. They aim to explore and make sense of the relationships between, vulnerability, exposure, risk perception and adaptive behaviours and how these ultimately link to resilience.

Methodologically, all activities have been based on the analysis of the scientific and operational approaches adopted across the international landscape, aiming at identifying a baseline for the RESILOC research activities.

The first three tasks of the WP, Risk perception (T2.1), Vulnerability (T2.2) and Exposed Values (T2.3), worked in close connection, to ensure that their outcomes are aligned and usable in a coordinated way for the design of the RESILOC Inventory (T2.6) and the activities of WP3, which focus on engaging users in the design of the RESILOC Toolkit.

The outcomes of T2.4 (Hazard Scenario analysis) have been used to specify data collection methods and tools that are adapted to particular hazard scenarios that have been identified by users as the most important. The combination of Tasks T2.1-T2.4 represents, therefore, the "core" of WP2 for the development of the RESILOC Analysis Framework and the definition of a method for classifying the elements for the assessment of resilience and for the elaboration of a self-assessment tool.

Finally, based on the results of the RESILOC Analysis Framework and the analysis of user needs, Task T2.6 (Architecture of the RESILOC inventory) produced the specification of the RESILOC inventory that will feed into WP4 for its implementation and verification.

3 RESILOC end users: a co-production process

RESILOC users have a central role in all research and innovation activities. In particular, the demands and needs of users and beneficiaries (local authorities, practitioners and citizens) are both the starting point and the target of the project Research and Innovation activities and had to be identified, collected, analysed and used for regular "reality-checks" regarding the ability of the project to respond to them. Indeed, the RESILOC consortium includes seven partners corresponding to the "user" definition, including either local authorities, practitioners' organisations or humanitarian organisations. They have been engaged in the project activities and consulted by the research partners through workshops and meetings (even though COVID-19 has played a role in limiting them).

To put the RESILOC end user engagement on a systematic footing, an "End user Engagement Strategy" (EES) was designed and implemented within the framework of research activities in WP2, so as to:

- improve the engagement of end users in overall project activities
- define the overall RESILOC project end users' engagement process in order to ensure that both internal (i.e. intended as project partners which represent local communities) and external end users (i.e. outside of the sphere of influence of RESILOC, beyond the local communities/pilot sites envisaged by the project) will be given a more prominent role in the current and next phases of the project.
- Improve the methodological approach of the engagement strategy by building on the concepts of co-creation and co-design.

The Strategy foresees a two-steps implementation process:

- **Phase 1** (August 2020 – December 2020). In this phase, the strategy has three objectives: clearly mapping of the end users who have been identified and engaged by RESILOC since the beginning of project activities; building the overall consortium capacity to plan for and engage with end users; collecting and assessing project local communities' feedbacks on RESILOC project outputs and the progress achieved so far. The implementation of Phase 1 of the EES has allowed a response to the need of fully achieving the goals of WP2 and unlock the design of the RESILOC Inventory, so that the Innovation activities in WP4 can start
- **Phase 2** (December 2020 – until the end of the project). During this phase, the Strategy aims to ensure that: the engagement of both internal and external end users is engrained in the project development plan, monitored and assessed; and that all project partners are equipped with the tools and the capacity to contribute to the engagement process. This long-term plan of the EES will keep the users motivated and engaged in the project and will set a favourable environment for extending the user base of RESILOC outside the project, aiming at bringing more potential to the field trials execution and, in general, to the project impact-related activities.

The next section presents the details of this strategy, followed by the results of a first round of stakeholder interviews implemented.

3.1 End users' engagement strategy

The End users Engagement Strategy aims to ensure that RESILOC tools and overall outputs are useful, relevant, owned and sustainable. To this end, the EES promotes a co-creation approach in the development process, that is based on a continuous and structured engagement of end users. Such an approach establishes a constant dialogue between

partners developing the tools (i.e. technical partners) and partners end users (i.e. partners that represent local communities), throughout the entire cycle of the development process of the RESILOC tools.

The approach is structured in two main phases, as follows:

- CO-DESIGN – engagement activities aimed at the identification and analysis of problems and related solutions. Such activities refer to the initial phase of the development process and serve the purpose of identifying specific user needs and requirements.
- CO-PRODUCTION – engagement activities aimed at the implementation/testing of the proposed solutions. Such activities refer to the implementation phase of the development process and serve the purpose of feedback gathering to check the compliance with identified needs and requirements (e.g. within the framework of WP5 - Field trials).

The EES foresees a set of involvement tools and methods and provides for a clear distribution of roles and responsibilities within the consortium, vis-à-vis the implementation plan and the monitoring and evaluation mechanism set in place.

Furthermore, the EES is integrated with a dedicated communication plan, which aims to establish a pro-active communication framework, strategic built on the reference frameworks provided by the Horizon 2020 programme and provide targeted informational support to key project stakeholder groups in the end user community. The EES communication plan is aligned to the overall RESILOC communication plan and guarantees for the application of relevant ethical principles to overall EES involvement activities.

The following paragraphs aim to illustrate the main pillars and concepts upon which the EES is based, while Appendix II.: provides the detailed EES.

3.1.1 Types of RESILOC end users and their roles

End users may be represented by individuals, groups, organisations and institutions. An end user is considered as such based on their close relationship with the object of use at hand, such as a tool, a service, etc and, thus, it is a:

- target of given policies and/or actions (Punie 2011; Bertoldi et al. 2013; Spisto 2016);
- provider of feedback (Castro Ribeiro 2015);
- target of information (Doyle, European Commission, and Joint Research Centre 2016).

The literature differentiates between two main involvement patterns, which refer mainly to the proposed duration of the engagement framework:

- spot interaction through feedback mechanisms (Hengl and Husnjak 2006; Abella et al. 2013; Castro Ribeiro and Guillen 2016; Bernard et al. 2018; Singh and Kotzé 2003; L'Astorina et al. 2015; Sun 2013);
- continuous interaction throughout the entire phases of a development process (Ben-Dor et al. 2008; Othman 2007; Almirall, Lee, and Wareham 2012; Sun 2013; L'Astorina et al. 2015).

In accordance with the work of Almirall, Lee, and Wareham (2012), **RESILOC understands end users as co-creators of a given service/tool/product/ etc. rather than a mere subject of study.** This perspective is integrated in the composition of the RESILOC consortium, where local authorities, practitioners' and humanitarian organisation are represented as partners.

3.1.2 A framework for defining RESILOC end users

Aiming to increase the understanding of resilience in local communities and to generate strategic tools empowering local actors' capacities on the topic, RESILOC has adopted the following end users' framework in order to ensure the role of end users as co-creators of its outputs (see Figure 5 below).

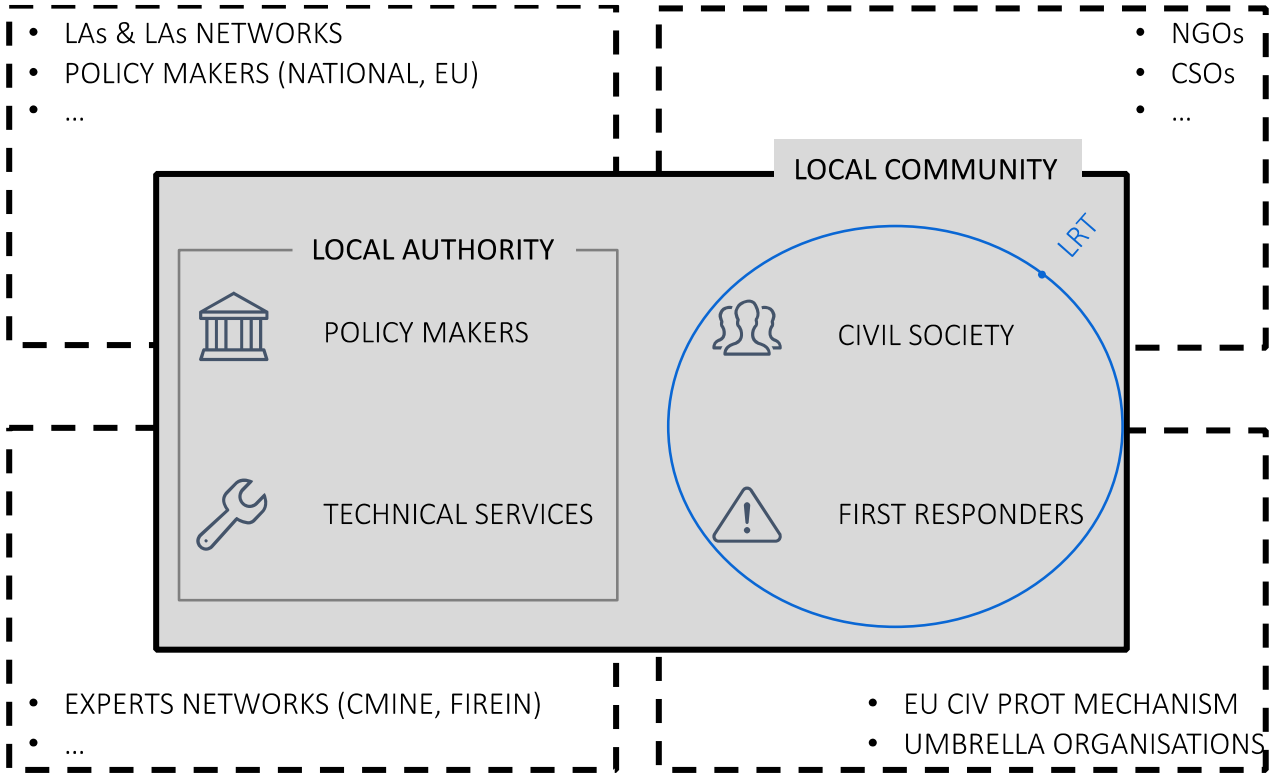


Figure 5 – RESILOC End users' framework

First, four broad types of end users are identified:

1. Policymakers;
2. Technical services – expert networks;
3. First responders;
4. Civil Society.

This framework is then applied for the identification and engagement of end users both horizontally (i.e. within and outside the RESILOC consortium) and vertically (i.e. considering the scope of action of the end user from the local to regional, national and European level).

That is to say that not only the four types of end users are considered at local community level both within and outside the project consortium but also for the identification of end users who operate outside local communities but whose actions influence the overall understanding and capacity of local communities.

Internally, the RESILOC consortium counts on the following end users as consortium partners:

Table 1 - End users represented in the RESILOC consortium

At the non-local level	At the local level
• Technical Services a. The Resilience Advisors Networks	• Civil Societies a. Municipality of Gorizia, Italy b. Municipality of Kamnik, Slovenia c. Tetovo Village, Bulgaria d. City of Catania, Italy e. Province of West Achaia, Greece
• First Responders a. Civil Protection Department – Region of Sicily b. Administration for Civil Protection and Disaster Relief c. Bulgarian Red Cross d. Hellenic Ministry of Defence	

Below we map out the types RESILOC end users within external to the project - within local communities and the LRTs – by applying the RESILOC end user framework.

3.1.3 End users' mapping using the RESILOC end user framework

The first objective of the End-use Engagement Strategy aims to clearly identify and map the end users identified and engaged by RESILOC since the beginning of project activities at partner local community level, in line with the RESILOC end users' framework. In accordance with the work developed in Task 6.2 and Task 5.1 on Local Resilience Teams (LRTs), the end users' map for each partner local community will be constantly updated throughout the project lifespan, according to the categories of users included in our framework (policy makers, technical services, civil society, first responders). Below we apply the RESILOC end user framework to scoping out end users at both local community and LRT levels.

3.1.3.1 RESILOC local community end users

Stemming from the RESILOC End users' framework, the following key concepts for the project are in need of further explanations:

- Local authority; and
- Local community

With *local authority (LA)*, RESILOC understands an administrative body in local government, that is an official organisation that is responsible by law for the public services in an area at sub-national level (often but not exclusively identifiable within the NUTS classification system from level 3 down).

With *local community (LC)*, RESILOC refers more broadly to a group of interacting people living in a common location; thus, entailing both the spatial/geographic dimension and its social, economic, institutional, human capital and environmental characteristics. That is considering not only the overall population residing within the administrative borders of a local authority but rather its relational networks and interactions within such borders and beyond (i.e. functional community).

The four identified types of end users allow for such distinction: policy makers and technical services to be identified within a local authority and civil society and first responders as primary stakeholders of the local community.

Whereas the end users to be identified within local authorities are expected not to vary greatly across countries represented in the consortium and Europe as a whole, there is a considerable diversity in both civil society and first responders across communities. Within RESILOC, the Local Resilience Team (LRTs) are, *inter alia*, a tool to reduce the consequent complexity in end users' identification and engagement at local level, insofar as their composition will be based on the assessment of stakeholders' interest and relevance in each community (see the methodology for LRTs in D5.1).

3.1.3.2 RESILOC Local resilience teams

Local Resilience Teams (LRTs) are a key component of the RESILOC project and overall vision of community resilience proposed by the project.

The LRTs are voluntary informal groups/partnerships of resilience experts/stakeholders in RESILOC local communities, established by the project. Such groups/partnerships represent an essential link between the project consortium and local/pilot communities and guarantee a constant exchange and feedback from the involved communities. LRTs include, together with Consortium members, municipalities close to the pilot area with similar conditions and already in working relationship with RESILOC field trials and other communities that will be invited to check the used approaches. Thus, LRTs are envisaged as multipliers of project intervention – i.e. they bring RESILOC within communities, by promoting the 'resilience' culture within their communities. LRTs are also the secondary users of the RESILOC platform. They will facilitate and contribute to the communities' involvement in the co-creation.

LRTs will be involved to provide locally acceptable practices to access and valorise local knowledge and use. The teams will be invited to contribute throughout the project (together with the project teams) to the validation of the results of each phase, to the approval of the field trials, and the final recommendations. In specific, LRTs are involved in the validation of the resilience indicators, their definitions and their relations, in a dedicated series of webinars and workshops, as part of task T3.1. LRTs will be involved in the approval of the field trials scenarios by participating in two meetings that will be organized for each pilot within task T5.2 Field Trial Design. The LRTs will also be involved in the validation exercise, being invited to give their contributions and suggestions for the project recommendations and the future adoption of RESILOC, as part of task T5.4 Field Trial Validation.

3.2 End users' preliminary Insights on WP2 results and RESILOC products

Within the framework of the EES Phase 1 implementation a first round of interviews with project end users has been carried out in the period 28.09.2020 – 24.10.2020, around the following topics:

1. Understanding of resilience locally
2. Existing approaches to assessing resilience in the community
3. Regulations and legal frameworks relevant to resilience
4. Views on the RESILOC tools and dimensions
5. Community participation in resilience related activities.

Appendix III.: EES - Interviews with Project Local Communities reports in detail on both methodology, respondents and results of the interviews carried out with representatives of RESILOC end user communities in Gorizia (IT), Tetovo (BG), Kamnik (SI), West Achaia (GR), and Catania (IT) within the framework of the Phase 1 – EES implementation.

The results of the interviews analysis complement the data obtained from the activities carried out as part of WP2, including literature reviews, exploration of disaster scenarios, measurement of vulnerability, and review of existing resilience approaches. Such knowledge, in particular the insights on the assessment and tools, provide the foundation for WP3, and offer a rich description of the complex operational and theoretical terrain in which the emerging RESILOC tools can be developed and refined.

The following paragraphs illustrate the key findings (aggregate results) for each of the 5 topics of discussion envisaged by the interview topic guide.

3.2.1 Key findings of interviews

3.2.1.1 Understanding resilience within the communities

Resilience is understood as the community-wide capacity to plan, and use soft skills, in gaining citizens' active participation in resilience strategies and activities. Active citizen engagement is experienced as a valuable component of resilience building. Encouraging preparedness, including both the knowledge and willingness of what to do and to take active precautionary measures, is generally seen as one of the key components in generating resilience across all five communities. Effective resilience governance is seen as critical in gaining such community engagement.

The role played by municipal actors, in partnership with citizens, focuses on infrastructural development, training, prevention education and obtaining the right equipment. Municipal actors consult and engage citizens in disaster management planning. Having a strong volunteering culture is seen as a considerable asset in mobilising communities for preparation and resilience building in some areas – particularly where there is less reliance of/trust in authorities to respond or support citizens.

Resilience can also build on existing practices relating to the construction and maintenance of buildings in the community – for example, via the Build Back Better scheme.

Promoting well-being and behavioural health were also recognised as significant factors in strengthening community resilience alongside awareness raising activities among all parts of the population.

3.2.1.2 Assessing resilience

There is strong agreement across all five communities on the value and importance of assessing resilience as a prelude to planning and decision making – mainly as part of the preparation phase. Ideally, it should combine qualitative and quantitative approaches to collecting data and most saw value in making comparisons and learning from other similar areas.

An absence of tools and a clear framework is impairing community-wide, and consistent, resilience assessment in all five communities. Resilience is currently mainly assessed informally through making sense of available information. Much of this relies on the skills, professional knowledge, and experience of resilience/hazard professionals in each of the communities to make sense of such information within the context of their local areas. This results in a shared awareness of the types and locations of community vulnerabilities and how they can be addressed.

3.2.1.3 Relevant regulations and legal frameworks

Across all five communities, regulations and legal frameworks provide extensive cover of civil protection governance, planning and responsibilities but they do not stretch to addressing resilience. Only one community reports on a national law on 'Protection of the Population' which covers resilience but not as a regulation. Laws protecting cultural heritage and the environment, and policies on sustainable development, are seen as relevant to resilience but do not directly address it.

3.2.1.4 RESILOC tools

The end users thought the tools would be highly relevant for improving community resilience and to encourage preparedness / adaptive behaviour. The tool dimensions currently on offer were considered to be largely relevant but considered by some as too many. The fact that they have not yet been fully defined and validated also made it hard for the end users to comment on them.

Any tool, it was felt, needed to be adaptable to the local context and able to accommodate the complexity of each area. Accessibility and quality of data for the tool could be a challenge – hence why all said that it needed to use a mixture of qualitative and quantitative information. Most areas emphasised the need to engage different stakeholders in assessing resilience.

Participants were particularly interested in the way the tool could be used to support the development of social aspects of resilience – particularly engaging citizens and fostering better cooperation and preparedness behaviour.

The proposed tool was recognised as relevant to resilience assessment of local infrastructures, resources and as a way of centralising data and supporting loss avoidance, assistance, and recovery. There was however some concern that the rapid onset of a hazard would inhibit real time use of the RESILOC tool as currently conceived.

3.2.1.5 Participation

Participation in resilience assessment and development was seen to be largely the responsibility of the civil protection infrastructure and key individuals and teams within it, including First Responders and Local Resilience Teams. The Mayor, as an elected official, plays a lead role in initiating and coordinating responses in the event of a hazard. Voluntary and community organisations, and NGOs, are also described as key participants.

3.2.2 Semantic analysis of the interviews

Building on the Interviews transcripts, a semantic analysis[6] was performed so to provide an overview on the most frequent concepts explored in the interviews (i.e. co-occurrence analysis). The selected sources (i.e. full transcripts of the interviews) have been elaborated through Orange software in order to analyse the co-occurrence of relevant terms.

Sources of all the groups have been separately pre-processed, excluding numbers, stop words and auxiliary verbs (e.g. "different types of 'resilience' since 2011. Some of these were" → "Different types resilience since some"). Then, words have been selected according to their frequency and represented in a diagram showing their co-occurrence in windows of size of maximum 11 lemmas, meaning that co-occurrence between two words exists only if the distance between these is less than 9 lemmas.

[6] Appendix IV.: provides a detailed overview of the semantic analysis and its results.

Criteria of selection for the keywords (i.e. frequency and co-occurrence thresholds) have been applied in order to show both an adequate number of lemmas and a clear network among them.

Co-occurrence analysis is graphically represented by a figure showing dots (mostly frequented quoted words) and edges (co-occurrences of couple of words in the defined window for at least a threshold number of times).

Analysing the aggregate transcript of all interviews, the highest co-occurrences are registered between *civil* and *protection*, *resilience* and *local*, *resilience* and *assessing*, *resilience* and *preparedness*, *resilience* and *disaster*.

Civil and *protection* form a relevant cluster in which other mentioned words are *actors*, *national*, *response*. A minor cluster is constituted by *disaster* and *management*, showing however a significant co-occurrence only with the term *resilience*, which of course constitutes the barycentre of the figure.

Moreover, the same analysis has been performed also on every topic of the interviews, with the following key findings:

- Question 1 (on understanding resilience at a local context) shows also a significant co-occurrence between *disaster* and *management*;
- Question 2 (on assessing resilience at a local context) shows a relevant role played by the term *data*;
- Question 3 (on relevant regulations and legal frameworks) shows a significant co-occurrence between *law* and *protection*;
- Question 4 (on RESILOC tools) shows a relevant role played by the term *preparedness*;
- Question 5 (on participation) present a central role played by the terms *civil* and *protection,* as well as *actor*.

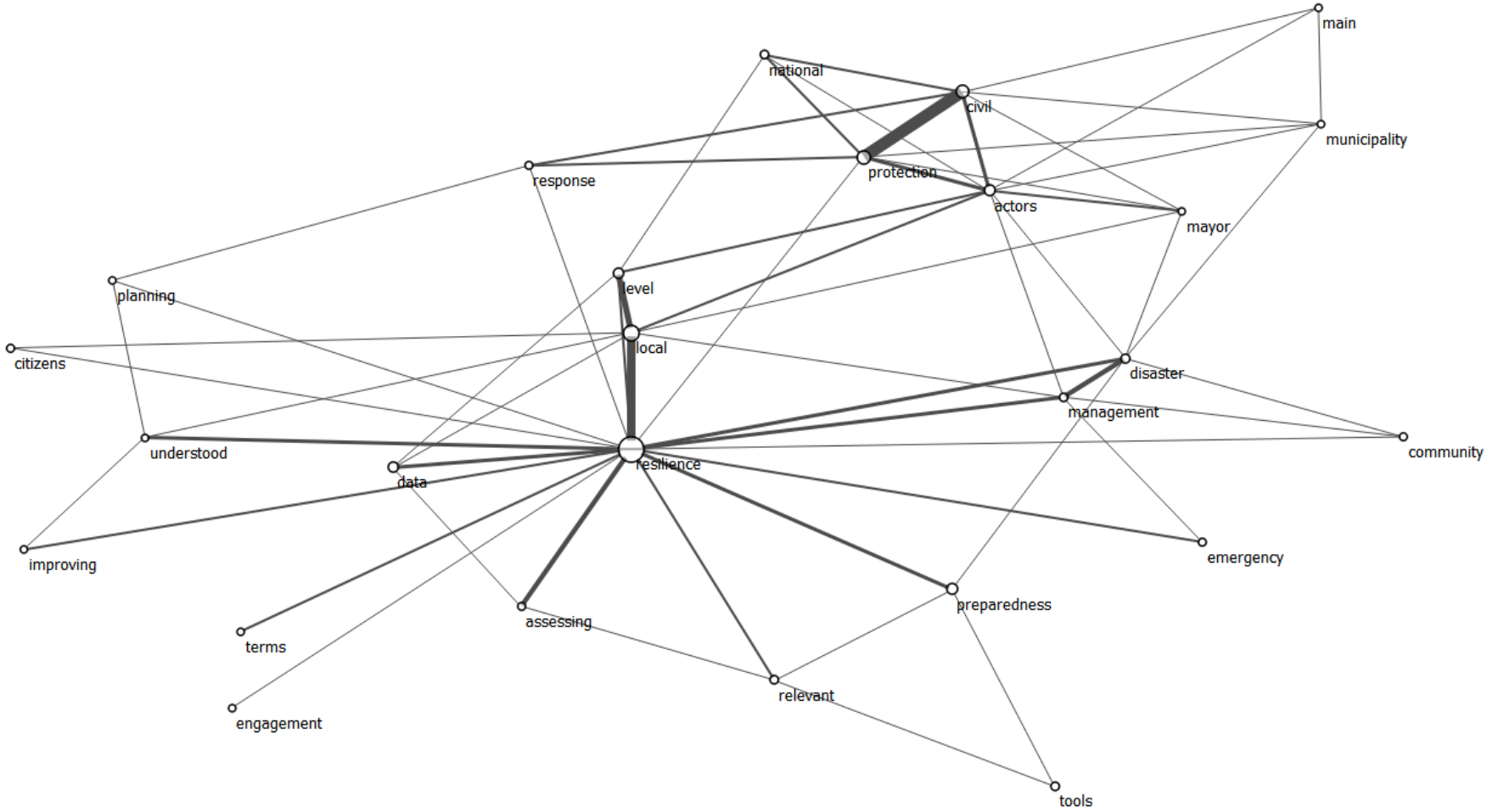


Figure 6 – Co-occurrence analysis – Full interviews

3.2.3 RESILOC Tools insights from end users

The semantic analysis therefore suggests that resilience is broadly understood within the context of disaster management. RESILOC communities end users seem to share a common understanding of the project, setting the assessment of resilience as a fundamental innovation in already functioning disaster management mechanisms and practices at a local level.

Moreover, despite differences in the availability of data across project communities, it appears that end users appreciate the RESILOC effort to offer tools to gather and process information, whether quantitative or qualitative in nature. In fact, end users acknowledged the added value of grounding the assessment of resilience in as many characteristics of the community as possible, as well as of the specific hazards to which their communities are exposed to.

Ultimately, end users support the idea that RESILOC tools could bring a value added to the work performed in the preparedness phase of the disaster management cycle. In fact, end users stressed throughout the interviews the importance of preparedness for strengthening the overall resilience of a community.

Finally, participation of different actors at local level is held important by all end users and there seems to be an agreement on the fact that civil protection mechanisms could greatly benefit from the upgraded involvement of citizens and volunteers.

Table 2 – SWOT Analysis of RESILOC tools

Strengths	Weaknesses
• Improving assessment capacity • Improving preparedness capacity • Identified dimensions appear relevant • Allowing for standardisation of data-collection and assessment • Adaptable to different hazards	• Need for a large amount of data, not always available • Seven dimensions may be too many • Dimensions have not been clearly defined / agreed with local areas
Opportunities	**Threats**
• Understanding of the intervention tools to tackle "social aspects" of resilience • Improving peer-to-peer learning	• Lack of capacity to turn assessments into concrete actions • Lack of capacity to address complexity of local context • Need for compliance with national legal frameworks (e.g. Cloud computing)

4 The RESILOC Scenarios

4.1 RESILOC scenarios rationale

The definition of the hazard scenarios to be adopted as reference for the validation of the outcomes of the project and for designing the field trials was one of the first aims of WP2. RESILOC communities end users were engaged since the project start into the discussion on which hazards are more relevant and representative of their usual activities in the DRR cycle.

