Deliverable 2.1

Report on the conclusions on needs and requirements and lesson learnt by the Living Labs.

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Document history

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Executive summary

The **GOBEYOND** project aims to enhance risk management for natural disasters by developing operational platforms that improve response capacity and situational awareness during geo- and weather/climate-related events. A central objective is to collaborate with end-users to adapt existing methods, algorithms, and tools for geohazard and weather/climate Early Warning Systems (EWS). This effort will result in a new generation of decision support tools that integrate the needs and requirements of authorities and first/second responders, identified through a participatory co-creation approach within a Living Lab (LL) framework.

This deliverable outlines the initial stages of this process within WP2 and explores how the LL concept can be effectively extended to each pilot site in collaboration with the responsible partners. Key aspects considered include analysing available methodologies and tools, applying them to gather relevant information, and fostering interaction among project partners and within each pilot site to develop a comprehensive understanding of end-user needs and requirements.

As a preliminary conclusion, the project emphasizes the importance of delivering flexible, modular solutions tailored to each pilot site, accounting for the specific types of risks they face and the responses required. Achieving this necessitates continuous collaboration between different partner profiles—researchers, developers, and end-users—which aligns well with the LL methodologies applied throughout the project.

Several challenges have been identified, such as the availability of first/second responders to participate in project activities amidst their daily work and understanding the varied needs across partner roles. Addressing these challenges is an ongoing effort that will continue into the demonstrations in WP5. The initial identification of these issues forms part of this deliverable, setting the stage for solutions to be developed as the project progresses.

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AMAYA	Agencia de Medio Ambiente de Andalucía
ATT	Regional Civil Protection Authority of Attica
BRGM	Bureau de Recherches Géologiques et Minières
CPAs	Civil Protection Authorities
CRAHI	Center of Applied Research in Hydrometeorology
DRAXIS	Draxis Environmental SA
ECMWF	European Centre for Medium-Range Weather Forecasts
ENoLL	European Network of Living Labs
EPCA	Regional Civil Protection Authority of Andalusia
EST	Civil Protection Authority of Estepona City
EWS	Early Warning System
HYDS	Hydrometeorological Innovative Solutions SL
HRT	Hellenic Rescue Team
LL	Living Lab
MR-IEWS	Multi Risk Impact Early Warning System
NOA	National Observatory of Athens
UNINA	University of Naples
UPC	Universitat Politècnica de Catalunya-BarcelonaTech

1. Introduction

The **GOBEYOND** project aims to improve risk management for natural disasters. One of its key objectives is to implement operational platforms that will improve response capacity and situational awareness in case of geo- and weather-related events.

This should be done by working with end-users to adapt existing methods, algorithms and tools for geo- and weather/climate Early Warning System (EWS) into a new generation of decision support tools capable of integrating the needs and requirements of authorities and first/second responders, identified through a participatory co-creation approach based on a Living Lab (LL) framework.

The development of this deliverable D2.1 relies on the work conducted in T2.1 Collaborative framework for the definition of end-user needs.

The aim of this document is to present the process followed to set up the co-creation framework, starting with the initialisation of 3 LLs, in the regions of Andalusia, Attica and Campania, and then extending this concept to other pilot sites considered in the project. Each LL is composed of the different actors that are involved in the related pilot site. Ideally these should involve first/second responders, representatives of local and regional authorities, developers and engaged citizens and associations that may act as "zero-order responders" but in this starting point the situation varies among the pilots.

In each LL, initial online or face-to-face meetings have been organized to engage the stakeholders. Once initialized, the LLs will remain active for the co-evaluation of the implementation phase, during the real-time demonstrations conducted along all duration of the project (WP5).

This document is structured as follows. Section 2 introduces the Background, summarizing the composition and main focus of each LL/pilot site. Section 3 presents a catalogue of tools and technologies proposed in earlier stages of the project to develop the co-creation work under the LL framework. Section 4 introduces the design of the questionnaire used to get a first glance the needs and requirements throughout the **GOBEYOND** pilot sites. Section 5 presents results collected from **GOBEYOND** partners using this questionnaire. Section 6 summarizes activities carried out in the pilots to promote the co-creation framework. Finally, Section 7 presents the deliverable's conclusions.

2. Background

WP2 will collect the requirements for the Multi-Risk Impact-based EWS (MR-IEWS) to be developed in WP3 and WP4. The system will be co-designed and adapted to the needs of Civil Protection Authorities (CPAs) and first/second responders through a collaborative framework for the definition of end-user needs (T2.1).

This framework will be done by specific Living Labs (LL) sessions in the regional pilot sites. The **GOBEYOND** project foresees the realisation of demonstrations in both regional and municipal pilot sites (Figure 1). The first LL were implemented on 3 of the regional pilot sites: Andalusia (Spain), Attica (Greece) and Campania (Italy), to host the user centred participatory co-creation approach.