At project onset, RESILOC community end users directed the project focus on scenarios targeting the consequences of an event (e.g., a flood, a number of collapsed buildings), rather than on the causes of the event: in other words, a flood may be caused by heavy rain or by a problem at a dam, with the same consequences. Although the onset and evolution of the event may differ, the assessment of resilience can be modelled using the same dataset and with the same methodological approach. Within this discussion, it was also expected that the causes of an event may result in a different perception and behaviour of citizens and this is acknowledged as one of the complexities of T2.1. Ultimately, RESILOC communities end users felt that it would have been beneficial for them to give priority to what they experience frequently and with significant impact on their communities. This approach was embraced by the RESILOC project but was, nonetheless, coupled with a research effort, carried out in T2.4 which also tried to address any other risks.

Similarly, the project partners have considered cascading effects as too complex to model with the “dimensional” approach adopted by RESILOC. This is a known possible limitation, and it is accepted because the research in WP3 about the assessment of the resilience dimensions in single-risk scenarios is already very ambitious: as in many other applications of science, the first step is to model simpler situations and only when they are mastered, extend the model to more complex situations. It is expected that the multi-dimensional analysis of cascading effects will stay as an open research item for future projects.

Deliverable D2.5 defines single-hazard scenarios for the RESILOC pilots, providing an initial risk assessment and proposing local mitigation actions for each of the scenarios, considering community specificities. Scenarios are discussed in a comparative manner and outlines hazard and community dimensions that could be addressed by the RESILOC Toolkit. This approach is in line with the objectives pursued within the RESILOC project as a whole and specifically under WP2, namely to “derive classification that can help organising data” and “identify a method for classifying the elements contributing to the assessment of resilience and the comparative analysis of statuses, strategies and actions in any kind of environment”. Ultimately, the RESILOC scenarios offer a standardised picture of the RESILOC communities and of their resilience which, together with the analysis or Risk Perception, Vulnerability and Exposed values, contributes to set the basis for the future RESILOC work.

Summing up, RESILOC scenarios:

- Introduce the RESILOC Communities – i.e., local communities participating through their authorities and civil organisations as project partners in the RESILOC project at the municipal level (Municipality of West Achaia in Greece, Municipalities of Catania and Gorizia in Italy) and the sub-municipal level (the village of Tetovo in Bulgaria).
- Identify hazards relevant for those communities.
- Provides a structure for collecting, classifying and using information, coded as qualitative inputs and quantifiable indicators on communities engaged in RESILOC.
- Contribute to design and structure the RESILOC dataset (static categories) and provide initial, estimated by the practitioners as relevant, exposure and vulnerability elements per

type of hazard to elaborate the functional relationships between risk factors and the community at stake for specific single-hazard scenarios.

- Serve as a blueprint for the exercises to be implemented in WP5 – Communities Involvement and Field Trials. – i.e., the hazard scenarios provide a comprehensive overview of relevant community and hazard characteristics, as well as expected developments of hazardous events. These descriptions should serve as an evidence base for setting the field trials.

4.2 Co-production process

As detailed in Deliverable D2.5, policy makers and domain experts participating in the project and coming from the project communities were consulted when determining which hazards to observe when elaborating the hazard scenarios.

Natural hazards were identified by interviewed stakeholders as the most characteristic of their community and of most interest to them. When drafting the actual scenarios policymakers, domain experts and local stakeholders preferred to describe events with a single hazard in mind. This made the task of describing, and thus modelling, hazardous events more accessible for the parties involved.

When defining the hazard scenarios, those experts investigated a diverse range of disaster manifestations, first responders' reactions, and community impacts defining possible sequences of events and identifying environmental, human, societal and technology related risks. As a result, a customised single-hazard risk assessment was performed in each of the hazard scenarios.

The co-production process implemented with each RESILOC Community clearly showed that actors involved in working with risks are quite diverse across the project local communities and societal dimensions in each community are affected differently in the local communities, even when faced with the same hazards.

The challenge of embracing such diversity was a clear demand stemming in all RESILOC Communities. The process therefore led, as an outcome of the risk assessment of the different hazard scenarios, to the definition of standard scenario which can be compared against one another across communities, with a specific focus on highlighting that consequences of hazardous events depend on community characteristics, as well as on hazard specificities.

Moreover, a concrete need for a common resilience framework and easy-to-understand assessment tool was also identified. RESILOC Community end users pointed out towards the need to create a structured and logically connected resilience database to be gradually filled and used by community managers with the aim to estimate and trace their community's exposed values and vulnerability indicators. Within this perspective, the need to combine qualitative and quantitative data collection tools was highlighted as a solution to gaps in (statistical) data availability. Specifically, modelling the risk perception of the community in the resilience assessment process should also be pursued through survey indicators.

Finally, the co-production process also showed a need for better approaches to communicate with citizens, to reduce the vulnerability of infrastructures, and to increase risk awareness. When analysing answers from the community interviews on how to improve resilience, apart from the more trivial need for investing in better infrastructure and equipment, there was also a clear need to focus on awareness raising and preparedness (as a dynamic asset of communities).

4.3 Implications for the development of RESILOC Tools

Beyond the abovementioned demands from RESILOC Communities end users which dealt with more general aspects, a specific set of them focused on the RESILOC Tools.

The following table aims to summarise both such demands and their implications:

Table 3 – Users demands - Implications for RESILOC Tools

Key insights from the RESILOC Communities	Implications for the RESILOC Tools
The RESILOC solution should, in its essence, support decision-makers to understand and prioritise risks associated with hazards, exposure and vulnerability within their communities, in order to make informed decisions about investments (tangible and intangible) for addressing those risks.	The RESILOC Cloud platform will offer to the users "stakeholders" a set of functionalities for creating a scenario and related timelines so that they can assess resilience and its components (hazard, vulnerability, exposed value, risk perception) against a number of actions. The underlying RESILOC inventory must be able to store and make available to the Platform all the created scenarios and timelines. Timelines and resilience assessment will be available to the stakeholders for comparison and study. A subset of the results from a scenario must be made available to all users.
As community managers and decision-makers are the main users of the RESILOC toolkit, it should provide meaningful classification and storage of basic information about communities as well as about the level of risk perception by the citizens on risk metrics (proxies and indicators).	The RESILOC Inventory must offer a rich classification of the stored information, allowing for an efficient searching and retrieving functionalities. Semantic tools will have to be considered. The RESILOC platform interface will prompt the user in case data, proxies, indicators or weights are missing for running a scenario.
The RESILOC architecture and platform should support the hazard description process and provide for common understanding of those underlying risk factors that impact the resilience of a community, starting with single and understandable natural hazards and building complexity, multi-layer and cascading effects in a further evolution of RESILOC by combining one or more single-hazard events.	The RESILOC platform must offer to the users "stakeholders" a functional tool for creating a scenario on the basis of the adopted method for data collection. For the aims of the project, all scenario will be based on a single-hazard. There will be no limitation to natural-hazard, although the demonstration scenarios will be of that kind. The combination of scenario in cascade will have to be considered in the design of the platform even if not implemented.
As each hazard may require different approach in risk assessment, the RESILOC toolkit should initially model and validate the selected types of natural hazards following recorded best practice and national legal frameworks.	The RESILOC Inventory will store a number of pre-defined scenarios derived from best practices and consolidate DRR scenarios. They will be made available to all users "stakeholders" for reference.

Key insights from the RESILOC Communities	Implications for the RESILOC Tools
The RESILOC toolkit should enable what-if scenarios to selected hazard in certain community context, thus modelling in a structured manner the sequence of events and being able to change the input variables characterising the community (exposure and vulnerability proxies, indicators) and the variables affecting the hazard probability and potential over the societal dimensions, to see in which case the risk can be reduced most and thus what could be the most effective and appropriate measures to implement to improve local resilience.	Both the RESILOC inventory and Platform will make possible for the users "stakeholders" to input weights and similar local factors for implementing specific scenarios and take into account the specificity of their local community. Such weights will be part of the "what-if" scenarios and the results of the assessment will specify the conditions they have been produced.
Not all data required by the methods for defining hazards, vulnerability, exposed value and risk perception may be available or up-to-date at the time of the creation of a dataset for a community. The RESILOC toolkit should be able to work also with an incomplete set of data	For running a resilience assessment all proxies and indicator with an assigned not-null weight must be available. In case some data are missing, the users will be prompted with message and offered a range of possible solutions: (i) accept that data from an available public source, (ii) derive the missing data from similar sources, e.g. from a national data set, (iii) mark the data as missing, forcing the use of a null weight. In all these cases, the results will be marked so that the user is informed about their limited representativity.
The use of the RESILOC toolkit must replace or be conflicting with existing legacy systems for collecting data during an event.	The RESILOC platform will offer a number of APIs as an interface with existing system. In no cases the data collected by the RESILOC sensors will be used for emergency management and their use will be limited to the recording of the behaviour of the society (including citizens) during an event.
All information uploaded and stored in the RESILOC inventory must be safe and secure. The choice of make some of them publicly available must be left to the stakeholders.	All data input in the inventory are considered restricted to the stakeholders of the community that uploaded them. Only a user "stakeholders" from a community can make a set of data "public". The action will be logged for future reference.
The data input by a stakeholder of a community can be managed (deleted or updated) by a stakeholder of that community, so that tampering, and falsification of data is not possible.	The RESILOC inventory will give limited privileges to users for managing data. All actions will be logged for future reference.

5 RESILOC Research activities in WP2

The following sections summarise the main results of Task 2.1 – 2.6 completed as part of WP2 and highlights interlinkages between the different tasks. The latter are summarised in Section 6.2 below, with a particular emphasis on highlighting the synergies and challenges between different tasks.

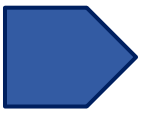
5.1 Tasks Results and Interlinkages

This section summarises the activities carried out in each of the tasks of WP2 – more details are available in the deliverables written as a result of each task.

5.1.1 T2.1: Analysis on Risk Perception

The deliverable resulting from this task is D2.1 “Analysis of Risk Perception”.

A review of the literature suggested that the most useful way of thinking about how communities work in the context of a disaster is to consider them as complex systems. The key attributes of communities as complex systems are that they are non-linear, uncertain, emergent and self-organized. In the face of a disturbance (such as a threat or actual hazard), communities as complex systems exhibit ‘dynamic adaptation’. If communities are to be considered as complex systems, then resilience needs to be considered not as an outcome but as a process.



These understandings have led us to the following current definition of this concept for the RESILOC project: “Community resilience refers to the capacities of local communities as complex systems (involving the actions and interactions of local agencies, citizens, the built environment and critical infrastructures) to mitigate, withstand, and recover from the impacts of a disaster or emergency, as well as to adapt or transform themselves to be less vulnerable to future disasters or emergencies”.

The research conducted as part of Task 2.1, including literature reviews, case studies and an online survey have shown that context dominates in forming risk perception and the meaning of risk to the individual citizen can be complex, multiple, varied, and infused with emotion, memory, relationships and sense of place. There are several factors that can influence citizens’ perception of risk in relation to natural hazards and other emergencies. While the online survey and case studies suggested that previous experience, age and education levels and other personal characteristics are influential, other studies reviewed have disputed this. Instead, they argue that these factors can amplify peoples’ perception of risk and, subsequently, their preparation behaviours. But more important are the ‘proximal factors’ – self-efficacy, outcome efficacy, descriptive norms and injunctive norms – that shape how people’s perception of risk motivates them to develop adaptive behavioural strategies that will increase their capacity to respond in threat situations.

While risk perception is generally associated with better preparedness and/or adaptive behaviour, it can also lead to increased vulnerability. The ‘risk perception paradox’ challenges the assumption that high risk perception will lead to preparedness and mitigating actions in disaster situations. Often the opposite can happen when people choose not to prepare. For example, they might be unwilling to move from a flood prone area because of stronger factors relating to their ‘personal stake’ (e.g. memory, community attachment, economic well-being) outweigh the influence of risk perception. Alternatively, they may not have the resources to move. This once again confirms that situational context is a key variable in shaping perceptions

of risk and hence preparation behaviours, as well as how these preparation behaviours do or do not lead to increased community resilience.

An overarching conclusion of this task is that risk perception and adaptive behaviours cannot be considered as a static feature of a community. The definition of relevant proxies and indicators must therefore include the self-assessment by users and local people. This a major input to T2.6, that must allow for capturing dynamic sets of data in the RESILOC inventory.

5.1.2 T2.2: Analysis of Vulnerability

The deliverable resulting from this task is D2.2 “Analysis of Vulnerability”.

The main purpose of the task was to construct a tool (i.e. RECVI – RESILOC Community Vulnerability Index) for the analysis of vulnerability for each of the pilot areas of the RESILOC project, as a basis for the elaboration of dedicated and efficient resilience-enhancing strategies. The task contributed to achieving WP2 objective of highlighting the major areas of vulnerability (and represents the starting point for mapping the main resources) for each community, so to direct local authorities to the most efficient and sustainable actions aimed at the enhancement of resilience. Moreover, in doing so, the deliverable explored the relation of (community) vulnerability with (community) resilience, as a complex and non-linear corelation.

The deliverable advances an assessment model of vulnerability which implies the calculation of vulnerability indexes, based on indicators and proxies, clustered around 5 dimensions that describe a community (i.e. social, economic, institutional, environmental and human capital). The assessment of vulnerability by means of indicators and proxies provided inputs to T2.1, T2.3 as well as to WP3. Moreover, the full list of indicators (27) and proxies (158) identified for the analysis of vulnerability was used for the design of the RESILOC inventory (T2.6) and for the design of the RESILOC platform (T3.3).

The calculations of the RECVIs implied the integration of local knowledge and context-related insights, as the indicators and the proxies were selected and later weighted according to the assessed level of relevance for the context at stake (i.e. high, medium, low). The definition of the concept of "weight" of a proxy or an indicator is an important output from the task, with two clear implications: an active role for the expert users (WP5) and the need for a complex data structure (weights are hazard-related) to be included in the RESILOC inventory (T2.6). Moreover, the deliverable argues that the assessment of both vulnerability and resilience requires a holistic/systemic approach, as both concepts are dependent on the context and as such, they need to be analysed within a multidimensional system of refences (e.g. dimensions describing a community).

The participatory approach to the analysis further confirmed the added value for the assessment of vulnerability of the contribution of local experts in integrating local knowledge: selecting/indicating the level of relevance for the context at stake (i.e. high, medium, low), the vector (i.e. variable influencing positively or negatively the context at stake in terms of vulnerability) and the weight of each proxy and indicator (i.e. based on the assigned relevance), calling for a self-assessment tool to be used for this purpose. This is a relevant input for the design of the RESILOC inventory (T2.6) and the RESILOC platform (T3.3), as well as for the assessment of resilience.

D2.2 understands vulnerability as a relative concept, highly context-based, that can be assessed mainly in comparison with other similar units of analysis, neighbouring communities exposed to similar hazards. The relative approach to assessment tested for the case of community vulnerability represents an important input for WP3 as well for what concerns the community resilience assessment.

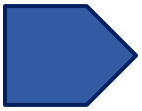
Finally, D2.2 proposes a further theoretical elaboration in the analysis of vulnerability, aiming to overcome the issue of data availability and upscaling the relativity perspective. The General RECVI proposes the identification of criteria and parameters that would allow for the identification of similarities between European communities, ultimately supporting the elaboration of relative indexes, not strictly bound to the idea of territorial continuity and thus allowing to distant (yet similar communities) across Europe to perform such analysis in comparative terms. Such input is considered insightful for the purpose of WP3.

5.1.3 T2.3: Analysis of Exposed Values

The deliverable resulting from this task is D2.3 “Analysis of Exposed Values”.

The main purpose of the task was to explore the relation of Exposed Values with resilience. A literature review, analysis of existing local procedures and participatory design with users, confirmed that such a relation clearly exists but cannot easily be quantified in a uniform way. The assessment of resilience requires a mixed approach that combines the objective economic evaluation with the subjective (local) value given to specific assets (e.g. historical sites) into a relative assessment that will be able to show how Exposed Values change in relation to another moment in time or a neighbouring community. Similar to vulnerability, this shows that resilience cannot be assessed with a one-size-fits-all calculation: this strongly calls for harmonising the outputs from T2.2 and T2.3.

The task also studied the integration of objective and subjective elements of Exposed Values in local communities by meetings with users and reviewing existing initiatives. The conclusions confirmed that the dimensions of exposed value can be assessed using indicators, but they must be complemented with the specificity of the local community. Exposed Values must be assessed as a change to a previous state of the community and in relation to the neighbouring communities.



Like in T2.2, exposed values must be assessed dynamically, i.e. captured in a sequence of snapshots and studied in a timeline and in a geographical context. The definition of the concept of "weight" of a proxy or an indicator for the Exposed Values is an important output from the task, calling for an active role for the expert users (WP5) and the need for a complex data structure (weights are hazard-related) to be included in the RESILOC inventory (T2.6).

Together with the project users, the task defined proxies, indicators and dimensions for the assessment of the Exposed Values. The contribution of local experts for what concerns the weight of each proxy and indicator, was confirmed to be a must for the assessment. This represent an input for the design of the RESILOC inventory (T2.6) and the RESILOC platform (T3.3).

The task collected data from the project local communities and defined a subset of proxies and indicators that all communities using RESILOC will be requested to provide. Such a list was used for the design of the RESILOC inventory (T2.6) and for the design of the RESILOC platform (T3.3).

Further to the partial collection of data from the communities, the task analysed possible issue with the availability of data, suggesting strategies for deriving them from more general data (e.g. at national or regional level). The harmonised indicators and dimensions have been plotted in a graphical representation, providing inputs to WP3 for the design of the RESILOC platform.

As an overarching issue, it became evident that there is a need for a strategy for the management of unavailable or not completely reliable proxies (e.g. because of obsolescence). The ability to indicate the reliability of proxies as an attribute is an input for the inventory design (T2.6).

5.1.4 T2.4: Definition of Hazard Scenarios for Pilots

The deliverable resulting from this task are D2.4 and D2.5 “RESILOC Hazard Scenarios Analysis”.

The main goal of the task was to collect inputs from the users about their needs in term of increasing resilience for their hazards and scenarios of choice.

As a first outcome, the task has defined a method for collecting data and information about hazards in a community. This was done collecting, analysing and comparing existing methods, so that a choice was made for the purposes of RESILOC and for the local communities. Having concluded that most of the existing methods do not apply well to local communities, the NERAG (Australian) method was chosen and applied. This choice had a clear impact on the design of the inventory (T2.6). Moreover, it is a clear path that WP5 will have to consider when interacting with the LRTs. Furthermore, it will represent a baseline for the design of the field trials scenarios (WP5).

The task defined the way hazards are connected to a scenario, combining a story with objective data. Having engaged with users and applied the chosen method to collect data and information, important conclusions were derived for the project:

(1) Users gave priority to natural-hazards and (2) suggested to focus on single events, with the justification that cascading events are clearly of interest, but too complex to describe as a first approach.

As a result of the task activities, the forms and method for collecting data were approved and the users were able to provide inputs to their specific needs in describing a scenario connected to a specific hazard. The selected hazards have constituted the basis for the collection and analysis of data in T2.1, T2.2 and T2.3. Consequently, they will also be used for the definition of the dimensions for the RESILOC hypercube (WP3) and for the design of the Cloud Platform (WP3 and WP4).

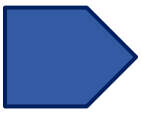
The task collected inputs, priorities and needs from the RESILOC communities, who picked two scenarios each for further analysis. A clear lesson is that the local history of past events is a great source of information. It proved also evident that the collection of data is not always an easy process.

The collected set of scenarios will also serve as inputs for the future tests and pilots. The storylines of the scenarios were co-created with the users, with the support of local existing plans, where available. These results have been useful to the interaction of T2.1, T2.2 and T2.3 with the users for the collection of information and data. They will serve also for the interaction with LRTs (WP5), for the definition of the scenarios for validation and pilots (WP5) and for grounding the future recommendations and guidelines to actual cases (WP7).

5.1.5 T2.5: Analysis of different approaches to resilience also outside EU

The deliverable resulting from this task is D2.6 “Analysis of different approaches to resilience also outside EU”.

This task carried out a survey on how resilience has been approached worldwide, defining the baseline on which RESILOC will research and innovate. Based on a literature review, interviews with experts, and the CMINE network, it has identified many existing initiatives, with the United Nations as a most significant promoter. They cover a wide range of situations, from large countries to cities, to infrastructures: the task produced a compilation of existing studies, from which RESILOC can take inspiration. It was also found that local communities have not been very much in focus so far. The output of this activity was a baseline for T2.1, T2.2, T2.3 and T2.4 (WP2) and also for WP3 and WP4 going forward.



T2.5 also compiled a list of resilience-related definitions from the literature, relevant standards, best practices and existing initiatives. The result has been the RESILOC Glossary of terms, to be used in all WPs and tasks. One of the critical findings of this analysis is the need for a specific definition of resilience in local communities, that has been covered in T2.1.

The survey of existing methods and solutions for assessing resilience helped to identify some shortcomings and limitations. Most of the approaches are based on scorecards and some apply a non-specified methodology for correlating indicators with resilience.

All of the reviewed existing solutions are qualitative and most of them are targeted at specific risks or hazards only: this confirms the validity and the added value of RESILOC, acknowledging that resilience cannot be measured in absolute terms and that it requires the adoption of a more flexible approach valid for all hazards and for different types of communities.

These findings are valuable inputs to other tasks, including the use of qualitative indicators and the inclusion of the assessment of local experts as an important design principle (T2.1, T2.2, T2.3 and T2.6). They are also valuable for the scope of work in WP3, WP4 and WP5 (Agile sprints) and for the recommendations on improving resilience that will be produced in WP7.

The task has also analysed if and how resilience has been studied in local communities. Few case studies are available, mostly based on scorecards and historical and static data. This confirms the need for including risk perception, behaviour and self-assessment in the assessment: a local community has very diverse dynamics compared with a country or a large city. A clear recommendation to T2.1, T2.2, T2.3 and T2.4 is to connect tightly with the local communities and find out their needs and specificities. In addition to the indications for the work in WP3, WP4 and WP5 (Agile sprints) and for WP7, these findings are valuable to the future exploitation plans to be prepared in WP8.

5.1.6 T2.6: Specification of RESILOC Inventory

The deliverable resulting from this task is D2.7 “Architecture of the RESILOC Inventory”.

This task was aimed at the design of the RESILOC Inventory on the basis of the needs and recommendations identified in Tasks 2.1-2.5 after their analysis of the current status of play and of the inputs received by the users. Given the innovative approach of the project to the collection of static and dynamic data, to the integration of inputs from the users about the weights of proxies and indicators and to the assessment of resilience, the task has defined original design concepts. The concepts of "Snapshot", "Timeline", "Action" and "Scenario" are

included in the design of the inventory as key to the dynamic and relative assessment of resilience.

Use-cases were designed involving all the users of the RESILOC platform: the local managers, the resilience experts, the citizens and the Inventory administrator. All roles and use cases have been discussed and approved by the end users.

Since the inventory has to include dynamic data, inputs from sensors and other live sources have been included in the design, leading to the design of the platform (WP3) and of the related interfaces (APIs). Data-related issues such as availability, trustworthiness, integrity have been addressed, include data protection, definition of user profiles and related capabilities and recording of actions. The resulting design represents the starting point for the implementation of the RESILOC Inventory (Task 4.1) and a supporting element for the design of the RESILOC platform (Task 3.3).

5.2 Synergies, contradictions and challenges

Table 4 below summaries the flow of information and contributions between Task 2.1 – 2.5 based on the results presented in Section 6.1 above. This shows that Task 2.5 has produced valuable inputs to all tasks, in particular for the exploration of current initiatives across the world. On the other end, Task 2.6 has received inputs from all other tasks in the form of requirements, user demands or definition of users and use cases. The executions of Tasks 2.1, 2.2 and 2.3 highlight significant synergies, in particular for the need of converging to usable definitions of the way the results of their analysis can be accommodated into the RESILOC Inventory and used by the users. Task 2.4 was equally aligned to the other tasks in providing inputs to T2.6, but the nature of the collected data is of a different nature and did not need specific coordination.

	T2.1	T2.2	T2.3	T2.4	T2.5	T2.6
T2.1		●	●			●
T2.2	●		●			●
T2.3	●	●				●
T2.4	●	●	●			●
T2.5	●	●	●	●		●
T2.6						

Table 4 – Cross-contributions of WP2 tasks

While it has been possible to harmonise the definition, data collection and analysis of indicators and proxies for the analysis of vulnerability and exposed values (similar methods, similar use of weights for indicators and dimension, same z-score algorithm used for normalising data), Task 2.1 has faced very different challenges as a result of the complex, non-linear relationship between risk perception, adaptive behaviour and resilience. This has made it much harder to identify relevant proxies and indicators, although an initial exploration was done as part of an online survey. More work will be needed in WP3 in collaboration with end users to inform the development of the resilience dimensions, indicators and proxies relevant to such more intangible data related to human behaviour in the face of hazards.

An additional layer of complexity is given by the adopted approach in the assessment of vulnerability, exposed values and, consequently, resilience. It is recognised by the project that these three concepts capture processes rather than static and objective values. The implication of this is that they can be only assessed dynamically, by the differences between two “snapshots” taken either at different sites (e.g. neighbouring community) or in different

moments in time (e.g. before and after some action has been taken). This is not a contradiction *per se* but has increased the complexity of work for WP3 since the synthesis of indicators into the RESILOC hypercube will require a more complex data structure.

The results of WP2 will naturally flow into WP3 and WP4, respectively for the **methods** and the **software** phases of the project. Some of the findings from T2.4 and T2.5 will become part of WP5 for what concerns the interaction with the LRTs and the design of the field trials.

The main challenge, however, is the follow-up of the synthesis of the analysis from T2.1, T2.2 and T2.3 for defining a method for assessing resilience along a limited number of dimensions (the starting hypothesis is 7 dimensions).

The complexity of the scope of work for T3.1 (Definition of Resilience indicator and matrix) and T3.2 (Definition on new strategies for improving resilience) has suggested to substantially revise the workplan of the project.

On the one side some shortcomings in the collection of data from the users (Tasks 2.2 and T2.3) and the need for additional surveys (Task 2.1) call for some specific “leg work” in WP3; on the other side, cooperation with the end users is needed for a longer time than originally planned. For this reason, the cooperation between researchers, developers and users will be extended until the end of the field trials, allowing for a longer overlapping between the project phases and for a continuous refinement of the methods and the tools.

6 Conclusions and recommendations

The following sections summarise the main conclusions of the research activities carried out as part of WP2 and set out some of the limitations of the work done and recommendations for future research and development activities conducted as part of future tasks and work packages.

6.1 Design principles

The study phase of this project – WP2 – has highlighted the complexity of the concept of resilience and 'community resilience' more particularly and the implications this has on the design of the RESILOC tools which aim at assessing, and galvanising new strategies to enhance, resilience in local communities. WP2 has developed a definition of community resilience to guide the design of the RESILOC tools:

> "Community resilience refers to the capacities of local communities as complex systems (involving the actions and interactions of local agencies, citizens, the built environment and critical infrastructures) to mitigate, withstand, and recover from the impacts of a disaster or emergency, as well as to adapt or transform themselves to be less vulnerable to future disasters or emergencies".

This complexity was captured in D2.1 which mapped the relationship between risk perception, preparedness, adaptive behaviour, and resilience in light of four theoretical catchments that situate these concepts in the broader context of a community. As can be seen in Figure 7 below, this broader context includes, among other things, community vulnerabilities, values, norms, previous experience and various structural factors related to the lifeworld.

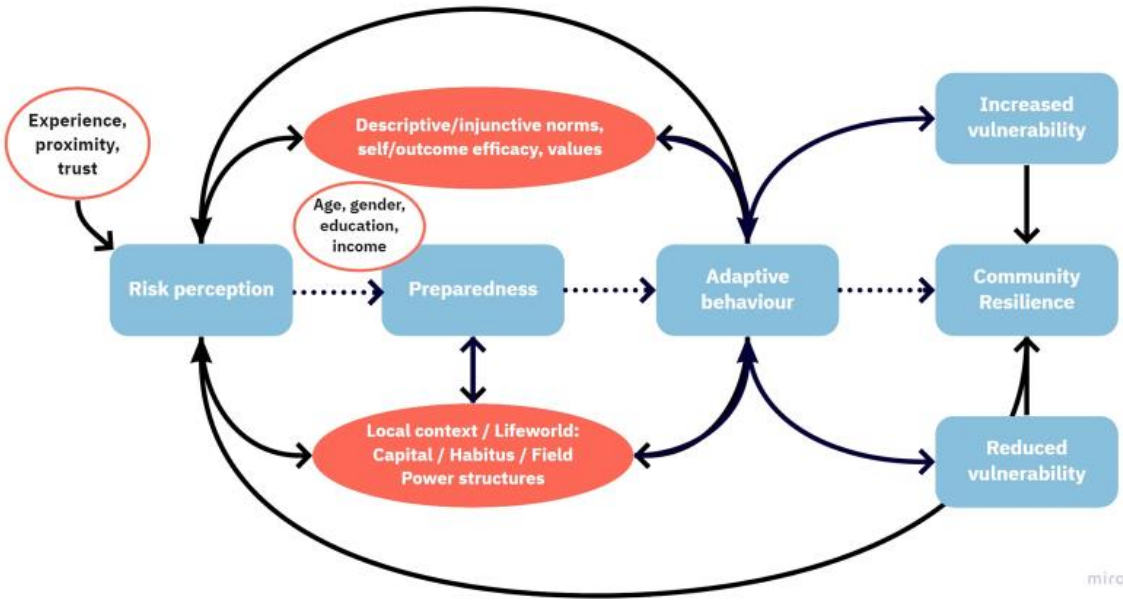


Figure 7 – Community-based adaptive behaviour model of resilience

The complexity of this model and the results of WP2 have several implications going forward for the design of the RESILOC tools. In practical terms, they give rise to a set of design principles, as follows:

1. *An anti-reductionist perspective*: The current vision for RESILOC is to assess the resilience of a community at particular points in time using a set of up to seven

dimensions based on proxies and indicators – to provide resilience snapshots. While such an approach can provide a diagnostic perspective on resilience, on its own it inevitably ignores the understanding of resilience as a process not an outcome (Cutter et. al., 2008; Abramson et. al., 2015) and that resilience capacities are dynamic and cannot easily be measured at a single point in time (Bene et. al., 2012). The design of the RESILOC tools as a whole therefore needs to incorporate assessment measures that are reflexive, reflective, process-sensitive and adaptive.

2. *Context-specificity*: It follows from the first principle that a 'one size fits all' approach is unlikely to work. Communities need to be given the tools to collect and analyse information that enables them to map and understand the dynamics that shape resilience in their particular lifeworld, and then to act on this information in terms of risk-reduction and disaster management strategies.
3. *Co-design and co-creation*: Social constructivism and value-embedded action systems tell us that the RESILOC tools will only be useful if they embody the value and purpose that reflects the lived experience of their users. This makes the case for users to be involved in the design, development and validation of the tools throughout the project life-cycle and beyond.
4. *Dynamic evolution*: The RESILOC tools will be of limited use if they can only present a static, cross-sectional picture of community resilience. Community risk perception, preparedness and resilience evolve dynamically and in ways that are inherently unpredictable. The tools therefore need to incorporate functionalities that can capture and analyse change as it develops longitudinally within the community, while the RESILOC inventory needs to be flexible, allowing a degree of adaptation to reflect context within a broad framework that provides a coherent cross-community structure to guide communities on their information collection activities.
5. *Proximal sensitivity*: Within this broad cross-community framework, the tools need to capture the contextual factors that are key predictors of adaptive behaviour and resilience in each community. This is a formidable challenge that requires close engagement with each community to understand how these dynamics work on the ground.
6. *Developmental*: Our research has established that human agency is pivotal in supporting the transition between risk perception, preparedness, adaptive behaviours and, ultimately resilience. Human agency is mediated through power structures – and, in particular, the relationship between community 'lifeworld' and 'the system'. In addition to resilience assessment tools, communities need supplementary guidance on how to empower them to take an active, co-design and co-creation role in resilience assessment and improvement.

WP2 has started this design process by exploring how to define and collect such proxies and indicators via an analysis of existing data collected from project communities relating to exposed values, vulnerability and hazard scenarios (Tasks 2.2, 2.3 and 2.4); and using an online survey to measure 'risk perception', 'adaptive behaviour' and 'self-efficacy' among citizens, while Task 2.6 focussed on how indicators and proxies could be combined as part of the RESILOC inventory. This work will continue in WP3, 4 and 5 in order to co-design and co-create the RESILOC tools within the pilot communities, including the dimensions, indicators and proxies needed to assess resilience.

6.2 Assessing resilience as a process

The tasks carried out as part of WP2 have confirmed that using a set of pre-defined rules or algorithms to calculate a resilience value will not suffice to provide definitive results on the "resilience performance" of a community. Even more sophisticated approaches involving machine learning do not guarantee success given the large number of proxies and indicators

needed for a credible assessment and taking into account the limitations of data availability already encountered in this first phase of the project.

This is not unexpected and simply confirms the complex nature of assessing community resilience discussed above. Therefore, rather than considering resilience as something to measure the tasks completed so far support viewing resilience as a process – that evolves over time depending on many underlying and contextual factors. This supports a focus on comparing the resilience of a community over time, as a result of specific actions, events, or other developments – to determine a relative change in resilience using resilience snapshots. So rather than limiting to calculating quantitative change, this approach includes also qualitative information about the direction of the change in resilience (increase, decrease) and the intensity of the change (low, medium, high).

6.3 Different types of data sources

As highlighted in Figure 8, the assessment of resilience is expected to rely on a mixture of 'static' and 'dynamic' data to provide a snapshot of resilience in a community related to particular hazard scenarios. The 'static' elements are usually linked with the collection of largely quantitative data of the more tangible resources or characteristics of communities – as was done in Tasks 2.2 and 2.3 with regard to 'vulnerability' and 'exposed values' – to provide such information as, for example, the number of available hospital beds, doctors, citizens within particular age groups, etcetera. Given their mainly numerical nature, this allows for a visualisation of resilience across up to 7 dimensions, which are in turn based on several indicators and proxies. Such a visualisation using colour coding could serve as the basis of an alert system singling out which dimensions might require immediate attention (similar to the approach developed in Tasks 2.2 and 2.3 for vulnerability and exposed value).

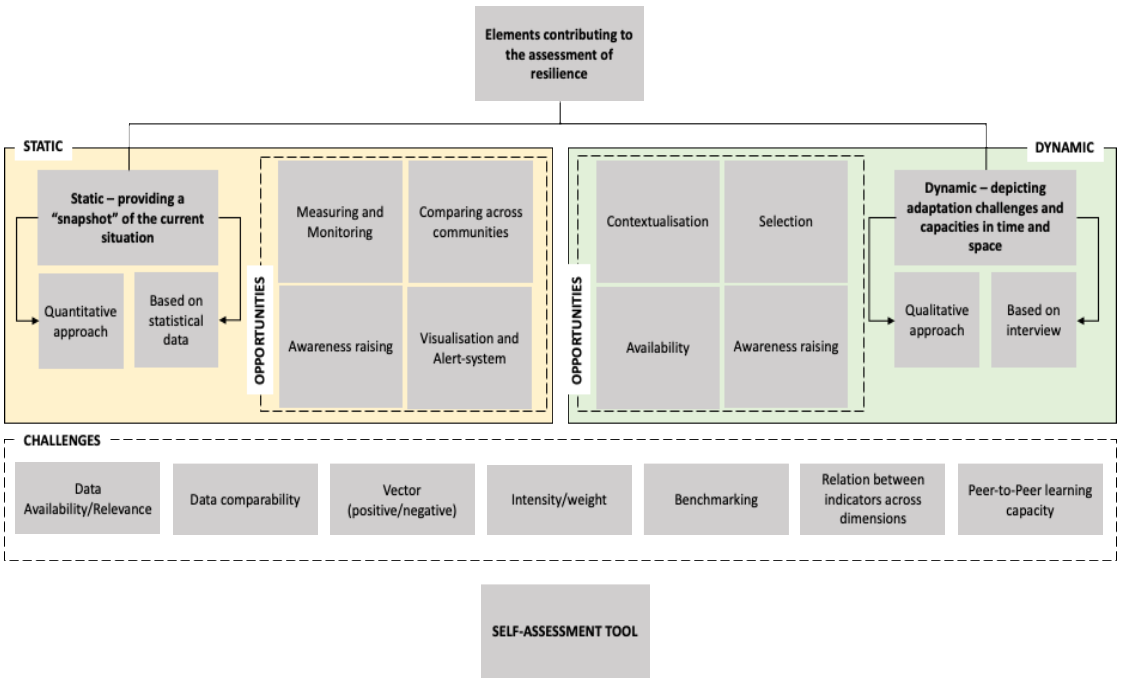


Figure 8 – Opportunities and challenges for static and dynamic elements contributing to the assessment of resilience

However, relying on such data alone suffers from various issues. First, it provides only a very limited snapshot of resilience of a community, and second, the data for such an assessment may often – as has been shown in Tasks 2.2 and 2.3 – not be available or deemed relevant in particular communities. Adding more dynamic data, relating to less tangible aspects of

communities (including the adaptive capacities of communities) can provide a richer resilience assessment. This data is likely to need to be collected from citizens via interviews, surveys or other ways and may include both quantitative and qualitative data. Dynamic data collection tools, such as sensors, social media, the RESILOC App and other crowdsensing solutions can also be used during real or simulated events (as part of field trials) to collect data on the relationship, for example, between risk perception, adaptive behaviour and resilience. This is of great relevance for RESILOC, given the complexity of linking personal behaviours with resilience.

This 'hybrid' approach to assess resilience will be further explored in Task 3.1, by exploring and learning from previous resilience frameworks and developing the dimensions, indicators and proxies needed to assess resilience for specific hazards via active participation of end-users – in order to develop a consolidated resilience assessment framework (the "RESILOC Hypercube").

6.4 The role of resilience experts

However, such a framework, based on a richer assessment of resilience, still does not meet all the design requirements for the RESILOC tools – in particular, the need to develop tools that do not use a 'one-size-fits-all' approach using pre-determined weights or data combinations. This needs to be addressed by allowing community experts and representatives, or 'resilience community mediators', via the LRTs – to indicate their agreement with the weight, vector and relative importance ("the impact factor") of each proxy and indicator for a specific risk – using a self-assessment tool. It can also allow such stakeholders to challenge the data provided by decision makers to complete the initial snapshot and to add additional relevant assessments.

The central role of such community mediators is clear as they can easily alter priorities and, ultimately, the results of resilience assessments and what-if scenarios. For this reason, such mediators need to be chosen on the basis of their local knowledge and impartiality – they need to value the safety of their community above any political interests. In principle, such a self-assessment tool could also be used to ask other members of the community to have a say in the definition of such "impact factors", empowering the community to participate in decisions that will increase their resilience to disasters. By implementing this vision, the role of citizens and other local stakeholders will be more central in contributing to the public safety and security of communities.

It must be noted that the proposed RESILOC tool design is much richer in scope than the typical 'scorecard' approach used in some other resilience assessment frameworks, because it combines the underlying elements in a more dynamic and flexible way. Such an approach connects the conventional elements of the risk equation (hazard, vulnerability and exposed values) and the outcome of a risk perception analysis into a snapshot that can be re-assessed through the specific weighting introduced by the local experts and other stakeholders on the basis of their first-hand knowledge (see Figure 9).

All that comes at a price, though. In particular, users are required to complete a more challenging sequence of tasks:

- collect and input all the required data (proxies)
- manage the unavailability or obsolesce of data
- "weight" and assess the related relevance of proxies and indicator according to a specific hazard scenario and the community context.

However, this approach to the assessment of resilience of local communities as complex systems helps to overcome the limitations of a rigid system based exclusively on pre-defined combinations of proxies and indicators.

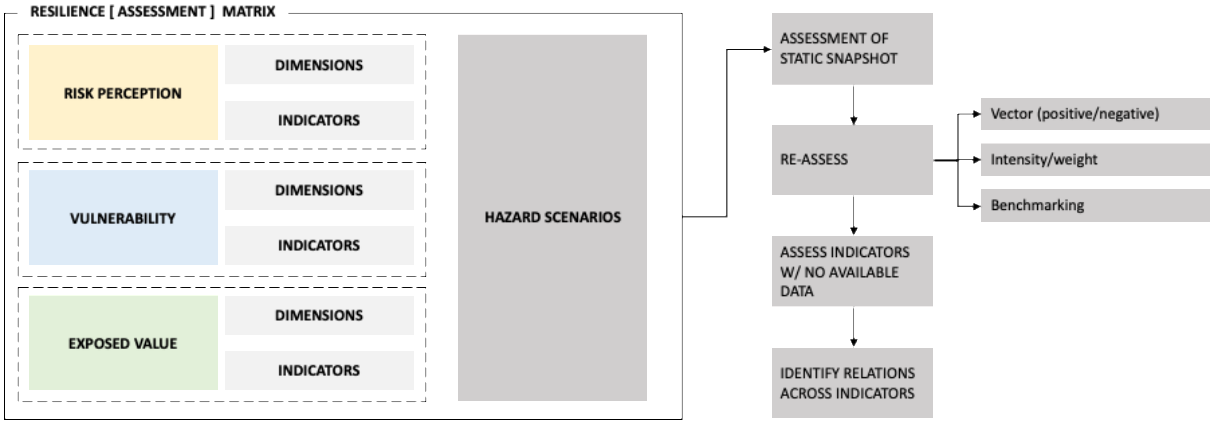


Figure 9 – RESILOC WP2 – From a static snapshot to resilience indicators

6.5 The trials

The project activity on the definition of the scenarios have collected valuable information about the users' interests and priorities. The trials to be designed and executed in WP5 must consider the results of Task 2.4 and of the analysis of the implementation of the End-user engagement strategy and develop specific guidance Methodology to gather the more possible information from them.

The adoption of a specific Trial Guidance Methodology is recommended for identifying possible shortcomings in the collection of data needed for the what-if scenarios, for ensuring the engagement of the local communities outside of the LRTs, for defining the role of the different groups of users and collect their feedbacks in a structured way.

6.6 Limitations and recommendations for future work

6.6.1 Focus on natural disasters and non-cascading events

The research in WP2 has been carried out aiming at exploring the complexity of assessing resilience in local communities, leading to the conclusion that it can only be done using a hybrid approach that combines different types of data and draws on the views of various community stakeholders. The role of the end users has been pivotal in exploring the applicability and usability of the proposed solution: on the one hand, they have highlighted inevitable gaps in data availability, on the other they have defined a set of scenarios of interest that have set clear priorities for the future implementation and validation of the RESILOC tools. Two very clear results from the discussions with users are a need, at the moment, to focus on natural hazards and not on very complex scenarios, including cascading events.

Such a focus on **natural disasters** and **non-cascading events** can of course be seen as a current limitation of the proposed RESILOC tools, as other users may be interested in applying them to other and/or more complex situations.

However, the data collection and validation methodologies developed so far should be applicable to other types of hazards – and it is recommended that subsequent work packages test out using the RESILOC tools and platform for other hazards, such as 'man-made' hazards

As regards, extending the tool to more complex situations, including cascading events, project partners consider the requirements of this to add too much complexity to the dimensional approach adopted by the project – the first step is to model simpler situations and only when they are mastered, extend the model to more complex scenarios. It is expected that the multi-dimensional analysis of cascading effects will stay as an open research item for future projects.

6.6.2 Resilience proxies and indicators

WP2 has started to explore what proxies and indicators are likely to be relevant to assessing resilience in communities in relation to different hazard scenarios. However, this process itself has shown that there are many data gaps and issues. In some cases, lack of data was the result of temporary issues relating to the COVID-19 emergency which prevented partners from collecting or accessing it, while in other cases there were genuine data gaps at the local level which was partially solved by using data at a larger geographical scale (e.g. at the regional level).

At the same time, more work needs to be done to define the 7 proposed resilience dimensions and related proxies and indicators. This is particularly the case for some of the more intangible data related to the relationship between perceived risk, preparedness, adaptive behaviour and resilience. This will need to be explored as part of WP3 by looking at how other resilience frameworks have operationalised such concepts and as well as by engaging with end users.

6.6.3 User engagement and Agile development

In RESILOC, WP4 and WP5 are dedicated to innovation activities. They aim at implementing the RESILOC platform, create and manage the LRTs, and implement the field trials. One of the risks related to the implementation of the RESILOC platform in WP4 is that users may not have a clear idea of the final product before it is too late for adapting or reworking some of its parts. This does not only apply to the user interfaces, but mainly refers to the added value that the platform will bring in light of user demands.

The original plan of the project did not tackle this risk "by design", leaving room for interpretation and adding uncertainty to what message WP5 should pass to the LRTs and how the field trials should be organised. For this reason, project partners have started the definition of a "storyline" of a typical case of use of the RESILOC platform as part of WP2 activities in relation to a primary user, a secondary user and a beneficiary of the project (Section 1.2). The benefit of this exercise is manifold and includes the need to:

- clarify the process the platform will be embedded in and get it approved by users
- make clear to researchers the concrete needs of the users
- help implementers to understand what the users will or will not want to use
- support the project communication
- kick-off the tasks on exploitation and future sustainability

This storyline needs to be further developed in subsequent activities and WP3 in particular to develop a clear vision and use cases of the platform in communities. With a clear focus on the added value perceived and understood by users, this will enable the innovation tasks to become more focused and it will be possible to design a series of 6 "sprints" for the *Agile* approach that will be adopted.

At the end of each "sprint", a workshop with researchers and end users will be organised, allowing for the acceptance of the development cycle by users and an efficient management of the development process. In parallel, the design of the trials will have to be very concrete, counting on mock-ups and early prototypes to be discussed with local communities, stakeholders and LRTs.

6.6.4 From the inventory to the platform

The design of the RESILOC inventory carried out as part of Task 2.6 captured all the requirements defined by the other tasks. Nevertheless, the implementation of the hybrid approach and the additional requirements that will be identified in WP3 about the resilience framework or matrix ("The Hypercube") may require some refinements or extensions.

It is recommended to extend Task 4.1 until the design of the field trials is completed, so that, thanks to the planned "sprints", possible requirements coming from research and validation activities carried out as part of WP3 with end users can be captured, considered and used to adapt the RESILOC tools.

Given the many functionalities that will be offered to the users and the expected long list of datasets needed for configuring the system, it is recommended to start with an early design of the user interfaces (mock-ups) and allocate enough time for training the users and support them in the use of the platform: this will also enable us to refine the guidelines and recommendations for future take-up outside of the consortium.

6.6.5 The field trials

Although the field trials are not part of the research covered in WP2, the interaction with the end users has identified some considerations that should inform their design and implementation.

Our research has highlighted the complexity of assessing resilience and the different roles people play in increasing or reducing it. Furthermore, different stakeholders will have different perspectives on what aspects are important for increasing or reducing resilience.

This suggests that all identified users (stakeholders, practitioners and citizens) must be involved in the trials, to ensure that the RESILOC tools are relevant and tailored to their different needs, they agree with the weights associated with different indicators and provides, and that any actions identified genuinely increase resilience in their area. Community decision makers are likely to use the platform to get at least two snapshots per scenario; practitioners will be responsible for assigning weights and deciding on ‘actions’; and citizens will have to be involved in the use of the RESILOC App and other forms of disaster communication.

The approval and the evaluation of the field trial designs will have to include stakeholders, practitioners and LRT members (representing the citizens).

Appendix I.: RESILOC ethics self-assessment sheet

RESILOC ethics self-assessment sheet

This document is a self-assessment sheet that must be filled out by owners of RESILOC deliverables. This is to ensure that research and/or development activities related to each project deliverable comply with requirements of RESILOC Guidelines on Ethics and Data Protection (GDPR).

This RESILOC ethics self-assessment sheet must be used as part of each project deliverable that involves humans either in an active (e.g. data subjects) or passive (e.g. affected by tools) manner. Project reports (e.g. management or financial reports) are not required to undergo this ethics assessment.

This document is an important exercise part of the RESILOC Ethics Framework as it allows the owner of each RESILOC deliverable to reflect on ethical consideration and data protection requirements in a structured and approved manner before submitting the document to the Commission for review.

The document shall be used in line with the RESILOC Ethics Framework including the guidelines and procedures under deliverables D9.1 to D9.12 (all documents are made available on the RESILOC Own Cloud). The ethics self-assessment sheet must be included as the 1st Appendix A of the each RESILOC deliverable. In addition to filling out the sheet, authors must provide explanations of the answers given on the main table. Such explanations must be provided in the methodology section of the deliverable using the headline "Ethics Considerations and Data Protection". The ethics self-assessment sheets of private deliverables must be assessed through the responsible position within the issuing organisation. However, for public deliverables, the ethics self-assessment sheet must be approved by the RESILOC Internal Ethics Board. For that, please send this document to the Internal Ethics Board.

For Information or assistance contact:		helena.marruecos@iml.fraunhofer.de	
The self-assessment was conducted by:		The self-assessment was approved by:	
Name	Uberto	Name	Karsten
Surname	Delprato	Surname	Uhing
Institution	IES	Institution	FhG
Date	19.11.2020	Date	20.11.2020

		yes	no	n/a
G	**GENERAL**			
a	Did the research for this deliverable involve the collection of personal data?	X		
b	Does this deliverable, and the activities that have fed into it, comply with Regulation (EU) 2016/679 known as GDPR and 2002/58/EC Directive on privacy and electronic communications?	X		
c	Does this deliverable, and the activities that have fed into it, comply with the relevant national data protection and privacy laws, codes of practice and guidelines?	X		
d	Are there any ethics risk identified related to your work under this deliverable?		X	
1	**Human Participation/ Informed Consent**			
1.1	**Procedures and criteria that will be used to identify/recruit research participants** (D9.1)			
a	Did the research for this deliverable involve the recruitment of research participants? *(this includes surveys and interviews)*	X		
b	Did you identify selection, inclusion, & exclusion criteria?	X		
1.2	**Recruitment of respondents via social media** (D9.4)			**X**

b	Were special measures taken to ensure that the participants are adults?						
c	Did the research for this deliverable involve data collection using social media?						
d	Were measures taken to use only public profiles for the collection of data?						
		yes	no		yes	no	n/a
1.3	**Use of the informed consent forms and Info sheets to recruit research participants** (D9.2)						
a	Consent Form was issued						
b	Information sheet was issued			Issued in local language			
c	Combined sheet was issued	X				X	
1.4	**Use of the informed consent forms and information sheets on data processing** (D9.9)						**X**
a	Consent Form was issued						
b	Information sheet was issued			Issued in local language			
c	Combined sheet was issued						
2	**Organizational measures**						
2.1	**Data Protection Officer or contact person** (D9.5)						
a	Do you have a Data Protection Officer or contact person for participants?				X		
b	Was this contact mentioned on the Informed Consent Forms?				X		
3	**Technical measures**						
3.1	**Technical safeguard mechanisms for handling of personal data (PD) and special categories of personal data (SCOPD)** (D9.6 / D9.8) (SCOPD include information such as ethnic origin, political opinions, data concerning health, etc. For more details see Article 9(1) GDPR).						**X**
a	Did the research for this deliverable involve the collection of SCOPD? (D9.6)					X	
b	Which mechanisms were used to safeguard the personal data collected?						
	pseudonymisation			anonymization			
	encryption			other *(specify in the line below)*			
	access restriction						
3.2	**Data minimisation** (D9.7)						**X**
a	Has as little as possible data been collected throughout the research process?						
b	If more data was collected than initially needed, did you ensure the data was deleted?						
3.3	**Data profiling** (D9.10)						**X**
a	Was or will the data collected in the deliverable be used for data profiling?						
b	Were all data subjects informed of the profiling and its possible consequences? (as part of the Inform Consent Form and the Information Sheet)						
c	Were sufficient measures in place to safeguard their fundamental rights?						
3.4	**Processing of previously collected personal data** (D9.11)						**X**
a	Did you obtain consent to use personal data from previously executed research?						
b	Are technical/organisational measures required to safeguard the rights and freedoms of the data subject according to EU and national legislation in place in your organisation?						
4	**Other Issues of ethical concern**						
a	Were there any other ethical considerations detected during the work of this deliverable that are not covered by the list above?					X	
b	If yes, please list the concerns below and elaborate on the related counter measures in the methodology section of this document						

B cont.								
_5	**Opinions/approvals provided by ethics committees and other experts**							
5.1	**Following documents received opinions/approvals provided by ethics committees and other experts for the research conducted for this deliverable.**							
			yes	no		yes	no	n/a
a	Informed Consent Forms and Information sheet	IEB			EEA			
		DPO			LEB			
b	Questionnaires / Surveys	IEB			EEA			
		DPO			LEB			
c	Design /Methodology of research activity	IEB			EEA			
		DPO			LEB			

Appendix II.: End-User Engagement Strategy

II.1. Objectives

The purpose of the End user Engagement Strategy (EES) is twofold:

1. to improve the engagement of end users in project activities, with reference to recommendations 7, 8 and 9 delivered by the REA after the first project review;
2. to define the overall RESILOC project end users' engagement process in order to ensure that both internal (i.e. intended as project partners which represent local communities) and external end users (i.e. outside of the sphere of influence of RESILOC, beyond the local communities/pilot sites envisaged by the project) will be given a more prominent role in the next phases.