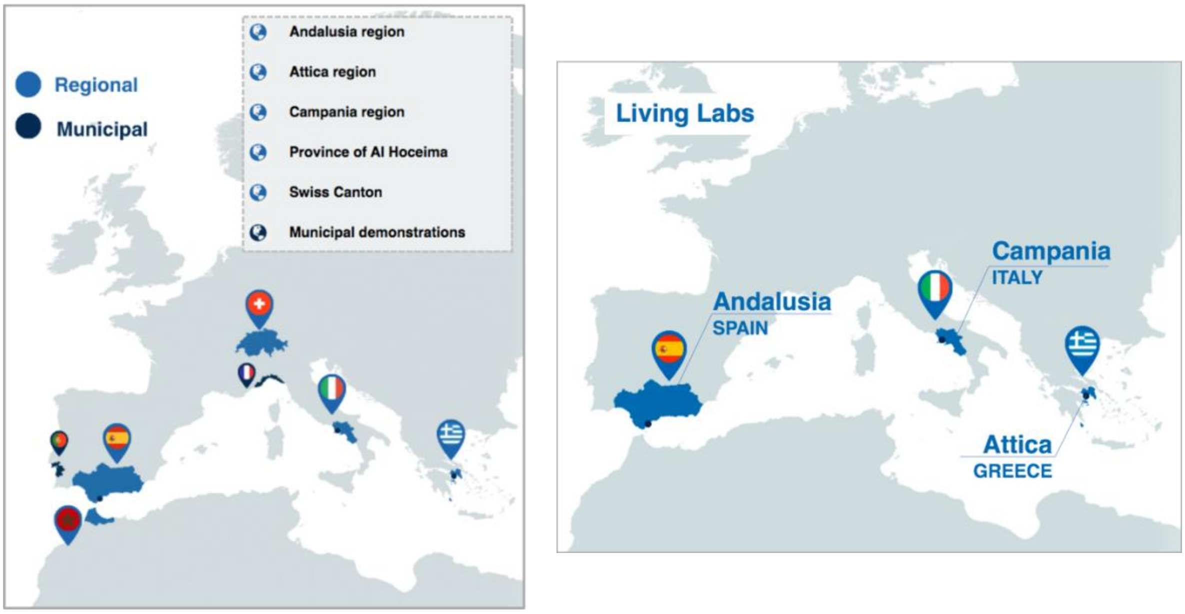


Figure 1 **GOBEYOND** pilot sites and Living Labs localisation

It is therefore important to identify the main characteristics of these regional pilot sites as a starting point for the constitution of the LL (Table 1).

Table 1 Living Labs regions main characteristics

Andalusia Region	**End Users**	▪ Regional Civil Protection Authority of Andalusia (EPCA) ▪ Governmental agency acting as first responders (AMAYA) ▪ Civil Protection Authority of Estepona City (EST) ▪ Cities of Lepe and Isla Cristina
	Hazards	All major geo and weather hazards (major focus on tsunamis)
	Focus	▪ Evaluate integration of MR-IEWS in response protocols ▪ Assess effectiveness and time savings in deploying intervention units ▪ Demonstrate coordination with other regions and national level
	Other Participants	*Developer:* HYDS (Hydrometeorological Innovative Solutions) *Technical Support:* Center of Applied Research in Hydrometeorology (CRAHI) of the Universitat Politècnica de Catalunya-Barcelona Tech (UPC)

Attica Region	**End Users**	▪ Regional Civil Protection Authority of Attica (ATT) ▪ Hellenic Rescue Team (HRT) (first responders) ▪ Civil Protection Authority of Piraeus City
	Hazards	All major geo and weather hazards
	Focus	▪ Integrate local and regional information into a unified user-interface ▪ Evaluate capacity to trigger decision action from response protocols
	Other Participants	*Technology Provider:* DRAXIS Environmental *Scientific Expert:* National Observatory of Athens (NOA) *Supporter:* Hellenic Rescue Team (HRT)
Campania Region	**End Users**	Civil Protection Authority of Pozzuoli Municipality
	Hazards	Earthquakes, volcanic ash fall
	Focus	▪ Test adapted MR-IEWS for pre-eruptive and post-eruptive phases ▪ Pre-eruptive: Damage from precursor earthquakes ▪ Post-eruptive: Damage from ash fall ▪ Advanced seismic network for earthquake detection and alert ▪ Evaluate impact using EASE tool ▪ Support rapid deployment and safety actions ▪ Assess impact of volcanic ash fall using EASE tool
	Other Participants	*Technical Support:* UNINA (Università degli Studi di Napoli Federico II) *Developer:* HYDS (Hydrometeorological Innovative Solutions)

The process to obtain the needs and requirements for these pilot sites follows a roadmap with different stages, as shown in the figure below.