The Strategy thus foresees a two-steps implementation process:

1. PHASE 1 (August 2020 – December 2020)
2. PHASE 2 (December 2020 – until the end of the project).

Within Phase 1, the Strategy aims at fully reaching the following objectives:

1. clearly mapping of the end users who have been identified and engaged by RESILOC since the beginning of project activities;
2. build the overall consortium capacity to plan for and engage with end users;
3. collecting and assessing project local communities' feedbacks on RESILOC project outputs and the progress achieved so far.

Within Phase 2, the Strategy aims to ensure that:

1. the engagement of both internal and external end users is engrained in the project development plan, monitored and assessed; and
2. all project partners are equipped with the tools and the capacity to contribute to the engagement process.

II.2. Vision

RESILOC PRODUCTS ARE USEFUL | RELEVANT | SUSTAINABLE | OWNED

RESILOC end users and beneficiaries represent the core/driving force of the projects' R&I activities.

The development process of the RESILOC tools is centred on the needs and the requirements of such actors, while its outputs/products (i.e. RESILOC inventory and cloud-based platform) ensure a high degree of:

- USEFULNESS – RESILOC provides concrete strategic tools for local actors, that allow them to assess the resilience of their communities to ensure better planning and ultimately, strengthening of .
- RELEVANCE – RESILOC tools serve the purpose of setting context-relevant and context-specific resilience-strengthening strategies, that stem from a high level of awareness of context vulnerabilities, resources and capacities.

- OWNERSHIP – RESILOC tools will benefit from user-friendly interfaces and will ensure a step-by-step guidance for the users, so to ensure an independent deployment, within context-specific practices and procedures.
- SUSTAINABILITY – RESILOC tools are designed to accommodate the needs of a variety of users, beyond the profiles envisaged within the project consortium. The Local Resilience Teams formed by the project are envisaged as a sustainability component – it is expected they will use the RESILOC tools after the end of the project.

II.3. Mission

CO-CREATION: CO-DESIGN and CO-PRODUCTION

In order to ensure that RESILOC tools and overall outputs are USEFUL, RELEVANT, OWNED and SUSTAINABLE, the EES promotes a CO-CREATION approach in the development process, that is based on a continuous and structured engagement of end users.

Such an approach establishes a constant dialogue between partners developing the tools (i.e. technical partners) and partners end users (i.e. partners that represent local communities), throughout the entire cycle of the development process of the RESILOC tools.

The approach is structured in two main phases, as follows:

- CO-DESIGN – engagement activities aimed at the identification and analysis of problems and related solutions. Such activities refer to the initial phase of the development process and serve the purpose of identifying specific user needs and requirements.
- CO-PRODUCTION – engagement activities aimed at the implementation/testing of the proposed solutions. Such activities refer to the implementation phase of the development process and serve the purpose of feedback gathering to check the compliance with identified needs and requirements (e.g. within the framework of WP5 - Field trials).

II.4. Core Values:

PARTICIPATION| RESPONSIVENESS | EFFICIENCY & EFFECTIVENESS | OPENNESS AND TRANSPARENCY | INNOVATION | DIVERSITY | ACCOUNTABILITY

The engagement process envisaged by the EES reflects the following core values:

- PARTICIPATION – end users are at the centre of the RESILOC tools development process and they are involved in clearly defined ways. The procedures (i.e. tools and methods) and the objective/purpose (i.e. co-design, co-production) of the engagement is clearly and timely communicated by the promoters of the engagement activity (i.e. Task leader, WP leader, Task owners, etc.).
- RESPONSIVENESS – The promoters of engagement activities establish clear channels and procedures of communication with end users and ensure a timely reply to any request.
- EFFICIENCY & EFFECTIVENESS – The engagement activities are planned so as to capitalise on existing resources (i.e. financial, human, time). Moreover, a monitoring and evaluation mechanism is put in place to allow for periodic checks of the

engagement activities – as a basis for potential integrations/adaptations of the EES (See MONITORING AND EVALUATION section).

- OPENNESS & TRANSPARENCY – The results of the engagement activities are communicated to end users (e.g. reports, minutes of the meetings, etc.) and are available on request at any time of the process.
- INNVOVATION – The engagement activities are designed to allow for COVID19 safe interactions (e.g. use of online platforms and tools for interviews, online surveys, etc.).
- DIVERSITY – Engagement activities are designed in respect of diversity and promoting gender mainstreaming. Even more so, the EES capitalises on the diversity intrinsic to the consortium so as to ensure the production of sustainable and replicable outputs.
- ACCOUNTABILITY – The promoters of engagement activities (i.e. Task leaders, WP leaders, Task owners) are clearly identified in all stages of the process and are fully accountable in their interaction with end users.

II.5. Monitoring and evaluation

The EES foresees a Monitoring and Evaluation (M&E) mechanism, that aims to support an efficient implementation of the engagement strategy.

The M&E mechanism entails the following characteristics:

- object of M&E: the engagement activities implemented within the framework of the EES (e.g. activities related to co-design and co-production such as interviews, workshops, FGIs), etc.);
- goals of M&E: to check whether the progress of the EES implementation (i.e. regarding output production and outcome achievement) is in line with the set objectives in order to allow for potential corrective actions to the strategy;
- phases of M&E: activities of M&E will be performed through the entire cycle of the EES;
- roles and responsibilities of M&E: the implementation of the EES M&E mechanism will be overseen by the Practitioners' Representative (PR) and Scientific Coordinator (SC). Each Task owner/promoter of an engagement activity will have the responsibility to perform the M&E actions (with the support of ISIG and TIHR) and report the results to the PR and SC. The PR and SC assess whether the EES implementation is satisfactory or not;
- data collection – tools and procedures: the EES entails specific tools for the timely collection of information (i.e. reporting templates, questionnaires, etc.) on the progress. Task owners/promoters of an engagement activity are going to collect and analyse data and the PR and SC.

Concretely, the following evaluations activities will be implemented per each phase of the M&E mechanism:

- ***ex ante* evaluation activities** – during the design phase of the EES the project GANTT will be updated with an extra layer that singles-out the engagement activities to be performed within the EES. Such a layer aims to provide a consolidated overview of the engagement activities already engrained in the project structure at proposal stage. Moreover, templates for data collection will be designed as follows: reporting templates

for engagement activities (e.g. interviews, workshops, etc.) as well as satisfaction questionnaires for participants at engagement activities;

- ***in itinere* evaluation (monitoring) activities** – during the implementation phase of the EES data on the progress and on the satisfaction with the engagement activities will be collected by means of the above-mentioned tools. Progress data will be crossed against the project GANTT so to monitor the compliance with the set schedule and decide if corrective actions/changes are necessary. Data from satisfaction questionnaires will be analysed and shared with the PR, SC as well as with all task owners/promoters of engagement activities so to facilitate the learning process around the organisation and implementation of such activities;
- ***ex post* evaluation activities** – at the conclusion of the EES a final evaluation report will be drafted (i.e. to be included as an Annex to D5.3.).

II.6. Tools and Methods

This section aims:

1. to clarify the roles and responsibilities of project partners in ensuring the implementation of the EES;
2. to set out the methods suggested for use throughout the project to engage end users in the co-creation (co-design and co-production) of the project outputs.

II.6.1. Partners roles and responsibilities

The EES implementation, as any other project activity, ultimately falls under the RESILOC Project Management Plan; it is subject to the Project Quality Insurance Plan and it is compliant to the Project Ethical Framework and Guidelines as well as to the Project Scientific Coordination.

The following specific roles and responsibilities are identified as key components for the EES's efficient implementation:

1. Practitioner Representative (PR) (Katja Banovec Juroš – ACPDR). The PR coordinates and monitors the progress of the EES implementation, providing support and feedback to involved partners. The PR is accountable for the EES implementation reporting directly to the Project Coordinator, the Scientific Coordinator and the Project Manager. The PR is responsible for ensuring the efficient and continuous implementation of the Strategy as well as to design and enact implementation of corrective measures as needed during the project lifespan (See MONITORING AND EVALUATION MECHANISM of the EES Section). Finally, the PR liaises with Project Partners responsible for Communication and Dissemination to ensure the integration of the EES with these project components.
2. Project Local Communities (PLC). PLCs are the immediate end users of the RESILOC project. Beside the roles and responsibilities already defined within the RESILOC project management documents, within the EES, PLCs need to ensure the timely response to project needs in both co-design and co-production processes. The PLCs are:
    - Municipality of Gorizia
    - Municipality of Kamnik

- Tetovo Village
- City of Catania
- Province of West Achaia

3. Project Facilitators (PF). PFs are project partners which are directly accountable for providing support to PLCs in engaging in project activities in general and in the EES. PFs are already identified in the RESILOC project management documents as PLCs supporters in organising and deploying project trials. The PFs are:

   - ISIG -> (Municipality of Gorizia)
   - ACPDR -> (Municipality of Kamnik)
   - BRC -> (Tetovo Village)
   - IES / DPRC -> (City of Catania)
   - HMOD -> (Province of West Achaia)

Moreover, within the EES, Work Package Leaders and Task Leaders are responsible for mapping out to what extent respective tasks or sub-tasks need the involvement of end users (both internal and external) and to carry out the necessary engagement activities.

ISIG and TIHR will be responsible for providing methodological support and *capacity building* to partners in preparing and implementing engagement activities.

Finally, FHG will be responsible for providing guidance in and ensuring compliance with the RESILOC ethical framework and data protection guidelines in all engagement activities.

II.6.2. Selected tools and methods

The different methods available for the engagement of internal and external end users are presented in Table 5, along with a short description of what they consist of, their main purpose, some considerations about when to use or not use each method, and what tools will be made available to apply them.

Table 5 - End users' engagement tools and methods

METHOD	DESCRIPTION	PURPOSES	CONSIDERATIONS	TOOLS
Community Mapping	Use of desk research, local stakeholder input, web-searches, and local audit to map the structure of local communities, with a focus on the roles and relationships of end users in these communities	To understand and map the structure of the five project local communities to help identify the roles and responsibilities of end users in these communities	This method needs to be applied to inform subsequent end-user engagement activities in order to know who to target This method can be applied in conjunction with mapping activities in Task 6.2 Local resilience	End-user mapping summary tool Mapping tool – T6.2
Survey	Use of a mixture of open and closed questions to collect the views and responses from a large number of people within or across communities	To collect qualitative and quantitative data across many people	This method relies on reaching a large, and ideally, representative sample of survey participants. Surveys can be conducted online, by telephone or using paper questionnaires.	Informed consent form Survey topics and questions Analysis framework
Semi-structured interviews	Collect more in-depth experiences and views of key stakeholders using a pre-defined list of questions or topics to be explored, but with the ability to probe particular ideas or themes raised by the interviewee; the interviews are usually conducted one-to-one but can be done face-to-face, online or via the telephone	To collect mainly qualitative data from a smaller number of interviewees than a survey, but providing more in-depth and detailed responses, and the ability to tailor questions to each community / interviewee.	This method can be quite resource intensive, as they usually last at least 1 hour, and interviews should ideally be recorded and transcribed; if interviews are not conducted face-to-face considerations needs to be given to how they will be recorded. Interviewees should be selected on the basis of the end-user mapping tool.	Informed consent form Interview topic guide Content analysis/reporting template - to feed into M&E activities

METHOD	DESCRIPTION	PURPOSES	CONSIDERATIONS	TOOLS
Focus group interviews	Collect more in-depth experiences and views of key stakeholders using a pre-defined list of questions or topics to be explored in a group setting; The group discussion is 'focused' or structured by a 'facilitator' and there should ideally also be present an observer or recorder to gather data on the outputs of the discussion	To collect mainly qualitative data from a group of interviewees, to record their responses to questions asked, but also to observe interactions between group participants; this method also often employs interactive methods, using flip charts or post-its, to elicit the views of , and encourage interaction between, focus group participants	While this method allows for the collection of views of a whole group of interviewees, it is also quite resource intensive as it relies on considerable preparation, engagement of participants, and analysis of the data. The Focus Group should take between 1 and 1.5 hours in total. The proceedings of the discussion should either be recorded verbatim using an audio recorder or through written notes.	Informed consent form Focus group guide Content analysis/reporting template – to feed into M&E activities
Participatory workshops	Collect views and responses from a group of stakeholders to a particular idea, prototype or concept.	To collect responses and feedback from a group of stakeholders who have been chosen to expert advice on their views of how useful, relevant or sustainable a particular tool or solution is to them and their communities. This method may also often employ interactive methods, using flip charts or post-its, to elicit the views of group participants	This method is similar to a focus group interview but is less rigorous and so may be less resource intensive. It can be used to provide feedback on an idea or prototype to assist the ongoing co-design of a RESILOC product or output. Group participants may be selected on the basis of the end-user mapping tool.	Informed consent form Workshop design and key questions Workshop summary /reporting template - to feed into M&E activities

II.7. EES Communication plan

The EES communication plan builds on the RESILOC project Communication Plan, specifying the strategy of interaction with the target group of End users. The goal is to establish a pro-active communication framework strategic built on the reference frameworks provided by the Horizon 2020 programme and provide targeted informational support to key project stakeholder groups in the end user community. Relevant ethical principles will be applied to all conducted actions.

The communication strategy in carried out on behalf of the RESILOC consortium and shall support the overall communication strategy, as well as all project partners' local communication activities relevant to End users.

The primary communication objectives of the communication efforts are:

- To give the project high relevance and visibility with End users to enforce accessibility of the project activities, create awareness for its deliverables and outputs strengthening their uptake and actual deployment.
- To encourage open dialogue with relevant End user communities about the project's aims, methods and outcomes and support interaction across all phases of project implementation.
- To reach out and involve relevant and targeted audiences in support of the strategic objectives of the project.

The RESILOC EES communication plan will be implemented with the use of various communication tools, channels and activities, further described in this section of the document.

II.7.1. EES Target Audiences & Objectives

The EES target audiences will be addressed with tailored communication initiatives addressing their specific needs and potential roles in the context of the jointly addressed strategic objectives. The main principles of interaction will be shaped by end user needs and shaped to achieve effectiveness and efficiency in information delivery and achieve engagement and satisfaction of the catered end user groups.

The following table builds on the objectives from the grant agreement and describes the general communication strategy per EES target group. Preliminary objectives have been assigned as well.

Table 5 - Target audience for communication

Target audience for communication	Communication strategy	Preliminary objectives
Policy makers	Two way Direct interactions, consultations, semi-structured interviews One way Press releases, newsletters	Sharing of experiences and advocacy Active promotion of local resilience and engagement through joint public statements with project team
Civil society	Two way Group discussions, roundtables, participatory workshops, local events, consultations One way Press releases, newsletters	Promotion of integration of project initiatives into local community interventions Active cooperation in awareness raising initiatives
First responders **Civil protection agencies** **Emergency management services**	Two way Group discussions, roundtables, participatory workshops, semi structured and focus group interviews, consultations One way Press releases, newsletters	Engagement in dialogue on the field trials and their results, integration of lessons learnt, and tools generated Active support to awareness raising and local resilience building initiatives
Technical services **End users from industry**	Two way Semi-structured interviews One way Press releases, newsletters, demonstrations, exhibitions	Active support to technical aspects of trials, presentation of solutions at conference platforms
Local resilience teams	Two way Group discussions, roundtables, participatory workshops, semi structured and focus group interviews, community mapping, local events, consultations One way Press releases, newsletters	Set of communication events tailored to the needs of specific LRT promoting direct involvement in resilience building processes Active engagement via social media and promotion of LRT activities by local partners Tangible contribution to the project and trials

II.7.2. EES communication toolkit

To increase impact, quality and efficiency of the communication actions a complex communication toolkit will be utilised for the benefit of the RESILOC EES and address multiple audiences within and beyond the project's own user communities.

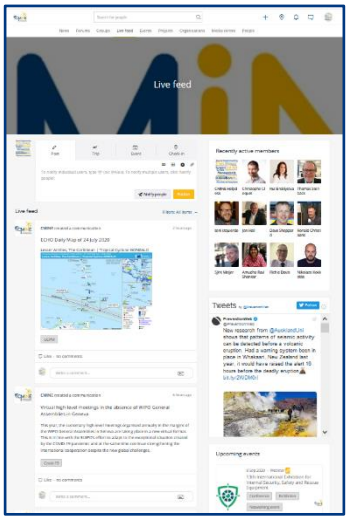
The communication actions will follow the general scheme

The RESILOC project's website and social media outlets on Facebook, Twitter and LinkedIn will be used to address End users with targeted communication. The communication on social media focused on the target groups of End users will be highlighted with the hashtags #UserDrivenApproach and #ResilocCommunityOfUsers.

Events will be organised in support of the direct interaction with end user representatives and local resilience teams. Online interaction platforms will serve to mitigate the limited opportunities for direct interaction due to the pandemic related restrictions.

II.7.2.1. The CMINE platform support

The CMINE platform will be used to deliver specific capabilities in support of the EES implementing teams and in-house End users engaged directly in the project implementation, as part of an integrated communication and dissemination strategy, providing:



1. A quality assured approach to the General Data Protection Regulation (GDPR). This embeds the capability to place data protection at the core of the project's processes in the context of specific EES initiatives
2. A specific membership and contact scheme that will maintain communicability amongst project members and other partners
3. A live feed to promote information sharing amongst the project team
4. A secure group for thematic discussions and debates as well as cooperative action preparation in the context of EES
5. A structured and secure document and media repository
6. A portal to communicate project progress and requests to the wider Crisis Management community

Event publication facility immediately making the events known across key stakeholders including researchers, practitioners and other key End-users.

Extended support is available for the team implementing the EES to take advantage of through the facility of the RESILOC Group hosting, established on the CMINE platform, enabling the teams to share information, interact and cooperate on related tasks even when personal meetings are not possible.

The End user focused communication actions will accompany the R&I work of the project throughout its duration. As project outputs become available throughout the course of project, efforts will be made to closely capture, monitor and manage results (including the

accompanying IP Rights) over the entire lifetime of the project and adjust communication activities, as well as dissemination and exploitation plans accordingly.

The EES Communication Plan will be regularly updated alongside the RESILOC Communication strategy based on an integrated approach, designed to effectively support implementation of communication, dissemination and exploitation activities in all phases of project implementation.

Appendix III.: EES – Implementation of Phase 1 Report: Interviews with Project Local Communities

III.1. Introduction

This Appendix sets out the results of the data gathered from the RESILOC end-user communities in Gorizia (IT), Tetovo (BUL), Kamnik (SI), West Achaia (GR), and Catania (IT) within the framework of the Phase 1 – EES implementation. It complements the data obtained from the activities carried out as part of WP2, including literature reviews, exploration of disaster scenarios, measurement of vulnerability, and review of existing resilience approaches.

Such knowledge, in particular the insights into the assessment of risk perception, preparedness, vulnerability and resilience developed so far, provides the foundation for WP3, and the remainder of the project. It provides a rich description of the complex operational and theoretical terrain in which the emerging RESILOC tools can be developed and refined.

End-users

RESILOC recognises end-users as co-creators of the tool under development, rather than passive recipients of the emerging product. They are an organic component of the RESILOC consortium where municipalities, practitioners and humanitarian organisations are represented as partners.

For the purposes of the EES project end users have been defined as:

- Policymakers
- Technical Service – expert networks
- First responders
- Civil society

In compliance with priorities set in the Recovery Plan and specifically with the End users Engagement Strategy, a first round of interviews with project end users has been carried out in the period 28.09.2020 – 24.10.2020.

The interviews were conducted and coordinated by ISIG and TIHR and were observed by the project Practitioner Representative.

Moreover, partners that are considered Project Facilitator for Project Local Communities were invited to assist and facilitate the interactions.

The interviews gathered information on the level of awareness of Project Communities about the RESILOC project overall and its fundamental predicates.

There is a full report of the interviews in the Annexes (Section 7); Section 4 provides summary reports for each community; and Section 5 contains a matrix (5.1) comparing responses across the five communities together with a SWOT analysis (5.2) relating to the proposed RESILCOC tools.

III.2. Methodology

Data was collected from a total of 18 participants across all 5 community partners.

- 6 interviewees in Gorizia
- 5 interviewees in Tetovo
- 3 interviewees in W. Achaia with 1 interviewee providing an additional written response

- 1 interviewee in Kamnik and 2 written responses
- 1 written response from Catania

The interview topic guide was developed with input from all project partners. It covered five topics:

1. Understanding of resilience locally
2. Existing approaches to assessing resilience in the community
3. Regulations and legal frameworks relevant to resilience
4. Views on the RESILOC tools and dimensions
5. Community participation in resilience related activities.

Data gathering and analysis were conducted by ISIG and TIHR.

III.3. Project Communities' summary results

The main insights gained from each topic in each Project Community are summarised below. A summary table aggregating all results is provided in Section 5. In Annex 6.1 to 6.5, the full report for each community is presented.

III.3.1. Municipality of Gorizia, Italy

On UNDERSTANDING RESILIENCE AT LOCAL CONTEXT

The main hazards to which Gorizia is exposed are earthquake and hydro-geological/landslides.

Improving resilience is mainly understood as strengthening soft-skills and planning capacities within the community, raising awareness, and promoting the active involvement of the population in the resilience-dedicated strategies and practices at local level. A special focus is given to young citizens and schools. Improving resilience goes beyond infrastructural investment to strengthening capacities and skills of the local population This is summed up in the belief that learning from the past, when facing a disaster, matters more for a resilient population than resilient infrastructures.

Main actors are the institutions (Mayor's office, Municipality), the Civil Protection service, First responders. However, it is stressed that civil society organisations of all types (volunteering, cultural, sports) have a crucial role when it comes to resilience (and disaster management) as the COVID-19 emergency shows.

Active and engaged citizens are an added value to resilience frameworks, as well as an objective to be constantly sought by the Municipality (i.e. fostering and promoting the engagement of citizens).

In terms of actions to improve resilience, the focus is given to prevention/preparedness activities that go from structural maintenance to awareness raising campaigns.

Strengthening resilience is seen very closely linked to preparedness.

On ASSESSING RESILIENCE IN THE LOCAL CONTEXT

Assessing resilience is perceived as crucial for decision-makers and practitioners alike. There are currently no tools or frameworks available in Gorizia for community resilience assessment. Ideally this assessment should combine qualitative and quantitative data and be tested initially in a small unit of population, such as a neighbourhood. It should enable comparison with

findings in other neighbourhoods. The assessment should be performed starting from a small unit (e.g. neighbourhood) and should allow for a comparative perspective with other contexts.

On RELEVANT REGULATIONS & LEGAL FRAMEWORKS

A number of laws cover Civil Protection but there is nothing specific on resilience.

There is no consolidated financial framework for resilience.

On RESILOC TOOLS

The tools are seen as relevant to the preparedness phase and have raised considerable interest. A particular concern is how they will integrate the physical and social aspects of resilience.

The number and 'types' of dimensions presented appear to be sufficient.

From the perspective of the practitioners, there is the interest in understanding the 'intervention' tools for tackling the social aspects of resilience.

On PARTICIPATION

Actors that should be involved are associations/CSOs of all types, also in light of the ongoing experience of managing the COVID-19 situation at the local level.

III.3.2. Tetovo Community, Bulgaria

On UNDERSTANDING RESILIENCE AT LOCAL CONTEXT

The main hazards Tetovo is facing relate to winter conditions and wildfires.

Resilience is understood as a key component of the disaster management framework.

Tetovo depends on the strong engagement of local actors and community members in disaster management practices because there are no emergency services of any kind in the Municipality. The nearest fire and ambulances services are 35km away (45 mins) in Russe.

Consequently, improving local resilience is understood as acquiring new infrastructure and equipment as well as ensuring effective training for local voluntary first responders.

On ASSESSING RESILIENCE IN THE LOCAL CONTEXT

There is frequent consultation between the Mayor and local actors on disaster management practices. This leads to the development and exchange of information, knowledge and procedures for use in emergencies.

Resilience is 'assessed' at the local level by the Mayor and local community actors gathering and reviewing pre- and post-emergency information.

A statistically based resilience assessment would be difficult to implement given the size and resources of the Municipality. Tetovo can only be represented statistically within national data. When discussing the hypothetical possibility of resilience data for Tetovo, the respondent favoured a combined qualitative and quantitative approach. This was based on their experience of being able to work effectively with the qualitative data currently already available to them.

On RELEVANT REGULATIONS & LEGAL FRAMEWORKS

References to 'fostering resilience' may be found in a national law referring to 'Protection of the Population.

On RESILOC TOOLS

The tool appears relevant and useful in general, but the respondent stresses the difficulty in the availability of data.

On PARTICIPATION

The Tetovo community is engaged in resilience and disaster management practices in a satisfactory way.

III.3.3. Municipality of Kamnik, Slovenia

On UNDERSTANDING RESILIENCE AT LOCAL CONTEXT

The main hazards are landslides, floods, windstorms, earthquakes, and sleet.

Primary stakeholders: Mayor and the Municipal Administration, Advisor for Civil Protection, Voluntary Fire Brigade, and the Regional Red Cross Association.

Secondary stakeholders: citizens, kindergartens, medical institutions, and retirement homes.

Citizen resilience comes from prevention education, understanding the risks and preparedness, and a long tradition of volunteering.

Preparedness is the most critical phase of the disaster cycle.

Resilience can be improved by knowing and understanding hazard risks and strengthening risk governance. Improving stakeholder preparedness will reduce impact and shorten the recovery period. Resilience of local infrastructure as has been increased via the use of the Build Back Better (BBB) principle in the recovery period to combine attractive buildings with strengthened resilience.

Good lesson: Producing structural resilience for floods, windstorms, and earthquakes by combining traditional design and the natural environment with resilience measures – building a dam close to Kamnik that looks nice but has a practical purpose.

On ASSESSING RESILIENCE IN THE LOCAL CONTEXT

Assessing resilience is essential for understanding individual safety, the protection of property, economic and agricultural continuity, and the maintenance of infrastructure, transport, communication, and education and health services.

Resilience assessment should be top-down and combine statistically driven indicators and participatory exercises using dynamic qualitative indicators. It could be assessed across all of Slovenia's 13 regions – and compared with data locally.

Slovenia has a long history of protecting communities threatened by natural disasters. This results in heightened hazard awareness and a strong understanding of vulnerability and resilience within communities.

Comparison with other EU local communities will contribute knowledge and new experiences, leading to greater resilience. A challenge is to accommodate local conditions when adopting best practice.

The current focus is on understanding hazard risks in the context of local capacities. Working towards a resilience framework (as required by the EU).

Resilience assessment should capture the details of equipment, resources and personnel needed to meet a specific hazard and adapt to its development.

On RELEVANT REGULATIONS & LEGAL FRAMEWORKS

Legislation protecting the environment and cultural heritage. Critical Infrastructure Act, Construction of Facilities Act, Law on Protection against Natural and other Disasters. Slovenia has sustainable development goals (Agenda 2030)

Resilience supporting policies cover sustainable development, building codes, energy efficiency, waste recycling, awareness rising, and political governance

On RESILOC TOOLS

RESILOC tools are likely to be used for preparedness. Seven dimensions could be too many and their validity is not clear yet. Challenge would be planning and ordering of protective and response measures.

Importance of adapting tools to context and hazard type led to questioning the adaptability and versatility of the RESILOC tool and its capacity to accommodate complexity

On PARTICIPATION

At the local level, the following actors are identified: Mayor, Municipal Administration with Advisor in Civil Protection, Local Civil Protection commander with CP Headquarters, response units (voluntary, professional, Civil protection), municipal services (infrastructure and utilities)

At the regional level, the following actors are identified: Regional Civil Protection commander with CP Headquarters, response units (voluntary, professional, Civil protection), different regional services

At the national, level the following actors are identified: Slovenian Government, National Civil Protection commander with CP Headquarter, national response units (voluntary, professional, Civil protection), national services

These actors are fully engaged but levels of activity vary.

III.3.4. Municipality of West Achaia, Greece

On UNDERSTANDING RESILIENCE AT LOCAL CONTEXT

The main hazards are earthquakes, fires and overflowing from the rivers and sea.

Improving resilience is understood in terms of guaranteeing the efficiency of the response mechanism in case of emergency, for instance by means of exercises and drills. To increase resilience at local level, activities of training/capacity-building and awareness raising are needed for the following areas:

- Wellness: Promote Population Health Before and After an Incident, Including Behavioural Health
- Access: Ensure Access to High-Quality Health, Behavioural Health, and Social Resources and Services
- Education: Ensure Ongoing Information to the Public About Preparedness, Risks, and Resources Before, During, and After a Disaster
- Engagement: Promote Participatory Decision making in Planning, Response, and Recovery Activities
- Self-Sufficiency: Enable and Support Individuals and Communities to Assume Responsibility for Their Preparedness.

- Partnership: Develop Strong Partnerships Within and Between Government and Other Organizations

The main actors are: Civil Protection of Municipality of West Achaia, Greek Fire Brigades, Municipality of West Achaia, Local Hospital - First Responder, Police, Army. Secondary stakeholders are understood as citizens and the Local Resilience Team.

Actions undertaken at local level to increase resilience cover mainly engagement and awareness-raising. Moreover, citizens and authorities enjoy a shared perspective on what is needed for the preparedness and response phases of an emergency. Local disaster policy-making, and planning, incorporates resilience. Ideally emergency management planning should be risk and resilience based and be an integral part of strategic planning for government and communities. It should consider risks and risk treatments across the social, built, economic and natural environments

The most relevant disaster management phase for resilience is preparedness.

On ASSESSING RESILIENCE IN THE LOCAL CONTEXT

Assessing resilience is deemed relevant and useful. Participatory approaches where data can be collected directly in the field are highly valued

Currently there are no tools available for assessing resilience in West Achaia.

Learning from similar communities would be very useful.

On RELEVANT REGULATIONS & LEGAL FRAMEWORKS

No legal/policy framework available

On RESILOC TOOLS

The platform is considered useful, and its potential for peer-learning is recognised. The idea of the 7 dimensions is considered relevant.

The tool is considered useful for preparedness and response phases.

The goals of the platform are considered as follows:

- Reduce, or avoid, losses from hazards;
- Assure prompt assistance to victims;
- Achieve rapid and effective recovery

On PARTICIPATION

The involvement of responsible actor and of citizens is deemed satisfactory.

Disaster management at the local level involves a range of local institutional actors including the mayor, law enforcement and emergency managers.

III.3.5. Municipality of Catania, Italy

On UNDERSTANDING RESILIENCE AT LOCAL CONTEXT

The main hazards to which Catania is exposed are earthquake and hydro-geological risks.

Improving resilience is mainly understood as strengthening soft-skills and planning capacities within the community. Thus, improving risk perception and communication became key components combined with a stronger engagement of volunteers in Civil Protection activities. Added to this is capacity to acquire and manage data within a decision support framework.

Main actors are the institutions (Mayor, Municipality), the Civil Protection service, First responders. However, it is stressed that civil society organisations of all types (volunteering, cultural, sports) have a crucial role given their co-responsibility in the Civil Protection system.

Prevention and preparedness are viewed as key components of community resilience, which are based on effective communication, information, capacity-building and participation and engagement practices.

On ASSESSING RESILIENCE IN THE LOCAL CONTEXT

Assessing resilience is perceived as crucial for decision-making and first-response planning and actions.

No assessment of resilience is currently performed although it is recognised as being of paramount importance at local authority level.

Available data, current methods of data collection and elaboration only allow for general evaluation.

The integration of data-based assessments and their participatory review is considered a great asset, especially if allowing cross-community and cross-national comparisons

On RELEVANT REGULATIONS & LEGAL FRAMEWORKS

There is an aggregate of laws regarding Civil Protection issues, but not a specific law on resilience.

In terms of finances, there is no consolidated framework, but opportunities can be sought in regional, national and EU programmes.

On RESILOC TOOLS

The tools are useful and relevant for the prevention and preparedness phases.

Their value added is mostly seen in allowing the centralisation of data for the assessment and management of local resilience, monitoring and analysing risk perception and its relationship with local resilience.

It was highlighted that RESILOC tools should be compliant with national legislation on Cloud Computing.

Lack of available skills and resources at local level might hinder the use of RESILOC tools

On PARTICIPATION

Actors that should be involved are those involved in the Civil Protection system with a special focus on Volunteering Associations and citizens.

Participation, however, might be hindered by lack of resources and competence/skills relevant to the topic.

The engagement of several actors is seen as an opportunity to gather larger amount of data.

III.4. Aggregate Results

III.4.1. RESILOC Communities Matrix

Inferring from the summaries presented above, the core insights were further synthesised as concise statements. These have been placed in a comparison table to provide an overview of the information gathered. The table does not cover the responses to the RESILOC tools as these are tabulated in a dedicated SWOT analysis (see Table 2)

Table 6 - Summary of interview results

		A1_GORIZIA	A2_TETOVO	A3_KAMNIK	A4_W. ACHAIA	A5_CATANIA
1. UNDERSTANDING RESILIENCE	Hazards	• Earthquake • Hydro-geological • Landslides	• Winter conditions • Wildfires	• Landslides • Floods • Windstorms • Earthquakes • Sleet	• Earthquakes • Forest fires • Floods	• Earthquake • Hydro-geological risks
	Stakeholders	• Local authority • Municipal technical services • Civil protection system • First responders (including civil protection volunteers) • Civil society organisations (CSOs) • Citizens in general • Young citizens in particular	• Local authority • Civil society	• Local authority • Civil protection system • Civil society organisation • Citizens	• Local authority • Civil protection • System • National institutions • Citizens	• Local authority • Civil protection system • Citizens
	Resilience components	• Planning capacities • Awareness raising • Engaging citizens	• Disaster management • Improving technical and • Infrastructural capacity	• Preventions and Preparedness • Education • Risk awareness • Risk governance • Engaging citizens	• Prevention and Preparedness • Risk awareness • Self-preparedness • Engaging citizens	• Prevention and Preparedness • Planning activities • Risk awareness • Communication • Citizens' engagement
	Improving resilience	• Structural maintenance • Improving risk awareness • Improving preparedness actions	• Improving infrastructure • Upgrading/acquiring equipment • Providing information to the citizens	• Understating hazards and risks • Adopting Build Back Better principle • Combining mitigation infrastructures with natural environment	• Improving participation in disaster management planning • Improving partnership working in preparedness • Including resilience in policymaking on disaster management	• Improving preparedness strategies • Improving horizontal capacity-building • Improving risk awareness

2. ASSESSING RESILIENCE		• Not yet performed on a consistent basis • Efficient tools are not existent/known • Structured on both quantitative and qualitative data • It should start at neighbourhood level • It should be performed in comparison/relative to other contexts	• Performed on exchange of information basis between local authorities and CSOs • Quantitative, data-based approaches are hindered by the size of the local authorities • Structured on both quantitative and qualitative data	• There is a tradition of vulnerability assessment at local level • Structured on both quantitative and qualitative data • Should focus on specific hazards • Comparisons at regional, national and EU level are needed if linked with peer-to-peer learning	• Not yet performed on a consistent basis • Efficient tools are not existent/known • Structured on both quantitative and qualitative data	• Not yet performed on a consistent basis • Efficient tools are not existent/known • Structured on both quantitative and qualitative data • Assessments should undergo a participatory review process
3. REGULATIONS/FRAMEWORKS	**Legal frameworks**	• No specific laws on resilience • Included in the civil protection legal framework	• No specific law on resilience • References in national law on "protection of the population"	• No single law on resilience • References in legislation protecting the environment and cultural heritage. Critical infrastructure act, construction of facilities act, law on protection against natural and other disasters • Slovenia has sustainable development goals (agenda 2030)	• No legal/policy framework available	• No specific laws on resilience • Included in the civil protection legal framework

	Financial framework	• No consolidated financial frameworks available		• Resilience supporting policies cover sustainable development, building codes, energy efficiency, waste recycling, awareness rising, and political governance		• No consolidated financial frameworks available • Availability of funds in regional, national and EU programmes
5. PARTICIPATION		• Cross participation is of paramount importance • Current levels are satisfactory but need improvement	• Current levels of participation are satisfactory	• Institutional actors are fully engaged but levels of activity and deliverables might vary across national, regional and municipal levels	• Current levels of participation are satisfactory at institutional level	• CSOs participation is of paramount importance • Current levels are satisfactory but need improvement • Lack of adequate resources and capacities might hinder the process

III.5. Key Findings

Types of natural hazard

The hazards experienced across the five communities are: earthquakes; hydro-geological events or landslides; severe winters; storms; wildfires; and floods.

Understanding resilience within the communities

Resilience is understood as the community-wide capacity to plan, and use soft skills, in gaining citizens' active participation in resilience strategies and activities. Active citizen engagement is experienced as a valuable component of resilience building. Encouraging preparedness, including both the knowledge and willingness of what to do and to take active precautionary measures, is generally seen as one of the key components in generating resilience across all five communities.

Effective resilience governance is seen as critical in gaining such community engagement.

The role played by municipal actors, in partnership with citizens, focuses on infrastructural development, training, prevention education and obtaining the right equipment. Municipal actors consult and engage citizens in disaster management planning. Having a strong volunteering culture is seen as a considerable asset in mobilising communities for preparation and resilience building in some areas – particularly where there is less reliance of/trust in authorities to respond or support citizens.

Resilience can also build on existing practices relating to the construction and maintenance of buildings in the community – for example, via the Build Back Better scheme.

Promoting well-being and behavioural health were also recognised as significant factors in strengthening community resilience alongside awareness raising activities among all parts of the population.

Assessing resilience

There is strong agreement across all five communities on the value and importance of assessing resilience as a prelude to planning and decision making – mainly as part of the preparation phase. Ideally, it should combine qualitative and quantitative approaches to collecting data and most saw value in making comparisons and learning from other similar areas.

An absence of tools and a clear framework is impairing community-wide, and consistent, resilience assessment in all five communities. Resilience is currently mainly assessed informally through making sense of available information. Much of this relies on the skills, professional knowledge, and experience of resilience/hazard professionals in each of the communities to make sense of such information within the context of their local areas. This results in a shared awareness of the types and locations of community vulnerabilities and how they can be addressed.

Relevant regulations and legal frameworks

Across all five communities, regulations and legal frameworks provide extensive cover of civil protection governance, planning and responsibilities but they do not stretch to addressing resilience. Only one community reports on a national law on 'Protection of the Population' which covers resilience but not as a regulation. Laws protecting cultural heritage and the environment, and policies on sustainable development, are seen as relevant to resilience but do not directly address it.

RESILOC tools

The end-users thought the tools would be highly relevant for improving community resilience and to encourage preparedness / adaptive behaviour. The tool dimensions currently on offer were considered to be largely relevant but considered by some as too many. The fact that they have not yet been fully defined and validated also made it hard for the end-users to comment on them.

Any tool, it was felt, needed to be adaptable to the local context and able to accommodate the complexity of each area. Accessibility and quality of data for the tool could be a challenge – hence why all said that it needed to use a mixture of qualitative and quantitative information. Most areas emphasised the need to engage different stakeholders in assessing resilience.

Participants were particularly interested in the way the tool could be used to support the development of social aspects of resilience – particularly engaging citizens and fostering better cooperation and preparedness behaviour.

The proposed tool was recognised as relevant to resilience assessment of local infrastructures, resources and as a way of centralising data and supporting loss avoidance, assistance, and recovery. There was however some concern that the rapid onset of a hazard would inhibit real time use of the RESILOC tool as currently conceived.

Participation

Participation in resilience assessment and development was seen to be largely the responsibility of the civil protection infrastructure and key individuals and teams within it, including First Responders and Local Resilience Teams. The Mayor, as an elected official, plays a lead role in initiating and coordinating responses in the event of a hazard. Voluntary and community organisations, and NGOs, are also described as key participants.

III.6. Transcripts of interviews

III.6.1. Municipality of Gorizia, Italy

General information

INTERVIEWER

• Name, organisations and contact details of interviewers
  ○ Ramona Velea – ISIG researcher, velea@isig.it
  ○ Riccardo Laterza – ISIG researcher, laterza@isig.it

RESPONDENTS
• Number of participants: 6

• Names, organisation, position in the organisation, role in the RESILOC project.
  • Municipality of Gorizia, Deputy Mayor, decision-maker
  • Municipality of Gorizia, City councillor, decision-maker
  • Municipality of Gorizia, Service director, project manager, technical/admin staff
  • Municipality of Gorizia, Youth policy referent, project officer, technical/admin staff
  • Municipality of Gorizia, IT expert, communication project officer, technical/admin staff
  • Municipality of Gorizia, Civil Protection Service Manager, Practitioner

INFORMED CONSENT FORM
• Yes
• Date and place/platform – 29.09.2020, ISIG premises – on site meeting.

REPORT

TOPIC 1 – UNDERSTANDING RESILIENCE AT LOCAL CONTEXT
1.1. WHICH ARE THE MAIN "HAZARDS" YOUR COMMUNITY IS FACING? • **Practitioner**: The most relevant risk in the city is the seismic one: Gorizia has a class 2 risk (out of 4, where 1 is the highest). Another relevant risk is the hydro-geological risk, which can be determined by the minor water network collapse, which may determine landslides. The city faces the hydraulic risk as well (i.e. the risk that a body of water, such as the Isonzo river, could overflow) however it is considered a low-level risk: there is one neighbourhood that can be partially affected, also thanks to mitigation works for the past decades (e.g. hydraulic risk of the Corno creek was mitigated with works twenty/thirty years ago). There are other quite low risks and there are no significant industrial risks. However, as a general consideration, the COVID-19 pandemics showed how even unprecedent/unforeseen risks may occur at all times. • **Technical/Admin staff**: Sometimes the occurrence of a risk leads to secondary risks triggered by the first. For example, COVID-19 has generated unprecedented social emergencies.
1.2. WHAT DOES "IMPROVING RESILIENCE" MEAN TO YOU IN YOUR LOCAL COMMUNITY? • **Technical/Admin staff**: A fundamental feature of 'improving resilience' may be considered strengthening the capacity to design/project and set a vision at local level. This ability is key in supporting a community to move forward, to change, to create, thus, to be resilient. Within this perspective, the Municipality of Gorizia intends to stimulate such capacities in the framework of RESILOC project; in fact, in the framework of the Local Resilience Team (LRT), a figure/role will be identified that will be tasked with the coordination of local projects and initiatives able to broker and/or better consolidate (at local level) the European guidelines and standards on resilience. Another key aspect of 'improving/strengthening' resilience is considered to be the active involvement of the younger generations and stimulating participation generally. Within RESILOC the Municipality aims to strengthen participation of young people by capitalising on the local youth laboratory for European project making (i.e. Let's Go! Europe) – by involving its members in the LRT. • **Decision-maker:** Fostering and improving/strengthening resilience is highly linked with raising awareness across the local community, among all citizens but especially among young people.

Educating/informing and raising awareness at community level are key for 'improving resilience'. It is of crucial importance to invest in human resources, especially among young people.

- **Decision-maker**: The emotional intelligence and soft skills are also key aspects that need to be taken in consideration for the purpose of strengthening resilience. Also supporting the process of trust-building (i.e. among individuals, between citizens and institutions/authorities) appears to be a crucial element.
- **Practitioner**: Friuli Venezia Giulia has an important legacy when it comes to resilience: the 1976 earthquake marked the history of the territory, both in terms of the impact (and related management of the disaster) but also in terms of the adaptive capacity of local communities. It constituted an exceptional opportunity for the transformation of the territory from a mostly agricultural economic/productive model to an industrial one. Learning (also) from that experience, it might be said that a resilient population matters much more than resilient infrastructures, in view of a disaster. Also, another lesson from the territory is that the perception of risk at community level appears directly linked to the future absorption capacity in face of a disaster. The social 'machine' must maintain the planning capacity so to restart after a disaster.

1.2.1 Does resilience mean different things for the different hazards your community faces?

- **Technical/Admin staff**: Not necessarily, it is about the same ability to identify positive factors in unfortunate contexts.
- **Technical/Admin staff**: A differentiation between strategy and tactics must be done, however. The general principles are valid in any context, then depending on the various risks, different operational mechanisms are activated, following different tactics.
- **Practitioner:** The operational mechanisms (i.e. intervention models), are already in place. For each type of risk there is a sequence of 'steps' to be implemented, agreed as part of the preparation of a system.

1.2.2. *Who are the responsible actors when we think about resilience?*

- **Practitioner**: In terms of legal responsibility, the Mayor is the first responsible actor according to the legal framework.

1.2.3. Who are the primary stakeholders and the secondary stakeholders?

- **Decision-maker:** The primary actors are Civil Protection, Fire Brigades and First responders generally. Associations, such as dog rescue, actors in primary care providers, are other relevant actors. However, when considering strengthening the resilience of a community all actors of the society are relevant. In itself, a disaster affects everyone.
- **Technical/Admin staff**: Other actors, perhaps secondary, insofar as they are not operational, but who are necessary to create the conditions for resilience, are: schools, associations and voluntary networks. Their crucial role was demonstrated within the COVID-19 lockdown: for instance, providing online support in promoting sports and active life (i.e. of crucial importance for families and citizens given the circumstance), or voluntary associations working with vulnerable people, guaranteeing psychological support. The system of civil society, of social pluralism, should be taken into consideration as a whole. Specialised associations are more operational, but non-specialised ones are the natural context where resilience skills are strengthened. The family as a social unit is also relevant.
- **Practitioner**: It is important to clarify that in Italy, the Civil Protection mechanism is a service which involves everyone from the President of the Republic to citizens. All of the actors must do their part, including the citizen who has the duty to get informed. For what concerns responsibilities, they are of the public institutions and in particular of the Mayor. All parties work together in coordination, but the Mayor is the one that makes the decisions and takes the responsibility.

1.2.4. What role do citizens have?

- **ALL:** Citizens, down to the family as a social unit and civil society at large should have an active role in resilience-strengthening practices.
- **Practitioner:** Citizens should have an active role in the communication/information regarding risks and self-protection practices.

1.3. WHAT, IF ANYTHING, HAVE YOU OR OTHERS DONE SO FAR TO INCREASE THE RESILIENCE OF YOUR COMMUNITY?

- **Technical/admin staff**: The activation of the Alert System.
- **Practitioner:** Several measures have been taken on the public administration side. In recent years, a lot of work has been done on prevention, which is the main topic: the various information campaigns, or the maintenance of a prepared structure, are fundamental. Prevention and resilience go hand in hand. There is however the need to achieve more in this sense: especially working with young people and schools. This is ever more relevant now, as society appears to be promoting mainly individualistic

patterns and behaviours. In this context, getting to families is difficult but fundamental – and this can be achieved through the work with young people.

1.4 IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE DO YOU SEE IMPROVING RESILIENCE AS MOST RELEVANT?

- **Practitioner:** Definitely preparedness.

1.4.1. How can resilience be improved?

- **Decision-maker:** It is of paramount importance to work on resilience topics with schools and young people in general, so to stimulate overall 'change' in society. Information and awareness raising on all levels (starting with the Families, as the smallest social unit) should be fostered.

TOPIC 2: ASSESSING RESILIENCE IN THE LOCAL CONTEXT

2.1. HOW IMPORTANT IS IT CURRENTLY FOR YOU TO BE ABLE TO ASSESS THE RESILIENCE OF YOUR COMMUNITY?

- **Decision-maker**: It is essential to carry out this type of assessment. It is also relevant for better designing citizens engagement frameworks: total involvement of citizens is needed so to promote awareness, which increases the degree of resilience and makes the community capable of facing immediate and subsequent difficulties related such as in the case of an earthquake.
- **Decision-maker**: There is a perceived level of difficulty for what concerns the assessment of resilience, in the sense that it is difficult to put into practice. As a suggestion, an evaluation of this type should consider data related to emotions. Fear plays a fundamental role and is difficult to measure, but it affects a local community only when the disaster occurs.

2.1.1. Should this exercise be a top-down one, based on statistical indicators perhaps? OR A participatory exercise, based on dynamic/qualitative indicators?

- **Practitioner**: There are different types of resilience to be assessed at local level. For example, the infrastructural resilience: from this point of view Gorizia is not in good shape, buildings are not ready to face a seismic disaster for instance. Then there is social resilience. Both are areas need to be evaluated. It would be important to integrate them; it is difficult to quantify everything, however, if a value can be attributed to the state of the art, in order to progress and evaluate this progress, it would be excellent.
- **Technical/admin staff:** There must be a mix between an objective basis (i.e. understood as quantitative/statistical data) and perception data (i.e. understood as qualitative data), that should be identified together with the local community in terms of self-evaluation. Such an assessment may be relevant insofar as it allows to understand where the community stands in terms of resilience (for instance a value of 2 out of 4), but more importantly so, it allows to identify actions and methods in order to reach a higher level (for instance identifying the actions/measures needed to go from a value of 2 to a value of 4).

2.1.2 What scale do you think this assessment should have?

- **Decision-maker:** It is necessary to start from the local level and then compare it with other contexts, with a macro-approach. For the case of Gorizia for instance, it would be relevant to work within the Regional area, given the diversity between Italian regions.
- **Practitioner**: the assessment should start from the smallest unit, such as neighbourhood community level. This applies for the assessment as well as for the engagement of local actors. Based on previous experience in organising community events related to the communication of the Emergency Plan, a direct contact/approach to each community is the most efficient one.

2.2. ARE YOU CURRENTLY ABLE TO ASSESS THE LEVEL OF RESILIENCE OF YOUR COMMUNITY?

- **Decision-maker**: No
- **Practitioner**: Not aware of the existence of any such instruments to assess resilience.

2.3. WOULD YOU BE INTERESTED IN LEARNING FROM OTHERS' EXPERIENCES IN ASSESSING RESILIENCE?

Do you think a comparability across Europe would be an added value?

What do you think are the challenges for the Best Practice replicability?

- **ALL**: Absolutely yes, it is very important.
- **Decision-maker**: COVID-19 experience proved very well the need for learning from the others' experiences: other Municipalities contacted Gorizia to request information on the management of different aspects of the emergency.
- **Technical/admin staff:** The COVID-19 pandemic was a 'democratic' shock that has involved even the strongest and most developed States, an opportunity has opened up that must be

seized: it is essential to compare different contexts and learn from each other. Examples from Gorizia:
  - The Gorizia COC (Municipal Operational Centre) of the Civil Protection Service was very reactive and fluid in adapting to the situation. It was the first to take action, so others followed.
  - The. Punto Giovani (i.e. local youth centre) was relevant at national level: it was one of the few Euro-desk points that continued to work online, being mentioned at European level as a relevant example of resilience applied to a youth centre.

TOPIC 3 – RELEVANT REGULATIONS & LEGAL FRAMEWORKS

3.1. WHAT IS THE LEGAL FRAMEWORK ON RESILIENCE WITHIN WHICH YOU OPERATE?

- **Decision-maker**: There is an aggregate of laws regarding Civil Protection issues, but not a specific law on resilience. Among these:
  - the policies relating to the vulnerable groups, as it could be gathered also from recent COVID-19 experience, are strongly relevant for what concerns resilience;
  - youth policies are relevant as well, given the consequences that young people have experienced also from a psychological point of view during the COVID-19 pandemic.

3.2. WHAT IS THE FINANCIAL FRAMEWORK ON RESILEINCE WITHIN WHICH YOU OPERATE?

- **Decision-maker**: Economic support to build resilience is somewhat left to the free initiative of associations, or for example to some institutions (for instance, the Prefecture which raises awareness on road safety). There is nothing structured in place. Over the years as youth policies sector, the Municipality of Gorizia has worked on prevention with a different approach, for example on lifestyles, substance abuse, bullying, achieving good results; the same approach should be replicated on resilience.

TOPIC 4 – RESILOC TOOLS

4.1. WOULD YOU FIND SUCH A TOOL USEFUL FOR YOUR COMMUNITY?

- **Technical/admin staff**: Such an instrument would make it possible to work with different variables for the purpose of different scenarios in relation to risk. It appears difficult to take into consideration such a high number of variables.
- **Practitioner:** issues raised about the potential functionality of the 'simulated actions'. An increased interested is raised by the possibility of analysing and working with variables describing the social dimension. From the perspective of the practitioners, there is the interest in understanding what could be the 'intervention' tools to tackle social aspects, rather than infrastructural ones. For instance, it would be relevant, for what concerns the social dimension, to take in consideration the ability of the local society to cope with the risk in terms of awareness. Moreover, it is suggested that different profiles (e.g. social scientists, psychologists) should be involved in identifying such 'tools' and strategies for building a community path towards a stronger resilience. In this sense it is important to ensure that the data analysed by the RESILOC tools, the software output, is coupled by the 'human intelligence' and the knowledge/awareness of the local context: only the political institutions can have a vision on how to bring a technical proposal into a social context. The software output must therefore always be refined.