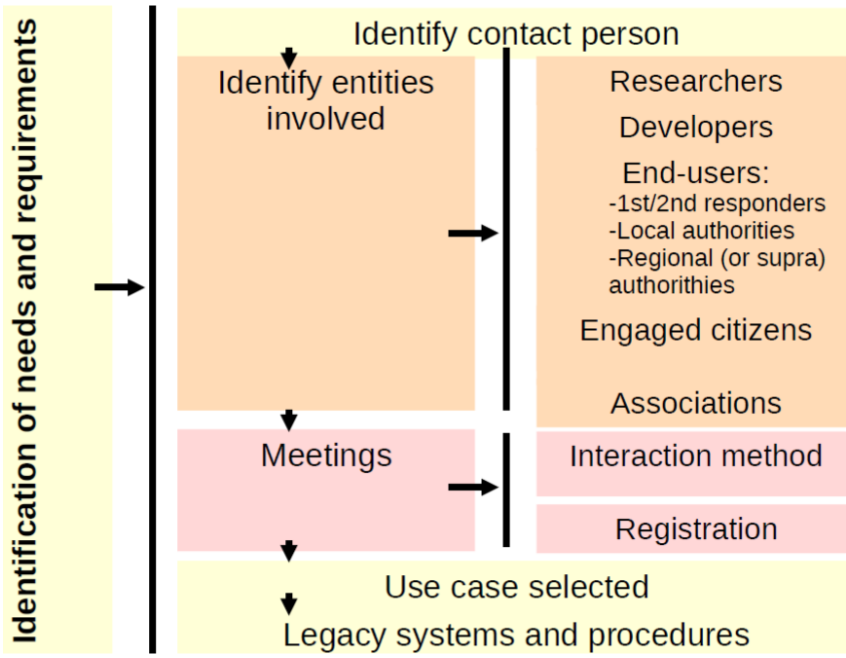


Figure 2 Needs and requirements roadmap for **GOBEYOND** pilot sites

In order to monitor this process, a dashboard has been set up, shared in the common workspace of the project, to follow the evolution of these steps and to have a vision of the progress in each LL in percentage. The updated situation for August-2024 is shown in Figure 3.

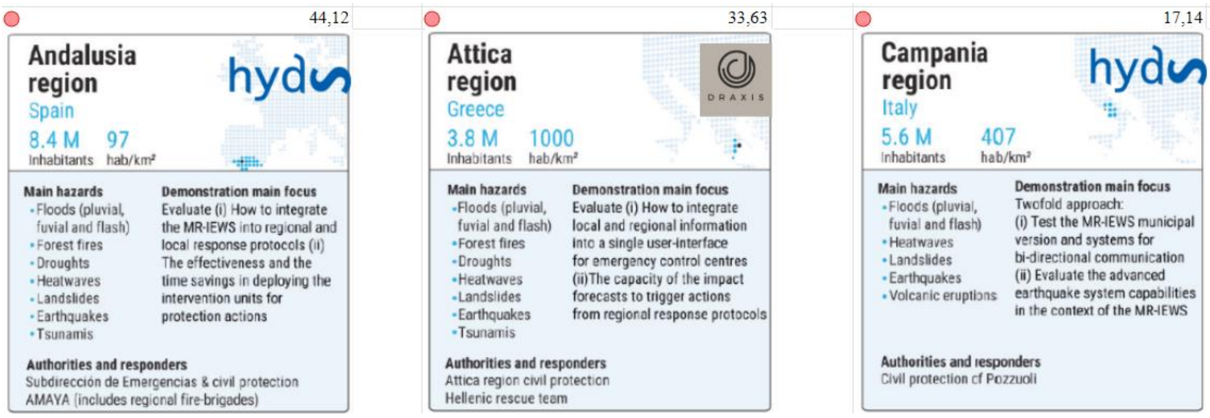


Figure 3 Progress in the steps to establish needs and requirements in the LL

3. Tools and methodologies inside the LL framework

Living Labs (LL) are user-centred, open innovation ecosystems that integrate research and innovation processes in real communities and environments. They focus on co-creation, involving multiple stakeholders such as citizens, researchers, businesses and government to develop and test new solutions. The European Network of Living Labs (ENoLL) is an international federation that promotes and develops LL worldwide. ENoLL facilitates the exchange of knowledge on the subject and collects tools and examples of use that have been used in the project to take the first steps in this direction.

Emergency LL use a variety of tools and methods to foster innovation and practical solutions. Here are some key tools and methods that are commonly used:

- Co-creation and Co-design: Engaging stakeholders, including end-users, in the design and development process to ensure the solutions meet real needs.
- Ethnographic Studies: Observing and analysing the behaviour and interactions of people in their natural environments to gather insights.
- Contextual Inquiry: Conducting interviews and observations in the context where the product or service will be used.
- Prototype Testing: Developing and testing prototypes in real-world settings to gather feedback and make iterative improvements.
- Usability Testing: Assessing how easy and effective it is for users to interact with the product or service.
- Stakeholder Ecosystem Management: Managing relationships and interactions among various stakeholders involved in the LL.
- Governance and Business Models: Establishing frameworks for decision-making and sustainable business practices.