4.2. HOW DO YOU FIND THE IDEA OF ASSESSING RESILIENCE ALONG DIFFERENT DIMENSIONS?

- **Practitioner**: The proposed dimensions are perceived as a good starting point: the decision to revise them may come at a later stage, according to findings of the first tests.
- **Technical/admin staff**: Perhaps the social dimension should be more differentiated and specified, being very relevant and having the need to capitalize on it. The social approach in analysing a community in terms of resilience is perceived as an added value.

4.3. WHO DO YOU THINK WOULD BE MOST LIKELY TO USE SUCH A TOOL?

- **Technical/admin staff**: Such a software should be placed in the "command and control room", being controlled both by short-term and long-term decision-makers, let's say between the Civil Protection and the City Council. But if the instrument supports a political vision, then it must also be available to the City Council.
- **Practitioner:** The Municipal Emergency Manager should be the one using the tool - In Gorizia is a dedicated person, but this is not the case everywhere. The manager would have the task of involving everyone, first of all the Mayor.

4.4. IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE WOULD IT MOST LIKELY BE USED?

- **Practitioner:** Surely prevention and preparedness. In an emergency context it would be ineffective.

4.5. WHAT DO YOU SEE AS THE MAIN CHALLENGES OF USING SUCH A TOOL?

- **ALL**: No particular challenges, if the tool is used in cooperation with the Statistical Office for what concerns the needed data.

TOPIC 5 - PARTICIPATION

5.1. WHAT ARE THE ACTORS INVOLVED CURRENTLY IN DISASTER MANAGEMENT CYCLE?

- **ALL**: The Mayor, Civil Protection, Fire Brigades and First responders generally.

5.2. WHICH ARE KEY ACTORS (TYPE OF STAKEHOLDERS) THAT ARE NOT FULLY / FORMALLY ENGAGED NOW IN THE DISASTER MANAGEMENT CYCLE BUT YOU WOULD LIKE TO INVOLVE?

- **Technical/admin staff**: Local associations involved in social assistance, the school system, cultural associations. Also, psychologist or social scientists in general – so to support intervention plans focused on adaptation.
- **Practitioner:** Sports associations and parishes – in the sense of organisations that, during emergency situations can stay close to the population and the most fragile groups, carrying out activities that are inevitably not carried out by public institutions. During the COVID-19 lockdown, these associations have for example supported families in the management of children and the elderly.

OTHER DISCUSSED ISSUES

- **On the RESILOC tool**: Beyond the (infra)structural part, the most important area in which results can be achieved even in a few years is the social one. More than the action on the physical space, practitioners are interested in understanding whether there is the possibility, starting from an analysis of the social composition of a community, to understand what the intervention tools in society/at community level are. This can be achieved, for example, by involving psychologists and other professionals. Perhaps human sensitivity and intelligence would be lacking in software of this type. The proposal can stop up to a certain point, but the dimension of the involvement of institutions and citizens cannot emerge from the calculation of a software. Only the political institutions can tell how to bring a technical proposal into a social context. The software output must therefore always be refined.
- **Crisis and innovation**: In the emergency situation linked to COVID-19, resilience has activated and accelerated processes that might have occurred in any case but much more slowly, for example bringing the digital environment even in families. It may be said that the digital goals reached during the crisis, could had been achieved otherwise even in twenty years.
- **COVID-19 and communication**: Gorizia established an emergency service hotline, that was supported by 40 volunteers.
- **Resilience and Communication**: communication needs to be captivating in awareness raising processes, as there seems to be an abundance of information nowadays.

III.6.2. Tetovo Community, Bulgaria

General information

INTERVIEWER

• Name, organisations and contact details of interviewers
  ○ Ramona Velea – ISIG researcher, velea@isig.it
  ○ Riccardo Laterza – ISIG researcher, laterza@isig.it

RESPONDENTS
• Number of participants: 5

• Names, organisation, position in the organisation, role in the RESILOC project.
  ○ Mayor of Tetovo village, decision-maker
  ○ interpreter for the Mayor
  ○ Director BRC Russe regional branch, Practitioner
  ○ Mr. Petar Yovkov - expert International cooperation BRC, proxy for RESILOC, Practitioner
  ○ Nikolay Todorov - Head of International operations, programmes and projects Unit , BRC, project manager for RESILOC, Practitioner

INFORMED CONSENT FORM
• Yes
• Date and place/platform: 7 October 2020, WebEx group interview

REPORT

TOPIC 1 – UNDERSTANDING RESILIENCE AT LOCAL CONTEXT
1.3. WHICH ARE THE MAIN "HAZARDS" YOUR COMMUNITY IS FACING? • **Decision-maker**: The main hazards Tetovo is facing are related to harsh winter conditions and fires (i.e. annually there are 10 to 20 occurrences of wildfires). There are no flood risks. Despite a past history of earthquakes there were no major events in the recent years.

1.4. WHAT DOES "IMPROVING RESILIENCE" MEAN TO YOU IN YOUR LOCAL COMMUNITY?
• **Decision-maker**:
  ○ Currently at local level there are several teams formed on different levels (Municipality and Regional) that are active in resilience and disaster management practices (*Note: such teams are formed on voluntary basis and involve local actors and citizens, beyond the first-responders' mechanisms*). However, the community lacks in tools and technology (e.g. supporting fire brigades in their activities of counteracting fires).
  ○ Resilience means, in fact, an effective disaster management system. Improving resilience implies preparing the local community to react and to implement resilience tools. In this sense, improving resilience would also imply the existence of an Information System. There is the need and the will (at Municipality/local authority level) to raise awareness within the community and to increase the capacity of the community to react/respond to hazards in the aftermath. A more stable preparation of the teams working with technical equipment is needed. Improving resilience implies both having the right tools and technologies and raising the awareness of the community.
• **Practitioner**: There are important infrastructural, and equipment, lacks such as firefighting machines.
1.4.1. Who are the responsible actors?
• **Decision-maker**: in Tetovo the Municipality cooperates with the local medical service, with kindergartens, and with representatives at the local level in the agricultural and volunteering associations. The Municipality involves as well local farmers which are in position to help. Most of them are volunteers, they are not compensated in any way. The main people involved are the leader of those organisations, doctors, the kindergarten's principle, the director of the cooperative and the school's principle.
1.4.2. What role do citizens have?
• **Decision-maker**: The rest of the citizens should be active and provide information when a disaster occurs, providing support to professionals.

1.5. WHAT, IF ANYTHING, HAVE YOU OR OTHERS DONE SO FAR TO INCREASE THE RESILIENCE OF YOUR COMMUNITY?

- **Decision-maker**: There are regular meetings discussing the possible hazards and ways to improve the community resilience. Together with the Red Cross Tetovo participated in a three-days training course for first response actions, held in the city of Varna.

1.4 IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE DO YOU SEE IMPROVING RESILIENCE AS MOST RELEVANT?

- **Decision-maker**: The teams are mostly active when it comes to reacting to a disaster, for instance fighting a fire or moving out snow, so mostly during the crisis.

TOPIC 2: ASSESSING RESILIENCE IN THE LOCAL CONTEXT

2.4. HOW IMPORTANT IS IT CURRENTLY FOR YOU TO BE ABLE TO ASSESS THE RESILIENCE OF YOUR COMMUNITY?

- **Decision-maker**: There is the need for evaluation, as well as there is always need to improve resilience, so there is for sure a need to develop such a tool. It would be very useful to have an instrument which alerts citizens, gathers them and provides information on time, which is as important as providing adequate equipment. The focus is on Tetovo, but there is the need to communicate with the other surrounding villages in order to be effective. Also, the regional level would be quite useful.

2.5. ARE YOU CURRENTLY ABLE TO ASSESS THE LEVEL OF RESILIENCE OF YOUR COMMUNITY?

- **Decision-maker**: Currently, apart from the official data collected after the disaster, there is no other 'measurement' of Tetovo resilience in place. Collected data is completed by the meetings with the local team. Most of the information are provided by the locals and collected talking directly to people from the villages. Now precise statistics about hazards are not available. The official data elaborated by national agencies are too broad and not really relevant for Tetovo.
  Regarding the meetings: there are spontaneous meetings when incidents happen, but also planned meetings, on a regional level, prior to the season when disasters are expected to happen (e.g. summer, before cold months of the year). Regional meetings involving Mayors lead to the implementation of resilience measures on the local level. A more precise statistic would be very helpful, but the main role in building resilience is played by the community. Community involvement in resilience strategies could be enhanced through a better communication – with and within the community itself.
- **Practitioner:** National data aggregates Tetovo data at the national level, so it is not so useful to consider them.

2.6. WOULD YOU BE INTERESTED IN LEARNING FROM OTHERS' EXPERIENCES IN ASSESSING RESILIENCE?

- **Decision-maker:** yes, it would be very useful. Currently, in order to improve the quality of implemented actions there are continuous communications with other nearby Municipalities. Exchanges and comparisons with Municipalities from other contexts (regional, national) could be also very beneficial.

TOPIC 3 – RELEVANT REGULATIONS & LEGAL FRAMEWORKS

3.1. WHAT IS THE LEGAL FRAMEWORK ON RESILIENCE WITHIN WHICH YOU OPERATE?

- **Decision-maker:** Resilience is included in an article of the Law on the Protection of the Population, but it is not a Regulation in itself.
- **Practitioner:** The law does not talk explicitly about resilience, but it includes actions, for instance management and reaction practices, which are related to resilience in terms of obligations for local institutions, Civil Protection corps, other actors.

3.1.1. What are the policy areas which you think are relevant when thinking about resilience?

- **Decision-maker**: Local population protection and environment sector are relevant according to the subject. Also, the education sector is connected.

3.2. WHAT IS THE FINANCIAL FRAMEWORK ON RESILIENCE WITHIN WHICH YOU OPERATE?

- **Decision-maker:** Part of the funds for resilience practices comes from the national level but most of it comes from the local budget available for the Municipality.

TOPIC 4 – RESILOC TOOLS

4.1. WOULD YOU FIND SUCH A TOOL USEFUL FOR YOUR COMMUNITY?

• **Decision-maker:** Although part of these data are missing in Tetovo, the setting is good, and the identified families of data/dimensions seem relevant. The simulation of "what if" scenarios by playing with the different dimensions could be useful.
4.6. HOW DO YOU FIND THE IDEA OF ASSESSING RESILIENCE ALONG DIFFERENT DIMENSIONS? • **Decision-maker**: The seven dimensions appear relevant and sufficient.
4.7. WHO DO YOU THINK WOULD BE MOST LIKELY TO USE SUCH A TOOL? • **Decision-maker**: The tool should be used on a local level, maybe by the Mayor, since the Municipality team is made by three people.
4.8. IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE WOULD IT MOST LIKELY BE USED? • **Decision-maker:** During the emergency time, in the sense of data collection, so to better prepare for future emergencies.
4.9. WHAT DO YOU SEE AS THE MAIN CHALLENGES OF USING SUCH A TOOL? • **Decision-maker:** after an appropriate training there are no other challenges perceived in using the tool.
TOPIC 5 - PARTICIPATION
5.1. WHAT ARE THE ACTORS INVOLVED CURRENTLY IN DISASTER MANAGEMENT CYCLE? • **ALL**: Civil protection, volunteers
4.10. PROVIDE AN EXAMPLE OF THE MECHANISM ON ONE SPECIFIC SCENARIO • **Decision-maker:** For instance, when heavy snowing is coming, the Municipality engage citizens by holding regular meetings in which the availability of the citizens/local actors is gathered (i.e. during the emergency). The equipment is prepared in advance so to make sure it will be in a good operating condition during the emergency.
4.11. WHICH ARE KEY ACTORS (TYPE OF STAKEHOLDERS) THAT ARE NOT FULLY / FORMALLY ENGAGED NOW IN THE DISASTER MANAGEMENT CYCLE BUT YOU WOULD LIKE TO INVOLVE? • **Decision-maker:** Everyone is already involved in the resilience activities. • **Practitioner**: Actually, there is a difference between "normal" resilience activities in Tetovo and the RESILOC project itself: there is a high level of engagement on regular activities but a lower one (currently) on the project.

III.6.3. Municipality of Kamnik, Slovenia

General Information

INTERVIEWER
• Thomas Spielhofer, Tavistock Institute of Human Relations, UK.
RESPONDENTS
• Katja Banovec Juroš, • Civil Protection Officer
INFORMED CONSENT FORM
• **Yes**
• 06/10/20, Microsoft Teams

REPORT

TOPIC 1 – UNDERSTANDING RESILIENCE AT LOCAL CONTEXT
1.1. WHICH ARE THE MAIN "HAZARDS" YOUR COMMUNITY IS FACING? **Katja:** Kamnik municipality has a population of approximately 30,000. A medium sized municipality. There are 212 municipalities in Slovenia and 2m people. Kamnik is one the wealthiest municipalities through tourism and businesses. Also, a highly developed area for civil protection The main hazards are landslides, (as a sub-alpine area), floods, windstorms, earthquakes and sleet. Windstorms can be very damaging. In 2014 Kamnik applied for the Resilient City campaign and produced a lot of useful data in the process.
1.2. WHAT DOES "IMPROVING RESILIENCE" MEAN TO YOU IN YOUR LOCAL COMMUNITY? **Katja**: Resilience is a key aspect of individual citizens. It represents a capacity, and knowledge, and appears in different ways depending on the many roles a person plays. For example, how I view resilience as a civil protection professional can be different from how I would view it as a mother or someone with elderly parents, or as an inhabitant of a large block of flats or even as a member of a choir. I contribute to resilience in different ways in these roles. I work on civil protection at the state level and can influence legislation. Brigita has a role educating and informing different sectors of the population vulnerability and resilience. She focuses on children, young people and the elderly. She strengthens resilience in Kamnik by reducing flood risk through a systemic and sustainable approach for regulating river flow and protecting against flooding. It has been a sustainable development where the flood banks have been made part of the natural environment and can be used for walking and cycling. Wooden blocks and stones were used to fit with historical design and natural preservation. Buildings have become more resilient to windstorms. In 2007 a windstorm took the rooves off many houses. They were replaced using the Build Back Better scheme so that the wind passes between, rather than lifting, the rooves. All new rooves now use this technique. This way science and traditional design have been combined and welcomed by the local community. Similarly, the rebuilding of the old primary school discovered to be vulnerable to earthquakes combines modern earthquake resilience technology with retaining the school's old façade. Schools and health facilities have the highest priority for strengthening physical resilience. **Social resilience**: There is a strong history of volunteering as a legacy of the Austro-Hungarian empire. For example: fire services and mountain rescue. Brigita coordinates volunteer training for resilience. Each school has an annual resilience training session. Protection against natural and other disasters is an elective

curriculum component. It helps raise awareness among children and young people. Children have also absorbed the voluntary culture.

Franja:

Primary: Municipal administration (mayor is responsible for CP in the municipality), Advisor for Civil Protection, Voluntary Fire brigade, Regional Red Cross Association

Secondary: citizens, schools, kindergartens, medical institutions, retirement homes,

What role do citizens have?

A big role in prevention, to be educated, to know the hazards and risks and how to prepare for disasters, construction in non-endangered areas (consent of the municipality), implementation of preventive measures you need to know (physical property insurance, damage insurance… ..), emergency call 112….

1.3. WHAT, IF ANYTHING, HAVE YOU OR OTHERS DONE SO FAR TO INCREASE THE RESILIENCE OF YOUR COMMUNITY?

What challenges have you/others faced in doing so?
Flood hazard and how to react, no basement (the municipality of Brezovica lies in the flood prone area), knowing personal and mutual protection

1.4 IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE DO YOU SEE IMPROVING RESILIENCE AS MOST RELEVANT?

Franja:

- **Emergency vs Preparedness:** In the phase of preparedness
- **How can resilience be improved?** In general: knowing and understanding disaster risks, strengthening disaster risk governance to manage disaster risk and consequently raise resilience, financial means should be provided to improve resilience of all aspects of the society and last but not least, a better preparedness of all stakeholders in the area of disaster risk reduction should be improved for effective response of whole community to disaster and with capability of the community to lower the impact of the disaster to minimum extent possible and to shorten the recovery phase as much as possible with regard of the Build Back Better (BBB) principle.
- **Could you provide an example from a lesson learnt?**
  Municipal evacuation and accommodation plans prepared at the municipal level.
- How does improving resilience make emergency management more effective?
  With improving resilience, the community, the hazards and risk are lower, the response is faster and more efficient. Disaster impact is lower, and the recovery phase is shorter.

TOPIC 2: ASSESSING RESILIENCE IN THE LOCAL CONTEXT

2.1. HOW IMPORTANT IS IT CURRENTLY FOR YOU TO BE ABLE TO ASSESS THE RESILIENCE OF YOUR COMMUNITY?

Katja:

Mainly indirect assessment of resilience because at state level hazard risk is assessed.
At municipal level hazard risk and capacities to respond to it are assessed but there is no direct assessment of resilience yet. This means identifying the hazard related problems locally and working out how to solve them, for example through the flood resilience work described earlier.
Assessing resilience is a complicated development from our current civil protection role on risks and capacities. But resilience goals, despite being hard to define, will become part of our civil protection mechanism. In August 2020 the EU started a programme to introduce resilience goals and planning but it is unclear so far what that means in practice and how it will work. According to the EU, resilience goals should be part of national disaster management. Katja was unsure of how to define a resilience goal beyond the civil protection work she already does. She quoted an example of health care resilience from the paper initiating the EU programme mentioned above. Here 'resilience' is the availability of critical medical equipment, critical care capacity and a capacity to handle mass casualties or a wide scale epidemic. Katja noted that this is a description of resources required rather than any other type of resilience.
Asked if a tool that provided this information would be adequate and it was felt by Katja not to be enough. Thinking about Covid-19 she described how someone in the administration was solely concerned with

ensuring there are enough beds. She feels that much more is required to stem the spread of the virus and to aid recovery and described the medical infrastructure and personnel necessary to achieve this. Measuring resilience during the Covid-19 pandemic is a very complex task and would not capture all the resources of people and equipment required in a constantly changing environment.

Franja:

- **What would it be useful for?**
  Very important. For individual's own safety, protection of property, economic aspect (agriculture, livestock, infrastructure, especially critical,… ..transport, communications… .special focus on educational and health system)
- **Should this exercise be a top-down one, based on statistical indicators perhaps? Or a participatory exercise, based on dynamic/qualitative indicators?**
  Primarily top-down based on statistical indicators upgraded with participatory exercise based on dynamic/qualitative indicators.
  Do you think the assessment is relevant at all? Absolutely.
- **Do you think an assessment is applicable at all?** Absolutely.
- **What scale do you think this assessment should have?** (e.g. functional community, local authority level, regional or higher level, etc.) Regional (13 in Slovenia) with local communities' participation where needed.

2.2. ARE YOU CURRENTLY ABLE TO ASSESS THE LEVEL OF RESILIENCE OF YOUR COMMUNITY?

Franja:

- **To what extent?** In Slovenia there has been a long history of protection against natural and other disasters with plenty of different activities for awareness raising that is why also at the local level citizens in general know the hazards, vulnerabilities and resilience of their community.
- **How do you do that?** By means of which data? Would you assess it hazard specific or in general?

Hazard specific since each hazard has its own specifics. By use of statistical data and dynamic data.

2.3. WOULD YOU BE INTERESTED IN LEARNING FROM OTHERS' EXPERIENCES IN ASSESSING RESILIENCE?

Franja:

- **Do you think a comparability across Europe would be an added value?** Absolutely, comparison with other EU local communities will contribute to a better knowledge, new experiences, lessons learnt… will contribute to a higher resilience.
- **What do you think are the challenges for the Best Practice replicability?**

Best Practice replicability should be taken with cautions with taking into consideration the specifics of local community (organisational, economic, infrastructural, social, cultural……)

TOPIC 3 – RELEVANT REGULATIONS & LEGAL FRAMEWORKS

3.1. WHAT IS THE LEGAL FRAMEWORK ON RESILIENCE WITHIN WHICH YOU OPERATE?

Franja:

- **Is there a resilience legal framework in place?** Yes. For example: Environmental Protection Act, Water Act, Cultural Heritage Protection Act, Critical Infrastructure Act, Construction of Facilities Act, Law on Protection against Natural and other Disasters ….
- **Is there a resilience policy framework in place?** Yes. Slovenia has implemented the Agenda 2030 with sustainable development goals into the Strategy of the Development of Slovenia (until 2030).
- **What are the policy areas that contribute to /influence the 'resilience' framework of your community?** Sustainable development, building codes, energy efficiency, waste recycling, awareness rising, good political governance at all levels of the society …

TOPIC 4 – RESILOC TOOLS

4.1. WOULD YOU FIND SUCH A TOOL USEFUL FOR YOUR COMMUNITY?

Katja: The RESILOC tool might be useful but it should not be complicated. People like simple tools and during the response period this tool could be too complicated. In describing the infrastructure needs for dealing with Covid-19 (infrastructure, equipment, protection, personnel etc.) the RESILOC tool might give an overall resilience reading of 'high', 'medium' or 'low' but a civil protection expert could make this assessment "from their own heart" based on their knowledge, experience. They would probably say 'medium' though as nobody wants to make it 'high' because you never know what could happen next.

Franja:

- **What do you like about it / not like about it? How would you hope to use it? Civil protection headquarters will use in the response planning phase and during the response phase.**
- **Is something missing from it? We shall see after using the tool.**

4.2. HOW DO YOU FIND THE IDEA OF ASSESSING RESILIENCE ALONG DIFFERENT DIMENSIONS?

Katja:

Making the indicators work is challenge. Seven could be too many. All the dimensions could be useful. Thy can be divided into two groups where one can be measured and the other is estimated. They all contribute to resilience. But getting something useful out of them is RESILOC challenge.

Agreed on the context specific nature of resilience data. How to get from measures to indicators is a dilemma. For example, how can you evaluate solidarity and convert it to numbers because it is linked to perception. Important to start with a basic and robust solution and then develop it according to what is needed. Perhaps start with the simple measures then add the more complicated ones.

Earthquakes - we have a tool that estimates the resilience of most buildings to an earthquake and it can be measured in combination with the earthquake hazard map. Also included is the response capacity of the earthquake protection resources. But, by using the seven dimensions for an estimation of resilience would need to be done for each hazard or scenario. But the EU is now very keen on a multi-hazard approach and it is a very challenging task for RESILOC.

4.3. WHO DO YOU THINK WOULD BE MOST LIKELY TO USE SUCH A TOOL?

Franja:

Action planning at all levels of governance (local, regional, national) for prevention, preparedness, response and recovery.

4.4. IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE WOULD IT MOST LIKELY BE USED?

Franja:

In the phases of prevention and preparedness.

4.5. WHAT DO YOU SEE AS THE MAIN CHALLENGES OF USING SUCH A TOOL?

Franja:

Planning and ordering of right protective and response measures.

5. PARTICIPATION

5.1. WHAT ARE THE ACTORS INVOLVED CURRENTLY IN DISASTER MANAGEMENT CYCLE?

Franja:

- **At local, regional and national level?**
  Local: Mayor, Municipal Administration with Advisor in Civil Protection, Local Civil Protection commander with CP Headquarters, response units (voluntary, professional, Civil protection), municipal services (infrastructure, utility services, electrical distribution companies…)
- **Regional:** Regional Civil Protection commander with CP Headquarters, response units (voluntary, professional, Civil protection), different regional services
- **National:** Government of the Republic of Slovenia, ministries, National Civil Protection commander with CP Headquarter, national response units (voluntary, professional, Civil protection), national services

5.2. PROVIDE AN EXAMPLE OF THE MECHANISM ON ONE SPECIFIC SCENARIO

Franja:

We have a scenario on one flood event well analysed on 10 pages in Slovenian – shall we translate it?

5.3. WHICH ARE KEY ACTORS (TYPE OF STAKEHOLDERS) THAT ARE NOT FULLY / FORMALLY ENGAGED NOW IN THE DISASTER MANAGEMENT CYCLE BUT YOU WOULD LIKE TO INVOLVE?

Franja:

In Slovenia the System of Protection is well organised in the following way:

RS Civil Protection units, services and bodies:

- RS CP Commander.
- RS CP Headquarters.
- National rapid response unit (EHI);

- Nuclear, biological and chemical protection units (NBC protection);
- Technical rescue units;
- First aid units;
- National Unit for Protection against Unexploded Ordnance (UXO);
- The Information Centre;
- National logistics centres;
- Support services;
- Committees for the inventory and damage assessment of buildings.

Firefighting units:

- Firefighting units of broader significance;
- Professional and voluntary firefighting units.

Units and services of societies and other non-governmental organisations which, for the performance of PRR tasks, are organised as services of national interest, and others:

- Mountain rescue service;
- Cave rescue service;
- Underwater rescue service;
- Rescue units with rescue dogs;
- Water rescue units;
- Units for the setting up of temporary accommodation;
- Amateur radio operator units;
- Flying clubs;
- Slovenian Red Cross;
- Caritas Slovenia.

PRR units, services and centres organised by state and other bodies:

- Compulsory public utility services in the field of water management (concession operators);
- Ecological laboratory with the mobile unit (ELME);
- Mobile unit of the ecological laboratory (MEEL);
- Mobile meteorology and hydrology unit (MEMH);
- Mobile notification centre;
- Unit for protection and rescue in the event of accidents with chlorine and other corrosive substances;
- Operators of electricity transmission and distribution networks;
- Companies or services involved in road maintenance;
- Railway infrastructure operator (SŽ – Infrastruktura, d.o.o.);
- The public health service;
- Veterinary service;
- Public service providers dealing with animal carcasses and other animal by-products;
- The police;
- The Slovenian Armed Forces (SAF).

At the municipal level:

- Water supply organisations;
- Waterway administrators and port and point of entry/exit operators.

Capabilities provided by the Slovenian Armed Forces:

- SAF helicopters and aircraft;
- Logistic capabilities (supply of food, water and fuel, provision of accommodation and support);
- Engineering capabilities (with construction machinery, bridging bridges);
- Establishment of temporary command elements.

Police capabilities:

- Capabilities of police stations, police administrations and of the General Police Directorate;
- Police officers from the Special Police Unit;
- Helicopters from the Police Aviation Unit;
- Vessels of the Maritime Police Station;
- Vessels for tasks in inland waters,

- Working group for the identification of people in the event of major natural and other disasters.

Capabilities of the Slovenian Maritime Administration:

- Vessels of the Slovenian Maritime Administration.

- **Why are not they engaged yet? What are the challenges of engaging them? How could they be engaged?**

Due to a very well-developed system of Civil Protection in the Republic of Slovenia, all necessary stakeholders are already engaged. The problem is their active role and their results around their competences.