These methods (Ballon & Schuurman, 2015) help ensure that the innovations developed in LL are practical, user-centred, and effective in real-world emergency scenarios.

Regarding the **GOBEYOND** project aim with the LL, we focus on the co-creation and co-design collaborative approaches that actively involve stakeholders, including end-users, in the development process of the Multi Risk Impact Early Warning System (MR-IEWS) to ensure that solutions are practical and meet real needs. Some insights for these were presented inside WP2 session during the kick-off meeting in Castelldefels in October 2023. Here are some key aspects to be taken into account by partners:

Co-Creation (Hagy, Morrison & Elfstrand, 2017)

- Stakeholder Engagement: Involves a diverse group of stakeholders such as users, researchers, citizens, and authorities to gather a wide range of perspectives.
- Workshops and Ideation Sessions: Facilitates brainstorming and idea generation among participants to co-create solutions.
- Iterative Feedback: Continuous feedback loops from stakeholders help refine and improve the solutions throughout the development process.

Co-Design

- User-Centered Design: Focuses on understanding the needs, behaviours, and experiences of end-users to create more effective solutions.
- Prototyping and Testing: Develops prototypes that are tested in real-world settings to gather user feedback and make necessary adjustments.
- Collaborative Tools: Utilizes tools like design thinking and contextual inquiry to involve users in the design process.

These methods will help so that the solutions developed are not only innovative but also practical and user-friendly, making them more likely to be adopted and successful in real-world applications.

The election of a proper bunch of tools adapted to each LL is the first key decision to be taken confronting the use of face-to-face methodologies and online tools. The following sections are a breakdown of the tools taken into account in the context of the project.

3.1. Online tools

Using online tools for co-creation can be highly effective, but it does come with its own set of challenges. Here are some common ones relevant for the project:

1. Communication Barriers:

Challenge: Misunderstandings can occur more easily in virtual environments due to the lack of non-verbal cues.

Solution: Use video conferencing tools and encourage clear, concise communication. Regular check-ins can also help ensure everyone is on the same page.

2. Technical Issues:

Challenge: Participants may face technical difficulties such as poor internet connections, software incompatibilities, or lack of familiarity with the tools.

Solution: Provide technical support and training sessions to help participants get comfortable with the tools. Ensure there are backup plans in case of technical failures.

3. Engagement and Participation:

Challenge: Keeping participants engaged and actively involved can be harder online, especially over long periods.

Solution: Use interactive tools like polls, breakout rooms, and collaborative whiteboards to keep sessions dynamic. Regularly solicit feedback to keep participants motivated.

4. Building Trust and Rapport:

Challenge: Establishing trust and rapport among participants can be more difficult without face-to-face interactions.

Solution: Start with icebreaker activities and team-building exercises. Encourage open communication and create a supportive environment.

5. Tool Overload:

Challenge: Using too many tools can overwhelm participants and complicate the co-creation process.

Solution: Select a few versatile tools that meet most needs and ensure participants are comfortable using them. Simplify workflows where possible.

The use of any of these tools implies addressing these challenges proactively to help the project to make the most of online tools for co-creation. There are already some tools in use inside the project:

- SharePoint
- Video-conference tools
- Email
- Google Drive
- Microsoft Forms
- Miro

These online tools have covered the needs of the initial installation of the three living labs and different project meetings and should not be extended to many more.

3.2. Face-to-face tools

Conversely, on the other side of the spectrum using face-to-face methods in LL can be very effective, but it also comes with several challenges relevant for the project:

1. Logistical Complexity:

Challenge: Coordinating schedules and locations for all participants can be difficult, especially if they are from diverse backgrounds or regions.

Solution: Careful planning and flexible scheduling can help mitigate this issue.

2. Resource Intensive:

Challenge: Face-to-face interactions often require significant resources, including time, money, and physical space.

Solution: Efficient use of resources and securing adequate funding can help manage these demands.

3. Limited Scalability:

Challenge: Scaling face-to-face methods to larger groups or multiple locations can be challenging.

Solution: Combining face-to-face methods with digital tools can enhance scalability.

4. Participant Engagement:

Challenge: Ensuring active and consistent engagement from all participants can be difficult.

Solution: Interactive activities and clear communication of the benefits of participation can boost engagement.

Addressing these challenges requires careful planning, resource management, and a willingness to adapt methods to suit the needs of all participants.

In order to get the 3 LL of the project off to a good start, efforts were made to organise face-to-face meetings where all those involved could share directly with each other how to set up the LL and the different aspects to be taken into account.

As a result, the first meetings were successfully organised in Andalusia, Campania and Attica in November 2023, March 2024 and July 2024 respectively, with the participation of end-users and developers, as well as different stakeholders of the pilot.

The following sections revise in detail the use of these tools to provide a first insight into the needs of the project LL. In Section 4 and 5 the design and results of an online questionnaire that was conducted to collect needs and requirements of the pilot sites, and in Section 6 the activities carried out in the pilots.

4. Needs and requirements pilot's questionnaire: Design.

Among the various elements implemented for the animation of LLs, a first questionnaire has been sent out to all the pilot sites under the form an online survey, over the March – June 2024 period. The inclusion of all the pilot sites, rather than just the regional Living Labs, as the target of this questionnaire allows us to make the most of the initiative and get a more global view of all the project components. The following paragraphs briefly describe the objectives and contents of the questionnaire.

4.1. Objectives and perimeter of the questionnaire

The main objective of this questionnaire is to get a first overview of the end-users' needs and expectations regarding the **GOBEYOND** platform. To this end, the adopted strategy is to let pilot sites first express their respective views, while avoiding to orient their answers with early findings of the project.

Therefore, the main topics addressed by the questionnaire are the following:

- Understanding of the fields of intervention of the organizations represented by the respondents;
- Identification of the natural phenomena that are perceived as the most critical (in terms of frequency of occurrence and impact) for each pilot site;
- Identification of the actionable quantitative metrics or indicators (e.g., intensity of the phenomenon, estimated losses, etc.) for decision support at the different stages of the crisis;
- Required reliability and accuracy levels for the platform outputs;
- Prioritization of the functionalities and features that are expected to be provided by the future platform.

4.2. Content of the questionnaire

The assembled questionnaire contains a total of 29 questions, i.e., 17 quantitative (closed questions) and 12 qualitative (open questions). These are grouped into separate sections, which are detailed below.

4.2.1. Section 1: General information

The first few questions aim to identify the role and expertise area of the survey respondent, through the following items:

Question #1: *Organization / Entity* [open question]

Question #2: *Type of organization activity* [list of choices]:

- Civil security
- Public safety
- Healthcare
- Transportation
- Energy
- Telecommunications

- Drinking water and wastewater treatment
- Other

<u>Question #3:</u> *Role / Function in the organization* [open question]

Then, the focus is put on the perception or experience of the various types of natural phenomena that threaten the pilot site of interest, in terms of impact and frequency of occurrence. The natural phenomena considered in the **GOBEYOND** framework are the following: river floods, flash floods, storms, heat waves, droughts, forest fires, earthquakes, volcanic risks, tsunamis, landslides and rockfalls. Therefore, for each of the aforementioned hazard types, the questions are formulated as follows:

<u>Question #4:</u> *How importantly is your territory exposed to those phenomena? [list of choices]:*

- Not at all
- Low (slight material damages)
- Medium (occasionally human and/or material damages)
- High (numerous human and/or material damages)

<u>Question #5:</u> *How often does your organization deal with those phenomena?* [list of choices]:

- Not at all
- Weakly (it happens once in a while)
- From time to time (once every 2 to 5 years)
- Regularly (almost once every year)
- Extremely (multiple times a year)

Finally, this section concludes with a couple of open questions regarding the current limitations and needs of the survey respondent's organization with respect to the identified natural phenomena:

<u>Question #6:</u> *What are the main concerns of your organization regarding the effects of those phenomena?* [open question]

<u>Question #7:</u> *What are your objectives and needs to deal with those phenomena?* [open question]

4.2.2. Section 2: Loss indicators for decision support

This section aims to evaluate the respondent's preferences in terms of indicators choices to quantify the phenomena's characteristics and consequences. It starts with a couple of question related to the existing situation in terms of early warning systems:

<u>Question #8:</u> *Do you have any Early Warning System(s)?* [Yes / No]

<u>Question #9:</u> *If yes, in what context is it / are they used (phenomenon, scale, ...) and what has been you experience with this / these system(s) so far (what worked, didn't work, was very useful...)?* [open question]

As the usefulness, relevance and availability of indicators varies greatly with the time frame considered, it is proposed to define different specific time windows. Each of these may also be related to different types of phenomena, in an attempt to reconcile the wide discrepancies in time scales that are found between all the natural phenomena considered in **GOBEYOND**:

- Several days before the event, which relates mostly to hydro-meteorological phenomena, volcanoes or landslides;
- Few / Tens of minutes before the event, which relates mostly to tsunamis;
- Few / Tens of seconds before the event, which relates mostly to earthquake early warning;
- Few minutes after the event, which relates mostly to earthquake rapid response but also to all other hazards.