III.6.4. Municipality of West Achaia, Greece

General information

INTERVIEWER
• Name, organisations and contact details of interviewers   ○ The interview was coordinated by Thomas Spielhofer – TIHR. The inputs were sent by the respondent in written document.
RESPONDENTS
• Number of participants   ○ 3

• Names, organisation, position in the organisation, role in the RESILOC project.
  ○ Municipal Employee in Civil Protection Department (Mayor's Office)
  ○ Katja Banovec Juroš - Practitioners' Representative (PR)
  ○ Col Ioannis Kostoulas (HMOD), Hellenic National Defence General Staff / Crisis Management Centre

INFORMED CONSENT FORM
• Yes
• 2/10/2020 Microsoft Teams & written questionnaire from Marios Didachos

REPORT

TOPIC 1 – UNDERSTANDING RESILIENCE AT LOCAL CONTEXT
1.4. WHICH ARE THE MAIN "HAZARDS" YOUR COMMUNITY IS FACING? • The main hazards are earthquakes, fires and overflowing from the rivers and sea. • The Municipality of West Achaia is a municipality of the region of Western Greece that was established with the Kallikratis Program from the union of the pre-existing municipalities of Dymis, Larissos, Movri and Olenia. The area of the new municipality is 572.22 sq. Km. and the population of 25,916 residents according to the 2011 census. The seat of the municipality is Kato Achaia. Most of the people in this community working in the primary sector with various agricultural products

1.5. WHAT DOES "IMPROVING RESILIENCE" MEAN TO YOU IN YOUR LOCAL COMMUNITY?
• IMPROVING RESILIENCE meaning that all the responsible actors needs to react faster and straight to the problem with out to lose time and this could improve from emergency exercise in different hazards scenarios such as fire, earthquakes and overflowing from rivers and sea.
• THE RESPONSIBLE ACTORS ARE:
  ○ Civil Protection of Municipality of West Achaia
  ○ Greek Fire Brigades
  ○ Municipality of West Achaia
  ○ Local Hospital - First Responder
  ○ Police
  ○ Army
• Also, the responsible actors is the primary stakeholders, the second stakeholders are the citizens and the Local Resilience team.
• The synthesis of the Local Resilience Team in the MWA was based on four factors:
  1) Relevance of the member with the project scope.
  2) Availability to participate in the project activities.
  3) Complementarity.
  4) Expertise and previous experience.
  As a first step of the above process, the local municipality got in contact with all the local authorities that were relevant to the project scope. The availability of several persons was investigated and profiles with complementary characteristics were selected.

1.6. WHAT, IF ANYTHING, HAVE YOU OR OTHERS DONE SO FAR TO INCREASE THE RESILIENCE OF YOUR COMMUNITY?

- If we want to increase the resilience of our community, we need to train our people with different activities and scenarios in local community. Such as:

a) Wellness: Promote Population Health Before and After an Incident, Including Behavioural Health
   - Activities to Promote Public Understanding of Health and Wellness
   - Activities to Ensure Sufficient Community Health Resources, along with the Capability to Leverage Those Resources to Achieve Desired Outcomes

b) Access: Ensure Access to High-Quality Health, Behavioural Health, and Social Resources and Services
   - Activities to Ensure Continuity of Healthcare and Related Social Services
   - Activities to Facilitate Transition to Recovery Planning
   - Activities to Provide Health Services and Remove Barriers to Accessing Them

c) Education: Ensure Ongoing Information to the Public About Preparedness, Risks, and Resources Before, During, and After a Disaster.
   - Activities Related to Community Education
   - Activities to Train and Educate Partner Agencies and to Develop an Effective and Coordinated Communication System or Network.

d) Engagement: Promote Participatory Decision making in Planning, Response, and Recovery Activities
   - Activities Related to Community Engagement
   - Activities to Involve Community Members in Planning and Decision making on Issues Relating to Response and Recovery
   - Activities to Build Connections Among Social Networks and Community Organizations
   - Activities to Include Community Members in Planning Exercises for Health Incidents.

e) Self-Sufficiency: Enable and Support Individuals and Communities to Assume Responsibility for Their Preparedness.
   - Activities Related to Self-Sufficiency
   - Activities to Encourage Personal and Community Preparedness
   - Activities to Encourage Civic Responsibility
   - Activities to Promote Effective Bystander Responses
   - Activities to Foster Self- and Community Reliance

f) Partnership: Develop Strong Partnerships Within and Between Government and Other Organizations
   - Activities Related to Effective Community Partnerships
   - Activities to Establish Pre-Event Memorandums of Understanding That Delineate Clear Roles and Responsibilities Among Partners Contents
   - Activities to Support Partnership Agreements with a Dedicated Workforce to Implement Agreed-Upon Activities
   - Activities to Assess the Extent of Existing Networks and Social Routines Among Community Members and Organizations.

- People understand the risks that may affect them and others in their community. They understand the risks assessed around, particularly those in their local area. They have comprehensive local information about hazards and risks, including who is exposed and who is most vulnerable. They take action to prepare for disasters and are adaptive and flexible to respond appropriately during emergencies.
- People have taken steps to anticipate disasters and to protect themselves their assets and their livelihoods, including their homes and possessions, cultural heritage and economic capital, therefore minimising physical, economic and social losses. They have committed the necessary resources and are capable of organising themselves before, during and after disasters which helps to restore social, institutional and economic activity.
- People work together with local leaders using their knowledge and resources to prepare for and deal with disasters. They use personal and community strengths, and existing community networks and structures; a resilient community is enabled by strong social networks that offer support to individuals and families in a time of crisis

- People work in partnership with emergency services, their local authorities and other relevant organisations before, during and after emergencies. These relationships ensure community resilience activities are informed by local knowledge, can be undertaken safely, and complement the work of emergency service agencies
- Communities, governments and other organisations take resilience outcomes into account when considering and developing core services, products and policies. They are adaptive and flexible to respond appropriately in disasters.
- Businesses and other service providers undertake wide reaching business continuity planning that links with their security and emergency management arrangements
- Following a disaster, a satisfactory range of functioning is restored quickly. People understand the mechanisms and processes through which recovery assistance may be made available and they appreciate that support is designed to be offered, in the first instance, to the most vulnerable community members.

1.4 IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE DO YOU SEE IMPROVING RESILIENCE AS MOST RELEVANT?

- the 4 phases of disaster management are Mitigation, Preparedness, Response, and Recovery.
- The most relevant in resilience is the Preparedness.
- The resilience be improved by emergency exercise, activities, to use new technologies. Communities are subjected to the damaging impacts of disasters caused by destructive bushfires, floods, and severe storms. The impacts of these disasters on people, the economy, our infrastructure and the environment remind us of the need to continue improving our resilience to disasters.
- We need to develop and embed new ways of doing things that enhance existing arrangements across and within governments, as well as among businesses, the not-for-profit sector, and the community more broadly, to improve disaster resilience and prevent complacency setting in once the memory of a recent disaster has subsided.
- To increase disaster resilience, emergency management planning should be based on risk and be integrated with strategic planning of government and communities. It should consider risks and risk treatments across the social, built, economic and natural environments.

TOPIC 2: ASSESSING RESILIENCE IN THE LOCAL CONTEXT

2.4. HOW IMPORTANT IS IT CURRENTLY FOR YOU TO BE ABLE TO ASSESS THE RESILIENCE OF YOUR COMMUNITY?

- It's really important to be able to assess the resilience in our community using the indicators or some other tools but sometimes maybe is not accurate, for this reasons it's better to use a participatory exercise where we can collect the data from the real action scene.

2.5. ARE YOU CURRENTLY ABLE TO ASSESS THE LEVEL OF RESILIENCE OF YOUR COMMUNITY?

- No, because Its first time where we are going to assess the level of resilience in our community with some indicators because we do not have the infrastructure and there may be large discrepancies in the calculations.

2.6. WOULD YOU BE INTERESTED IN LEARNING FROM OTHERS' EXPERIENCES IN ASSESSING RESILIENCE?

- I believe that if there are a similar community with similar problems with similar characteristics, we could learn from them, how they react in emergency and how assess the resilience.

TOPIC 3 – RELEVANT REGULATIONS & LEGAL FRAMEWORKS

3.1. WHAT IS THE LEGAL FRAMEWORK ON RESILIENCE WITHIN WHICH YOU OPERATE?

- Here in municipality of west Achaia we haven't a legal framework or policy framework in place.

3.2. WHAT IS THE FINANCIAL FRAMEWORK ON RESILEINCE WITHIN WHICH YOU OPERATE?

- Any useful recommendations?
- Reporting. Identify and report key performance and risk indicators that inform risk decisions.
- Testing. Conduct regular testing and audits to assess resilience levels.
- Technology. Keep technology assets up to date and patched appropriately, which may involve resolving technical debt.
- Tolerance. Review impact tolerances regularly to stay on top of changing customer expectations, business strategies, technology and regulations.

- Third parties. Consider the larger ecosystem of third parties, as resilience should extend to all parties a firm interacts with (and parties a firm's vendors, alliances and partners interact with as well).
- Change programs. Meet resilience criteria prior to launching change programs.
- Communication. Create living internal and external communication plans that evolve with a firm's continuous resilience journey.
- Disaster recovery. Build a plan that involves not only resolving operational disruption but also effective crisis management.
- Cultural change. Advocacy from within is critical. Make sure employees understand both the framework and the role they play in maintaining continuity across the enterprise.
- Ownership. Assign responsibility and accountability for key elements.

TOPIC 4 – RESILOC TOOLS

4.1. WOULD YOU FIND SUCH A TOOL USEFUL FOR YOUR COMMUNITY?

- What do you like about it / not like about it?
- How would you hope to use it?
- Is something missing from it?

- Yes, I agree is going to be a great tool for our community
- To learn from other communities how to react in a similar hazard.
- Nothing is missing from the proposed tool

5.4. HOW DO YOU FIND THE IDEA OF ASSESSING RESILIENCE ALONG DIFFERENT DIMENSIONS?

- Are the 7 dimensions the right ones?
- Are they too many/too few?

I agree with this idea because it cover most of them

5.5. IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE WOULD IT MOST LIKELY BE USED?

- It's going to be used in Preparedness and response

5.6. WHAT DO YOU SEE AS THE MAIN CHALLENGES OF USING SUCH A TOOL?

- The main challenge is the community to be ready and to react really quickly in hazard scenarios because there are going to be a similar situation in another municipality across the Europe. There are going to use the reports with the instructions and information from similar situations.

Also, the goals from these tools are:

- Reduce, or avoid, losses from hazards;
- Assure prompt assistance to victims;
- Achieve rapid and effective recovery.

6. PARTICIPATION

5.1. WHAT ARE THE ACTORS INVOLVED CURRENTLY IN DISASTER MANAGEMENT CYCLE?

- At local, regional and national level?

At Local level recovery actors are listed with the following actors.

- City manager generally coordinates with the emergency manager, mayor and other agencies in order to achieve effective and efficient response and recovery activities.
- Mayor, County Judge and County Commissioners declare a disaster and start disaster recovery process, and work with the emergency manager, city manager and other departments to organize personnel and resources, and coordinate with state and federal officials to raise the disaster funds
- Emergency Medical Technicians (EMT) produces emergency medical care services for injured and transport disaster victim's further treatment in hospital.
- Health Officers provide community health counselling and information to town staff on potential health-related, exposures, such as exposure to chemicals, and work on health-related recovery issues with the Division of Public Health Services.
- Emergency Managers provide emergency operations plan, assess damages and losses, provide resources, and coordinate personnel and operations by communicating with the dispatch centre, field personnel, department heads and political leaders
- Code Enforcement Officers assess damages and prepare policy to revise existing codes to support recovery efforts, and organize the housing permit process in the recovery process

- Finance, Treasurer and Tax Collectors create policies and procedures for emergency purchasing and projects, and inspect contracts for recovery purchasing and projects, estimate disaster response and recovery related costs and organize donated money to support recovery efforts, manage insurance conflicts, and provide information for public and private grant (Allenstown, 2013).
- Police provide security for disaster areas, and emergency public information, coordinate damage assessment efforts with Highway Department and the, code Enforcement Officer, protect disaster victims from fraud, and provide child safety and assistance for other community crime issues
- Firefighters provide assistance in the distribution of emergency public information and in maintenance of reconstruction safe, protect disaster victims from fire and fire risks, and provide assistance
- The Recovery Support Functions (RSFs) give support to local governments by facilitating problem solving, easily reaching resources, and promoting partnership among State and Federal officials, private entities and stakeholders.

In a national level:

- Individuals, families and businesses need to collaborate with local government which has significant roles of planning and managing all impacts of the recovery. According to FEMA's State Disaster Recovery Managers Responsibilities, local government may become overwhelmed and need staffing, recovery expertise, leadership or other assistance.
- Also, local government joins with State and Federal officials in the development and implementation of their plans and recovery process whether needed or wanted.
- Successful disaster recovery management includes coordination, integration, community participation and management. The state promotes leading and managing the overall recovery process, and plays the significant role to organize recovery activities, such as financial and technical support. State may have programs to assist implement recovery projects and finance. State informs public with important messages and acquires information from other stakeholders for distribution process.

III.6.5. Municipality of Catania, Italy

General information

INTERVIEWER

• Name, organisations and contact details of interviewers
  • Salvatore Marchese, IES Solutions, email: s.marchese@iessolutions.eu
  • Uberto Delprato, IES Solutions, email: u.delprato@i4es.it

RESPONDENTS
• Number of participants: 1
• Names, organisation, position in the organisation, role in the RESILOC project.   • End User/Resilience expert for Catania Municipality;
INFORMED CONSENT FORM
• Yes
• Date and place/platform – 23/10/2020, written questionnaire from Marco Romano.

REPORT

TOPIC 1 – UNDERSTANDING RESILIENCE AT LOCAL CONTEXT
WHICH ARE THE MAIN "HAZARDS" YOUR COMMUNITY IS FACING? • Hydrogeological risk • Seismic Risk
WHAT DOES "IMPROVING RESILIENCE" MEAN TO YOU IN YOUR LOCAL COMMUNITY? • Improving the perception of risk • Improving communication tools • Increasing the involvement of Voluntary Associations and Citizens • Availability of Business Intelligence and Decision Support data and tools *Does resilience mean different things for the different hazards your community faces?* • In general, the areas for improvement (perception, communication, involvement, tools) apply to all types of risk, but each of these areas must be specified and diversified for each type of risk. 1.2.2. *Who are the responsible actors when we think about resilience?* *Primary stakeholders* • Municipal Administration (various directorates and services) *Secondary stakeholders* • Volunteering associations • Citizens *What role do citizens have?* • Participation and Co-responsibility in the civil protection system
WHAT, IF ANYTHING, HAVE YOU OR OTHERS DONE SO FAR TO INCREASE THE RESILIENCE OF YOUR COMMUNITY?

- Drafting of the Civil Protection Plan
- Drafting and distribution of Information Brochures
- Dissemination meetings with Volunteer Associations
- Live simulations

1.4 IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE DO YOU SEE IMPROVING RESILIENCE AS MOST RELEVANT?

- Prevention and preparedness

1.4.1. How can resilience be improved?

- Information and guidance
- Targeted meetings with citizens in the context of the small community (neighbourhood, area, hamlet)
- Support for the Civil Protection System

1.4.2 Could you provide an example from a lesson learned?

- It was possible to increase the perception of risk and trust in the Civil Protection System through Information and Disclosure activities aimed at small communities in which indications were provided on how to mitigate and overcome specific risks.

1.4.3 How does improving resilience make emergency management more effective?

- It increases the ability to react
- It reduces the chain consequences of risk
- It promotes participation and trust in the Civil Protection System

TOPIC 2: ASSESSING RESILIENCE IN THE LOCAL CONTEXT

2.1 HOW IMPORTANT IS IT CURRENTLY FOR YOU TO BE ABLE TO ASSESS THE RESILIENCE OF YOUR COMMUNITY?

- The governance of a phenomenon cannot occur without relevant observation. The collection and analysis of data is essential to increase the knowledge of risks and the ability to manage disaster situations.

2.1.1 Should this exercise be a top-down one, based on statistical indicators perhaps? OR A participatory exercise, based on dynamic/qualitative indicators?

- A participatory procedure allows a greater contextualization and understanding of risks and the perception of them in the local community.

2.1.2 What scale do you think this assessment should have?

It would be useful at all levels but mainly at the local authority level.

2.2 ARE YOU CURRENTLY ABLE TO ASSESS THE LEVEL OF RESILIENCE OF YOUR COMMUNITY?

- No. The fragmentation of the available data and the functionalities of the available tools allows only a general evaluation level.

2.3 WOULD YOU BE INTERESTED IN LEARNING FROM OTHERS' EXPERIENCES IN ASSESSING RESILIENCE?

- Absolutely yes, it is very important.
- The definition of unique metrics that make it possible to describe contexts, societies, economies, populations, government bodies would be very useful as these can be very different.

TOPIC 3 – RELEVANT REGULATIONS & LEGAL FRAMEWORKS

3.1. WHAT IS THE LEGAL FRAMEWORK ON RESILIENCE WITHIN WHICH YOU OPERATE?

- The guidelines for the drafting of the National Recovery and Resilience Plan (PNRR) are currently under public consultation

3.1.1 What are the policy areas that contribute / influence the local community's "resilience" framework?

- European Union
- Italian State
- Sicilian Region
- Municipality of Catania

3.2. WHAT IS THE FINANCIAL FRAMEWORK ON RESILEINCE WITHIN WHICH YOU OPERATE?

- There are no specific resources. Improving resilience is one of the objectives pursued by the Civil Protection Service of the Municipality of Catania.

3.2.1 Any useful tips / suggestions / comments in terms of resources?

- Program specific resources at European / National / Regional level

TOPIC 4 – RESILOC TOOLS

RESILOC aims to develop a software tool that will combine data on physical aspects (e.g. infrastructures) and social features (e.g. demographics) of a community, with less tangible aspects associated with human behaviour and risk preparedness, with the aim of producing a community-specific resilience profile.

This will be done by collecting data on up to seven resilience dimensions: these could include Infrastructure, Communication, Social (Life World), Resources, Environment, Economy and Governance

RESILOC will deliver a cloud-based platform able to strategically support stakeholders in modelling and assessing resilience for a city or a community. The resilience profile will serve as a basis for identifying localised resilience-building strategies, enabling "what-if" scenarios and suggesting actions to be implemented thanks to informed and empowered local resilience teams.

4.1. WOULD YOU FIND SUCH A TOOL USEFUL FOR YOUR COMMUNITY?

4.1.1 What do you like / dislike about this / these tools?

- It allows to centralize the data necessary for the evaluation and management of local resilience
- For monitoring and analysing the perception of risk and local resilience
- Analysis of compliance with national legislation on Cloud Computing (platform certification, data location, security, etc.).

4.2 HOW DO YOU FIND THE IDEA OF ASSESSING RESILIENCE ALONG DIFFERENT DIMENSIONS?

- Overall god, pertinent and useful

4.3 WHO DO YOU THINK WOULD BE MOST LIKELY TO USE SUCH A TOOL?

- Civil Protection Service
- Governing bodies
- Local Resilience Team

4.4 IN WHICH PHASE OF THE DISASTER MANAGEMENT CYCLE WOULD IT MOST LIKELY BE USED?

- Surely prevention and preparedness. In an emergency context it would be ineffective.

4.5 WHAT DO YOU SEE AS THE MAIN CHALLENGES OF USING SUCH A TOOL?

- Integration with other systems for data processing
- Adjustment of skills
- Scarce availability of resources to be assigned to this specific activity

TOPIC 5 - PARTICIPATION

5.1. WHAT ARE THE ACTORS INVOLVED CURRENTLY IN DISASTER MANAGEMENT CYCLE?

- Local Civil Protection Service,
- Regional Civil Protection Department (DPCR) Sicily,
- National Civil Protection,
- Rescue Coordination Center (CCS),
- Municipal Operations Center (COC),
- Prefecture,
- Fire Brigade, Forestry Corps, Carabinieri, Guardia di Finanza, State Police, Provincial Police,
- Port Authorities,
- Local Health Authorities,
- neighbouring municipalities.

5.2 WHICH ARE KEY ACTORS (TYPE OF STAKEHOLDERS) THAT ARE NOT FULLY / FORMALLY ENGAGED NOW IN THE DISASTER MANAGEMENT CYCLE BUT YOU WOULD LIKE TO INVOLVE?

- None

5.2.1 What are the challenges of engaging them?

- Expand the availability of updated, localized, objective and certified data.
- Increase the capacity for participation, collaboration, coordination and communication between the various actors.

OTHER DISCUSSED ISSUES

- Implementation of the Municipal Emergency Plan for Seismic Risk
  - Preparation / Prevention Phase
    - Definition of Risk in terms of Danger, Vulnerability, Exposure;
    - Development of a scenario for the Seismic Risk for the Municipality of Catania in terms of Specific Characteristics of the City, scenarios of seismic shaking of the soil for the urban area, exposure map of the Urban System, assignment of scores for each element at risk (areas residential buildings, school system, etc.) for the different periods indicated (Normal, Crisis day, Crisis night, Resumption), classification of buildings based on construction type, adjustment of ISTAT data according to empirical values, estimation of vulnerability for historic and monumental buildings , estimation of vulnerability for service networks and infrastructural systems, estimation of accessibility of the road network, estimation of damage;

- Information and dissemination activities for the dissemination of behavioural rules;
- Preparation of waiting areas and related signs;
- Periodic updating of the Municipal Emergency Plan;
- Civil Protection exercises;

- Alert / Alarm Phase
  - Data acquisition;
  - Evaluation of the Event;
- Emergency Management Phase
  - Activation of the Municipal Operations Center (COC);
  - Constant involvement, coordination and communication with other actors involved in crisis management;
  - Activation of operating procedures:
    - Safeguard of the population;
    - Assistance in reaching the waiting areas;
    - Assistance to the population gathered in the waiting areas;
    - Reactivation of the main road network and indication of alternative routes;
    - Reactivation of telecommunications and / or installation of an alternative network
    - Preparation of shelter areas and emergency response areas;
    - Constant information to the population;
    - Organization of the emergency response of the S.A.R. (Search and Rescue);
    - Reconnaissance of the affected area and perimeter of the areas with unsafe buildings;
    - List of the most critical situations and request for intervention by the Fire Brigade;
    - Setting up of tent cities in the shelter areas for the first hospitality of the homeless;
    - Census and hospitalization of evacuated families;
    - Medical and psychological assistance to the injured, the elderly, children and people with disabilities;

Appendix IV.: Semantic Analysis

IV.1. Rationale

The semantic analysis deployed in the following paragraphs is aimed at exploring the selected sources by answering the following research questions:

1. Which are the most frequent topics in the selected documents?
2. Which are the strongest connections among these topics?

While the first question is addressed through the analysis of the co-occurrence network, that is a diagram showing the most frequent interconnections between the lemmas used in the selected documents, the second one is addressed both through the analysis of the co-occurrence network and a concordance analysis, further detailing which words are mostly used immediately before or after some specific keywords.

IV.2. Methodology

IV.2.1.1. Co-occurrence Analysis

The co-occurrence analysis has been performed on two groups of selected documents:

- Deliverables of WP 2
- Transcripts of interviews with Project Communities EES-Phase 1

Co-occurrence analysis has been also applied isolating single questions/topics of the interviews with Project Communities (i.e. within the framework of EES Phase 1) thus on the following sub-groups of the interview's transcripts:

- On understanding resilience at a local context;
- On assessing resilience in the local context;
- On relevant regulations and legal frameworks;
- On RESILOC tools;
- On participation.

The selected sources have been elaborated through Orange software in order to analyse the co-occurrence of relevant terms.

Sources of all the groups have been separately pre-processed, excluding numbers, stopwords and auxiliary verbs (e.g. "different types of 'resilience' since 2011. Some of these were" → "Different types resilience since some"). Then, words have been selected according to their frequency and represented in a diagram showing their co-occurrence in windows of size of maximum 11 lemmas, meaning that co-occurrence between two words exists only if the distance between these is less than 9 lemmas.

Criteria of selection for the keywords (i.e. frequency and co-occurrence thresholds) have been applied in order to show both an adequate number of lemmas and a clear network among them.

Co-occurrence analysis is graphically represented by a figure showing dots (mostly frequented quoted words) and edges (co-occurrences of couple of words in the defined window for at least a threshold number of times).

IV.2.1.2. Concordance Analysis

The concordance analysis has been performed only on the deliverables of WP 2.

For this purpose, seven keywords have been selected:

- Indicator(s)
- Proxy (proxies)
- Dimension(s)
- Vulnerability (vulnerable)
- Resilience (resilient)
- Exposure(s) (exposed, exposing, expose(s))
- Adaptation(s) (adaptive, adapting, adapted, adapt(s))

Selected documents have been inquired in order to show the 10 words used before and after every time the inquired term appeared in the text. The result is shown as a word cloud. The tables present the frequency (in absolute numbers and in relation to the number of keywords' occurrences (%)) of the mostly used terms.

IV.2.1.3. Semantic analysis of Interview

Full interviews

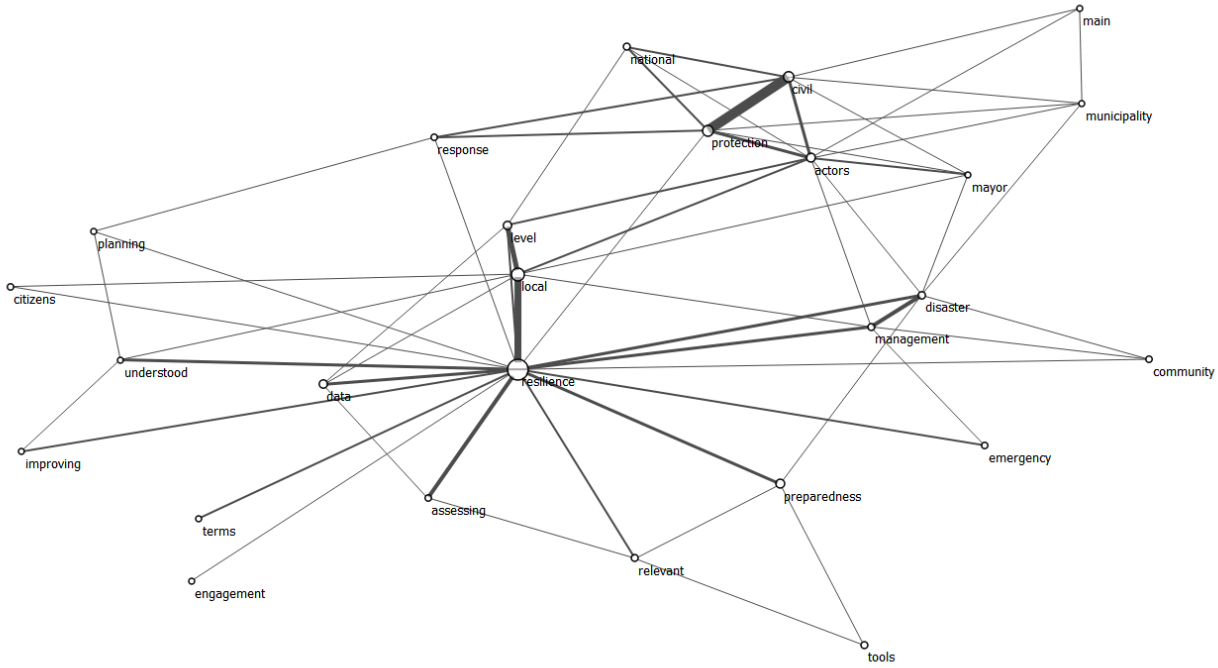


Figure 1 – Co-occurrence analysis – Full interviews

The figure shows 26 nodes, each one representing a word with at least 7 occurrences in the selected documents. 64 edges represent co-occurrences of at least 3 times between two words in a window of size 11; their thickness represents the number of co-occurrences.