Therefore, for each of these four-time windows, a similar series of questions are asked, regarding the usefulness of various indicators and the type of risk-informed actions that may be taken:

Question #10: *Specify the usefulness of these indicators in early warning, several days before the event, in support to the prevention phase (hydro-meteorological risks, volcanoes, landslides)* [Rating: Not applicable / Not at all / Quite useful / Useful / Very useful]:

- Assessment of the event's intensity
- Assessment of the event's extent
- Assessment of damage to buildings
- Assessment of the number of exposed people
- Assessment of the number of potential victims
- Assessment of the potential impact on specific infrastructures

Question #11: *Other indicators not listed above* [open question]

Question #12: *When receiving these early warnings (Early warning – Several days before the event), select below the actions that would be taken by your entity* [list of choices]:

- Informing the population
- Intensification of preventive actions
- Safeguard measures (road closures, population confinement measures, etc.)
- Pre-positioning of equipment and/or intervention teams
- Reinforcing on-call personnel
- Test procedures
- Maintenance checks on critical systems
- Data backups
- Securing business continuity
- Other

Question #13: *Specify the usefulness of these indicators in early warning, few minutes / tens of minutes before the event, in support to the prevention phase (tsunamis)* [Rating: Not applicable / Not at all / Quite useful / Useful / Very useful]:

- Assessment of the event's intensity
- Assessment of the event's extent
- Assessment of damage to buildings
- Assessment of the number of exposed people
- Assessment of the number of potential victims
- Assessment of the potential impact on specific infrastructures

Question #14: *Other indicators not listed above* [open question]

Question #15: *When receiving these early warnings (Early warning – Few minutes before the event), select below the actions that would be taken by your entity* [list of choices]:

- Alert population/users (manual broadcast: human decision)
- Alert population/users (automatic broadcast)
- Alert teams/employees (manual broadcast: human decision)
- Alert teams/employees (automatic broadcast)
- Critical systems protection (reflex actions)
- Critical systems protection (automatic actions)
- Individual self-protection (reflex actions)
- Evacuation/lockdown measures
- Pre-positioning of equipment and/or intervention teams
- Other

Question #16: *Specify the usefulness of these indicators in early warning, few seconds / tens of seconds before the event, in support to the mitigation phase (earthquake)* [Rating: Not applicable / Not at all / Quite useful / Useful / Very useful]:

- Assessment of the event's intensity
- Assessment of the event's extent
- Assessment of damage to buildings
- Assessment of the number of exposed people
- Assessment of the number of potential victims
- Assessment of the potential impact on specific infrastructures

Question #17: *Other indicators not listed above* [open question]

Question #18: *When receiving these early warnings (Early warning – Few seconds before the event), select below the actions that would be taken by your entity* [list of choices]:

- Alert population/users (manual broadcast: human decision)
- Alert population/users (automatic broadcast)
- Alert teams/employees (manual broadcast: human decision)
- Alert teams/employees (automatic broadcast)
- Critical systems protection (reflex actions)
- Critical systems protection (automatic actions)
- Individual self-protection (reflex actions)
- Other

Question #19: *Specify the usefulness of these indicators in rapid response, few minutes / tens of minutes after the event, in support to the response phase (for all hazards)* [Rating: Not applicable / Not at all / Quite useful / Useful / Very useful]:

- Assessment of the event's intensity
- Assessment of the event's extent
- Assessment of damage to buildings
- Assessment of the number of exposed people
- Assessment of the number of potential victims

- Assessment of the potential impact on specific infrastructures

Question #20: *Other indicators not listed above* [open question]

Question #21: *When receiving these rapid impact assessments (Rapid response – Few minutes after the event), select below the actions that would be taken by your entity* [list of choices]:

- Building a common operational picture (situational awareness)
- Sizing the response
- Prioritizing reconnaissance
- Anticipation / Sizing of requests for reinforcements
- Itinerary selection and definition of traffic plans
- Assessment of induced and NaTech effects
- Information to higher decision levels (regional, national, head office, etc.)
- Other

For each time window, the list of actions that may be engaged upon receiving information on the indicators is essential, in order to ensure that the **GOBEYOND** platform delivers actionable results for enhancing response capabilities. The actions proposed in the questionnaire are partly obtained from outcomes of the European H2020 TURNkey project, which was solely focused on earthquake hazard (Douglas & Azarbakht, 2021; Auclair et al., 2021). More recently, a study by Auclair et al. (2024), based on a consultation of stakeholders from French West Indies exposed to seismic risk, has also identified a series of actions that may be engaged by distinct groups of end-users at various stages of a crisis.

Finally, this section concludes with an open question regarding any need for information that may not have been covered by the previous questions:

Question #22: *If needed, please specify your needs in terms of early warning / rapid response information* [open question]

4.2.3. Section 3: Reliability

This section delves into more technical details of the early warning levels, enquiring about the respondent's tolerance to false or missed alerts, as well as their preference regarding the communication of uncertainties:

Question #23: *What is your tolerance for missed alerts?* [rating from 1 to 10, Intolerable to Fully acceptable]

Question #24: *What is your tolerance for false alerts?* [rating from 1 to 10, Intolerable to Fully acceptable]

Question #25: *How would you like to be informed of the prediction uncertainty?* [list of choices]:

- Probability distribution between the different possible values (e.g., Intensity I 2%, II 5%, III 15%, IV 25%, V 53%)
- Probability associated with the dominant value range (e.g., intensity between X and Y)
- Confidence index (e.g., very uncertain, uncertain, fairly sure, very sure)

4.2.4. Section 4: Tools needs and requirements

This section focuses on what the **GOBEYOND** platform should be, starting with an open question:

Question #26: *What do you expect from the GOBEYOND platform?* [open question]

Then, a large list of potential features and functionalities are evaluated, based on the MoSCoW method (Clegg et al., 1994). This approach is mostly applied to the fields of project management or software development, with the objective of reaching a consensus among stakeholders on which requirement to prioritize. The acronym is composed of the letters M (for *Must*), S (for *Should*), C (for *Could*) and W (for *Won't*), which constitute the rating of the importance of each requirement:

Question #27: *The future platform…* [Rating: Must have / Should have / Could have / Won't have]:

- Open and standards-based system (integrable with other systems)
- Capability to integrate user additional information
- Capability to link with existing procedures
- Based on reliable sources of information
- If possible, data sources remain open after the project
- Easy to understand and use
- Automations that trigger simple instructions or procedures
- Adaptable to a variety of cases
- Redundant operation
- Integration of 112 calls, Twitter events, etc.
- Access to training materials in the platform itself
- Compatibility with legacy systems
- Generate material for new social networks: Instagram, TikTok
- Possibility of integrating with existent daily dashboards
- Able to provide daily situation analysis: Informative maps and simple graphic information
- Produce in due time warnings with a summary of the main data
- Produce a mobile version that allows you to receive audible warnings when certain thresholds are exceeded
- In the case of local entities, provide resources to organise information for civil protection and local response teams

Finally, this section concludes with two final open questions regarding issues that may not have been brought up by the questionnaire:

Question #28: *Add in this section any missing or specific aspects you would like to bring up* [open question]

Question #29: *What type of information do you need to be more operational?* [open question]

4.3. Format and dissemination

The questionnaire has been implemented as an online survey, using the Office Forms application (see examples in Figure 4 and Figure 5). This format has proven very convenient to create and to edit the form, to send out the questionnaire and to collect the results.

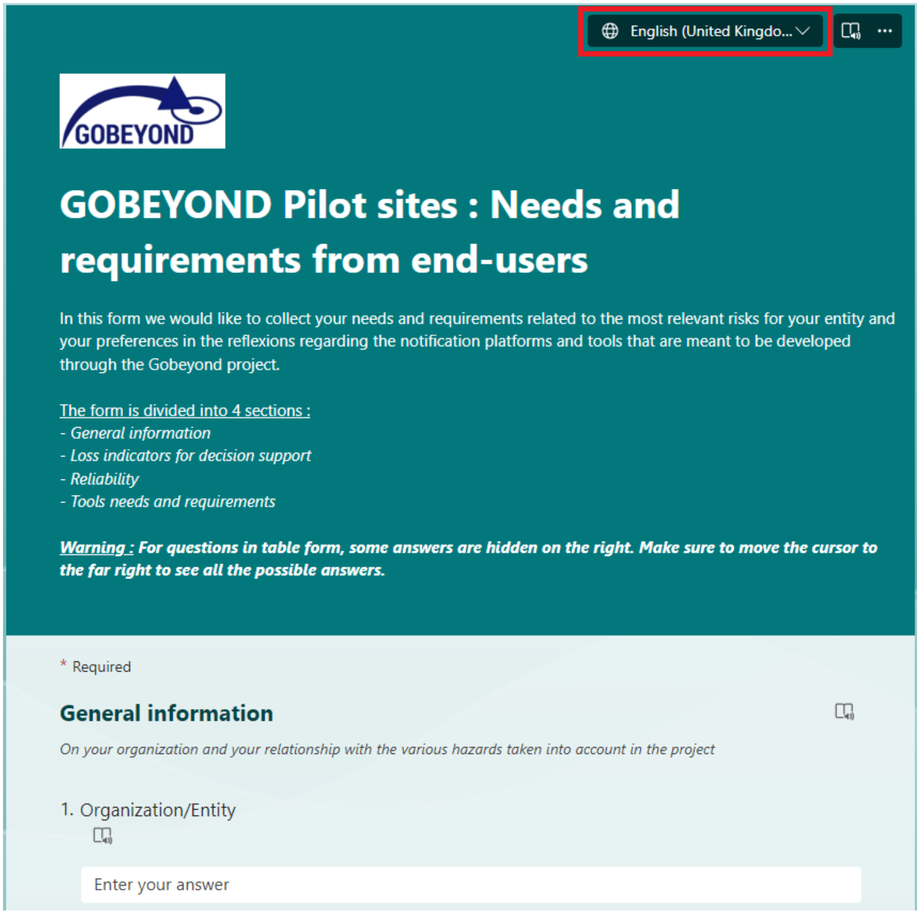


Figure 4 Header of the online form

With the language selection menu on the top right (red rectangle)

Apart from the English language, the form has also been translated into different languages in order to make accessible and usable by any actor of each pilot-site:

- In Spanish, for the Andalusia region;
- In Greek, for the Attica region;
- In Italian, for the Campania region;
- In German, for the Swiss canton;
- In French, for the Nice municipality area and for the province of Al Hoceima;
- In Portuguese, for the Setubal municipality area.