The highest co-occurrences are registered between *civil* and *protection* (20), *resilience* and *local* (14), *resilience* and *assessing* (9), *resilience* and *preparedness* (8), *resilience* and *disaster* (8).

Civil and *protection* form a relevant cluster in which other mentioned words are *actors*, *national*, *response*. A minor cluster is constituted by *disaster* and *management*, showing however a significant co-occurrence only with the term *resilience*, which of course constitutes the barycentre of the figure.

Question 1: On understanding resilience at a local context

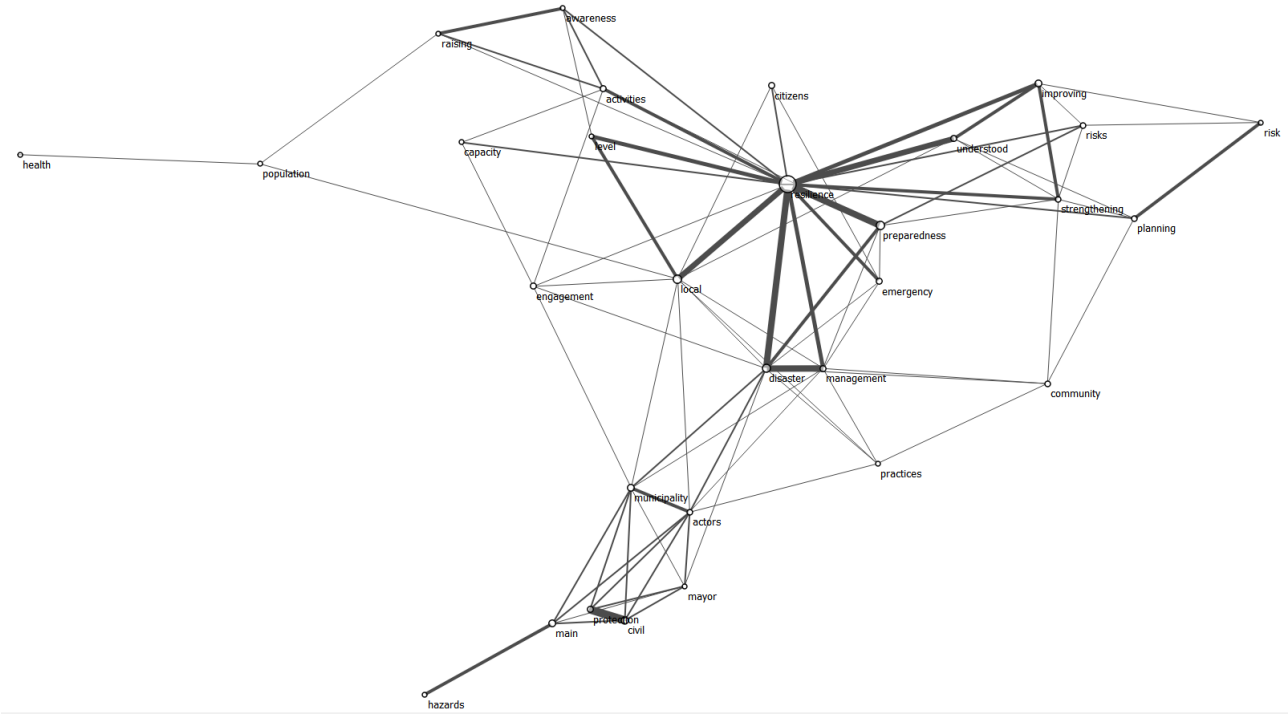


Figure 2 – Co-occurrence analysis – Question 1

The figure shows 30 nodes, each one representing a word with at least 4 occurrences in the selected documents. 89 edges represent co-occurrences of at least 2 times between two words in a window of size 11; their thickness represents the number of co-occurrences.

The highest co-occurrences are registered between *civil* and *protection* (8), *resilience* and *preparedness* (7), *resilience* and *disaster* (7), *disaster* and *management* (7), *resilience* and *local* (6), and *resilience* and *understood* (6).

The figure shows again a relevant cluster around the words *civil* and *protection*, involving also the couple of words *main* and *hazards*, as well as *mayor*, *actors* and *municipality*. *Local-level*, *awareness-raising-activities*, and *risk-planning* are other relevant co-occurrences.

Question 2: On assessing resilience in the local context

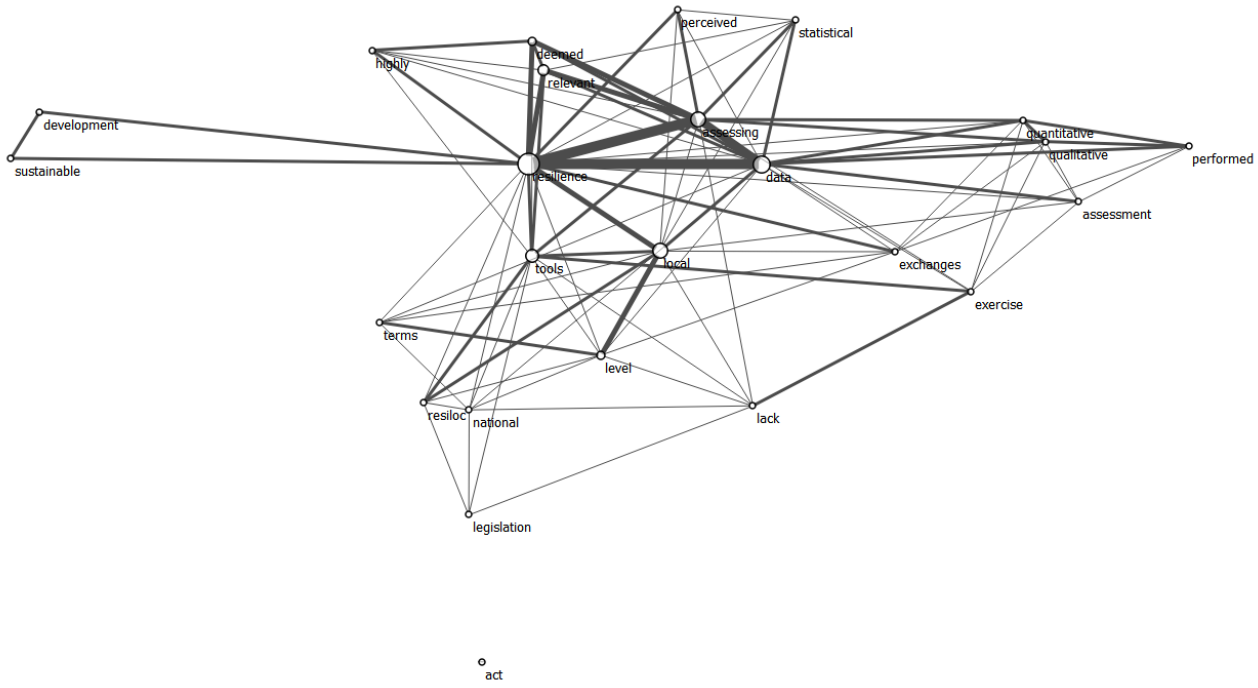


Figure3 – Co-occurrence analysis – Question 2

The figure shows 25 nodes, each one representing a word with at least 2 occurrences in the selected documents. 96 edges represent co-occurrences of at least 2 times between two words in a window of size 11; their thickness represents the number of co-occurrences.

The highest co-occurrences are registered between *resilience* and *assessing* (5), *resilience* and *data* (5), *assessing* and *data* (4). All the other co-occurrences scores are lower than 4.

Also in this case, the term *resilience* occupies the central part of the figure, while relevant couples of term emerge, such as *sustainable-development*, *local-level*, *quantitative-qualitative*.

Question 3: On relevant regulations and legal frameworks

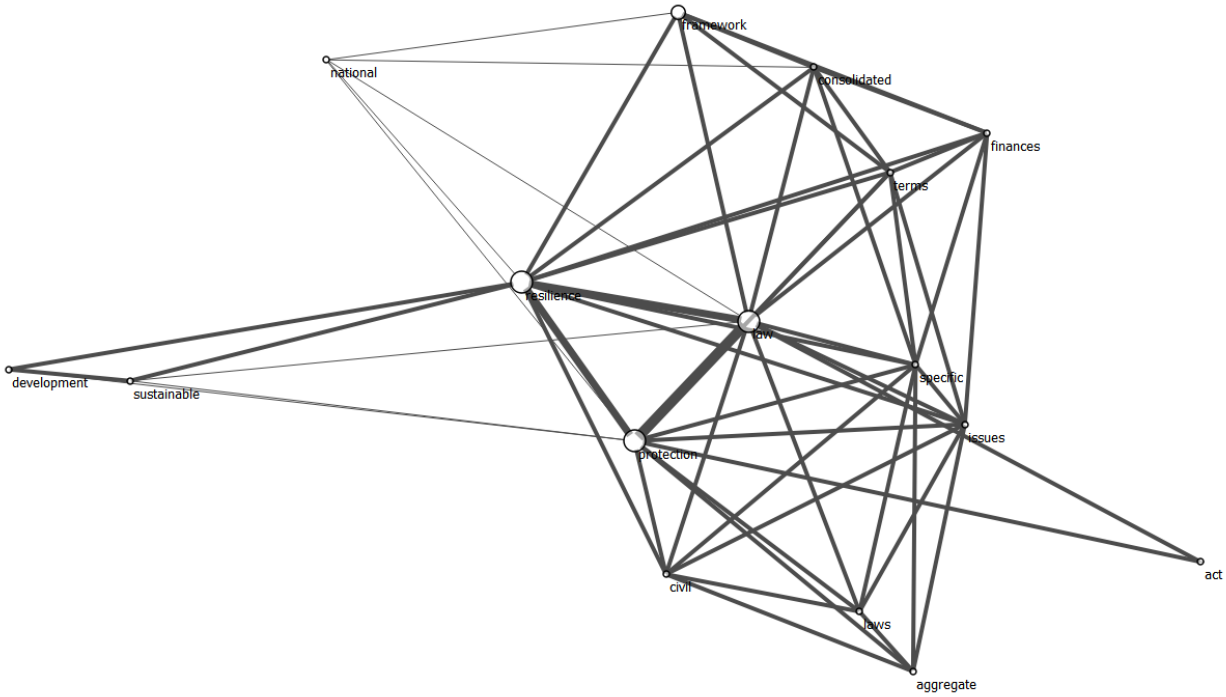


Figure 4 – Co-occurrence analysis – Question 3

The figure shows 16 nodes, each one representing a word with at least 2 occurrences in the selected documents. 59 edges represent co-occurrences of at least 1 times between two words in a window of size 11; their thickness represents the number of co-occurrences.

The highest co-occurrences are registered between *law* and *protection* (4), *resilience* and *law* (3), and *resilience* and *protection* (3). All the other co-occurrences scores are lower than 3.

Even though the term *resilience* in one of the most important in the figure, the couple *law-protection* occupies the central part of the figure, while some other couples of word emerge, such as *sustainable-development* and *consolidated-framework*.

Question 4: On RESILOC tools

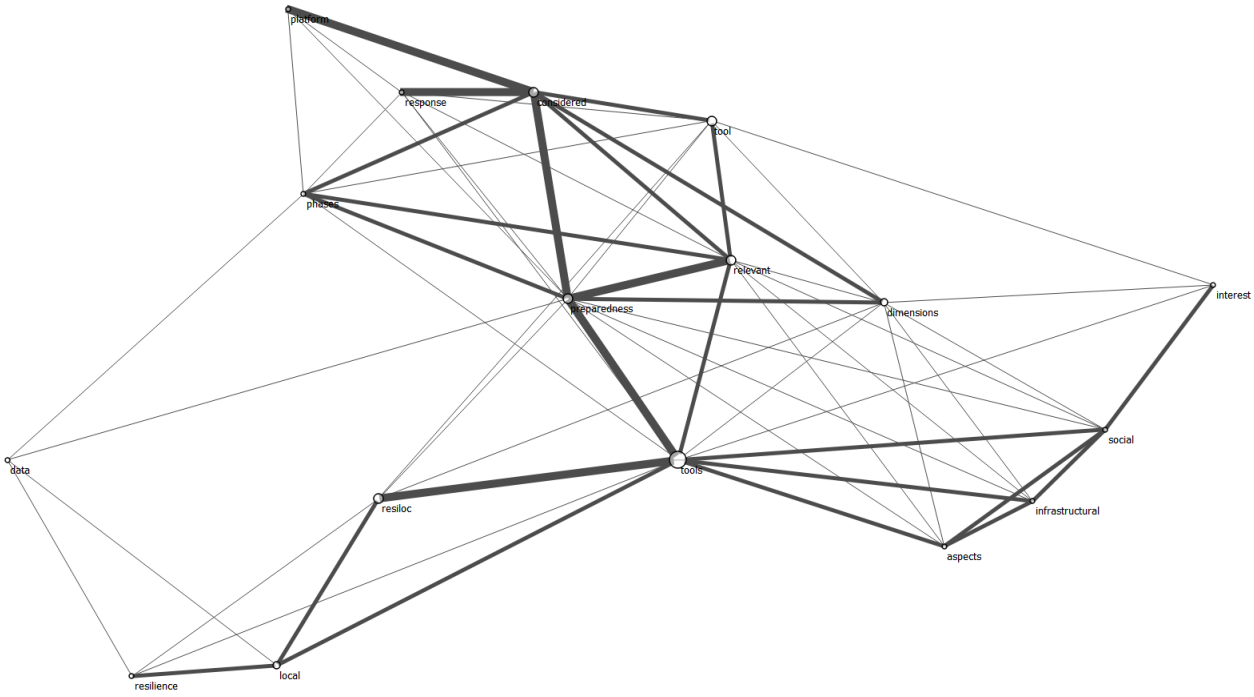


Figure 5 – Co-occurrence analysis – Question 4

The figure shows 17 nodes, each one representing a word with at least 2 occurrences in the selected documents. 62 edges represent co-occurrences of at least 1 times between two words in a window of size 11; their thickness represents the number of co-occurrences.

The highest co-occurrences are registered between *RESILOC* and *tools* (3), *preparedness* and *considered* (3), *preparedness* and *relevant* (3), *preparedness* and *tools* (3), *considered* and *platform* (3), and *considered* and *response* (3). All the other co-occurrences scores are lower than 3.

For the first time the term *resilience* has a very low frequency, while the centre of the figure is occupied by the term *preparedness*, showing a thick network involving also the term *tools*. Another relevant cluster is constituted by the terms *aspects*, *infrastructural*, *social* and *interest*.

Question 5: On participation

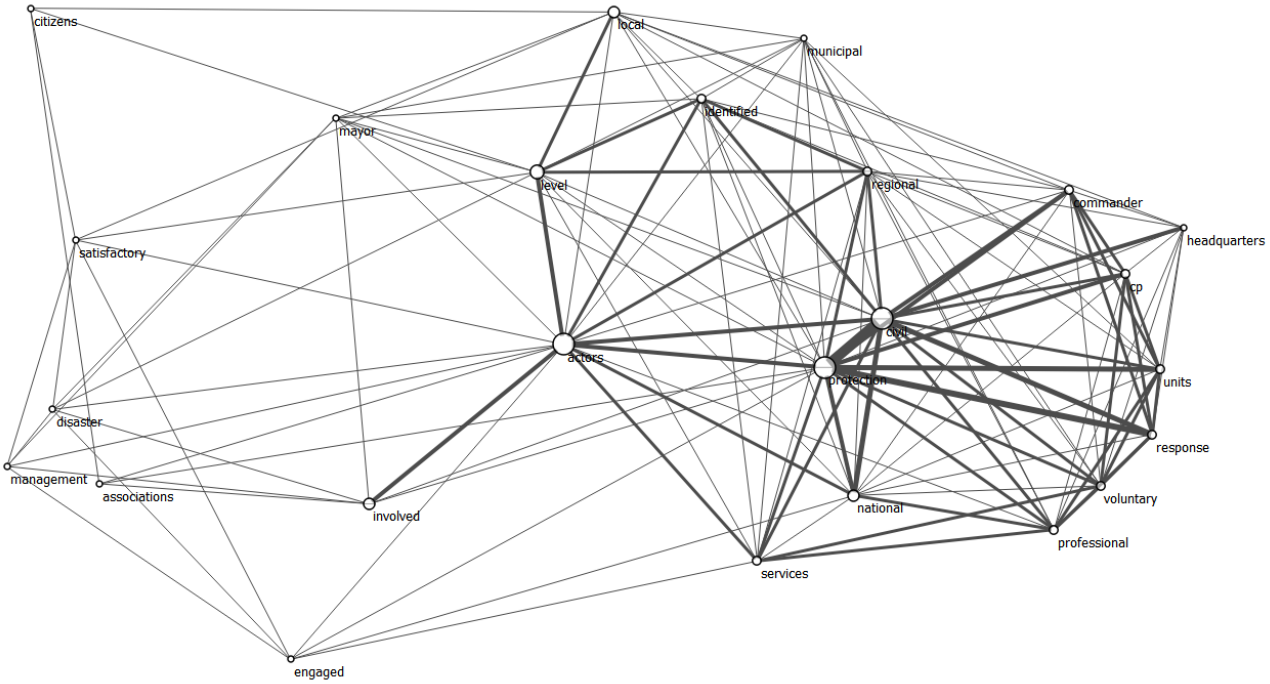


Figure 6 – Co-occurrence analysis – Question 5

The figure shows 25 nodes, each one representing a word with at least 2 occurrences in the selected documents. 141 edges represent co-occurrences of at least 1 times between two words in a window of size 11; their thickness represents the number of co-occurrences.

The highest co-occurrences are registered between *civil* and *protection* (10), *protection* and *response* (6), *protection* and *units* (5), *civil* and *response* (5). All the other co-occurrences scores are lower than 4.

As the terms *civil* and *protection* constitute the centre of the figure, with strong co-occurrence relationships with many other lemmas (*services, national, regional, commander, units, response, voluntary, professional*, among others), the terms *actors* also play a pivotal role, with relevant connections with terms like *involved, level, identified, regional, national, services*, beside *civil* and *protection*. Other lemmas are more marginal, such as the couple *disaster-management*.

IV.2.1.4. RESILOC Deliverables

Co-Occurrence Analysis

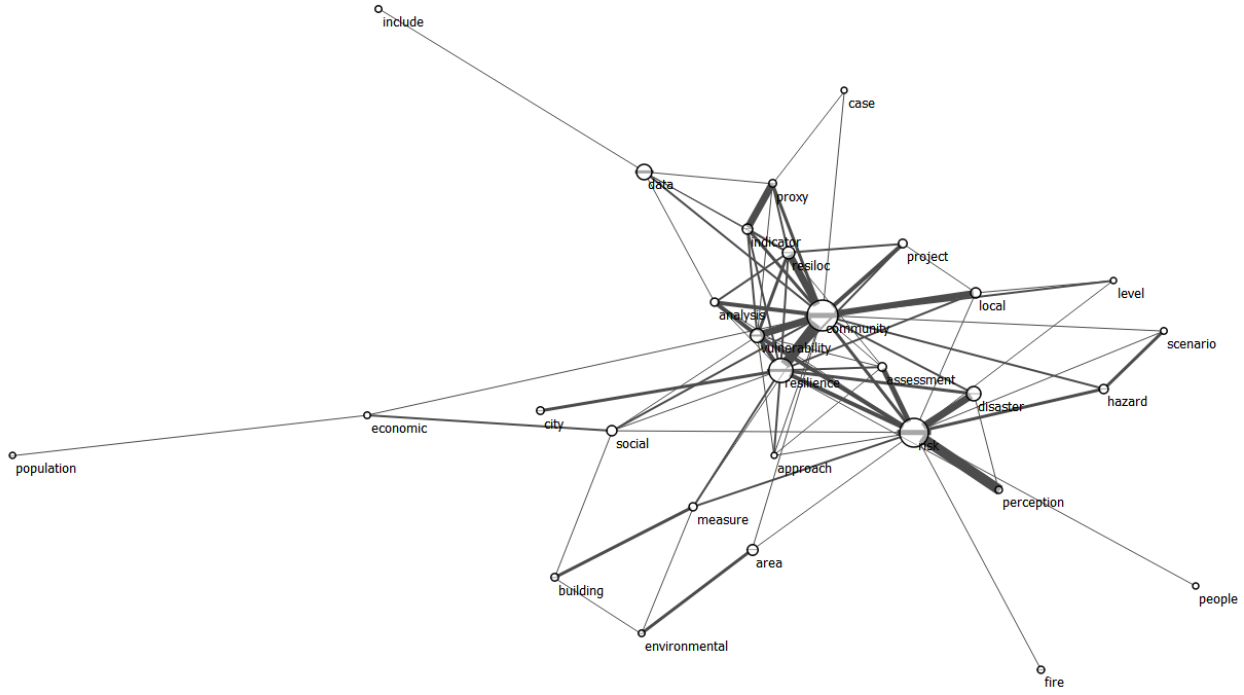


Figure 7 – Co-occurrence analysis – RESILOC Deliverables

The figure shows 30 nodes, each one representing a word with at least 500 occurrences in the selected documents. 97 edges represent co-occurrences of at least 80 times between two words in a window of size 11; their thickness represents the number of co-occurrences.

The highest co-occurrences are registered between *risk* and *perception* (633), *community* and *resilience* (623), *community* and *RESILOC* (472), *indicator* and *proxy* (455), *community* and *vulnerability* (440), and *risk* and *disaster* (434). Other relationships are below 400 occurrences.

Community stands as the pivotal term of the figure, showing a strong relationship with the term *resilience*. Other relevant couples have been already highlighted: *proxy-indicator*, as well as *risk* and *perception*. Out of the thick network of co-occurrences registered among these terms, the word data show a high frequency, yet no relevant co-occurrences with other terms, as well as the couples *environmental-area* and *building-measure*.

Concordance Analysis: Indicator

Figure 8 – Concordance analysis – Indicator

The most frequent words appearing in concordance with the term *indicator*, appearing in 796 sentences, are:

Term	n. of appearances	% of appearances in relation to the number of keyword's appearances
proxy	449	56.4%
dimension	236	29.6%
community	180	22.6%
Table	168	21.1%
RESILOC	156	19.6%
Vulnerability	135	17.0%
Resilience	134	16.8%

Other lemmas are below 100 occurrences.

Concordance Analysis: Proxy

Figure 9 – Concordance analysis – Proxy

The most frequent words appearing in concordance with the term *proxy*, appearing in 627 sentences, are:

Term	n. of appearances	% of appearances in relation to the number of keyword's appearances
indicator	449	71.6%
dimension	181	28.9%
community	162	25.8%
RESILOC	146	23.3%
table	144	23.0%
data	109	17.4%
relevance	105	16.7%

Other lemmas are below 100 occurrences.

Concordance Analysis: Dimension

Figure 10 – Concordance analysis – Dimension

The most frequent words appearing in concordance with the term *dimension*, appearing in 454 sentences, are:

Term	n. of appearances	% of appearances in relation to the number of keyword's appearances
indicator	236	52.0%
Proxy	181	39.9%
Table	175	38.5%
Community	161	35.4%
RESILOC	110	24.2%
Vulnerability	101	22.2%
Social	100	22.0%

Other lemmas are below 100 occurrences.

Concordance Analysis: Vulnerability

Figure 11 – Concordance analysis – Vulnerability

The most frequent words appearing in concordance with the term *vulnerability*, appearing in 1,016 sentences, are:

Term	n. of appearances	% of appearances in relation to the number of keyword's appearances
Community	289	28.4%
Analysis	251	24.7%
Resilience	235	23.1%
Risk	191	18.8%
RESILOC	191	18.8%
Indicator	135	13.3%
Dimension	101	10.0%

Other lemmas are below 100 occurrences.

Concordance Analysis: Resilience

Figure 12 – Concordance analysis – Resilience

The most frequent words appearing in concordance with the term *resilience*, appearing in 1,853 sentences, are:

Term	n. of appearances	% of appearances in relation to the number of keyword's appearances
Community	421	22.7%
Vulnerability	235	12.7%
Risk	213	11.5%
Communities	153	8.3%
Disaster	141	7.6%
Local	138	7.4%
Indicator	134	7.2%
Assessment	128	6.9%
Concept	124	6.7%
City	116	6.2%
RESILOC	113	6.1%
Strategies	105	5.7%
Framework	101	5.4%2
Project	100	

Other lemmas are below 100 occurrences.

Concordance Analysis: Exposure

Figure 13 – Concordance analysis – Exposure

The most frequent words appearing in concordance with the term *exposure*, appearing in 347 sentences, are:

Term	n. of appearances	% of appearances in relation to the number of keyword's appearances
Risk	83	24.0%
Vulnerability	80	23.0%
Hazard	50	14.4%
Community	49	14.1%
Analysis	47	13.5%
Assessment	47	13.5%
Values	45	13.0%
Indicator	45	13.0%

Other lemmas are below 40 occurrences.

Concordance Analysis: Adaptation

Figure 14 – Concordance analysis – Adaptation

The most frequent words appearing in concordance with the term *adaptation*, appearing in 408 sentences, are:

Term	n. of appearances	% of appearances in relation to the number of keyword's appearances
Behaviour	140	34.3%
Risk	117	28.7%
Perception	76	18.6%
Resilience	73	17.9%
Preparedness	65	15.9%
Community	50	12.2%
Capacity	41	10.0%

Other lemmas are below 40 occurrences.