The link to the online survey has been sent out to the contact points of each pilot site, who have in turn disseminated the questionnaire to all relevant actors of their area.

4. How importantly is your territory exposed to those phenomena ?

	Not at all	Low (slight material damages)	Medium (occasional human and/or material damages)	High (numerous human and/or material damages)
River floods				
Flash floods				
Storms				
Heat waves				
Droughts				
Forest fires				
Earthquakes				
Volcanic risks				
Tsunamis				
Landslides				
Rockfalls				

Figure 5 Example of the formatting of Question #4

The answers to the questionnaire are then readily exported into a CSV format, for further exploitation and analyses, as detailed in the next Section of the present report.

5. Needs and requirements pilot's questionnaire: Results.

After disseminating the questionnaire to all pilot sites, a total of 47 answers have been collected: the results are detailed and analysed in the following paragraphs. The results shown are partial as they include only responses received on date and not from all pilot sites.

5.1. Global results

Some key results of the questionnaire are detailed below, for each section of the form. First, the results are presented globally, without making distinctions between pilot sites.

5.1.1. Section 1: General information

The ratings of the impact and frequency of various hazard types are provided in Figure 6 and Figure 7.

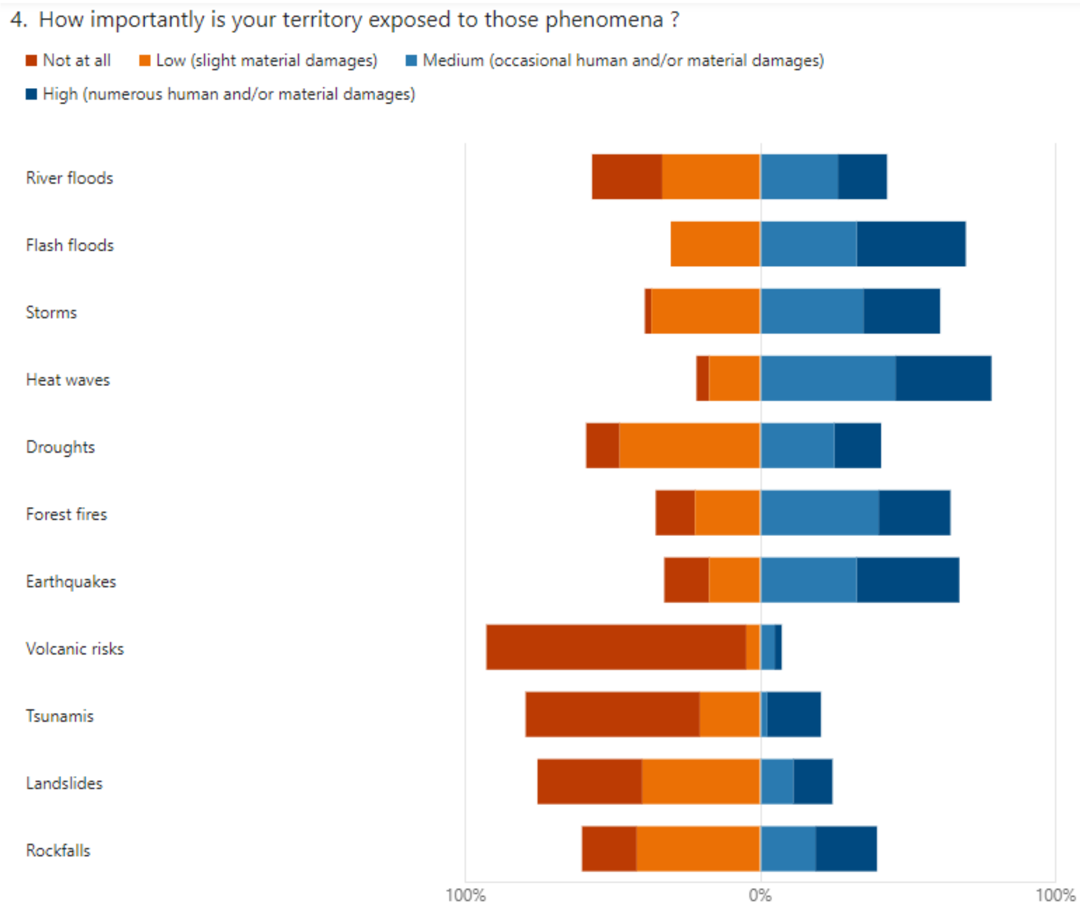


Figure 6 Global answers on hazards impact

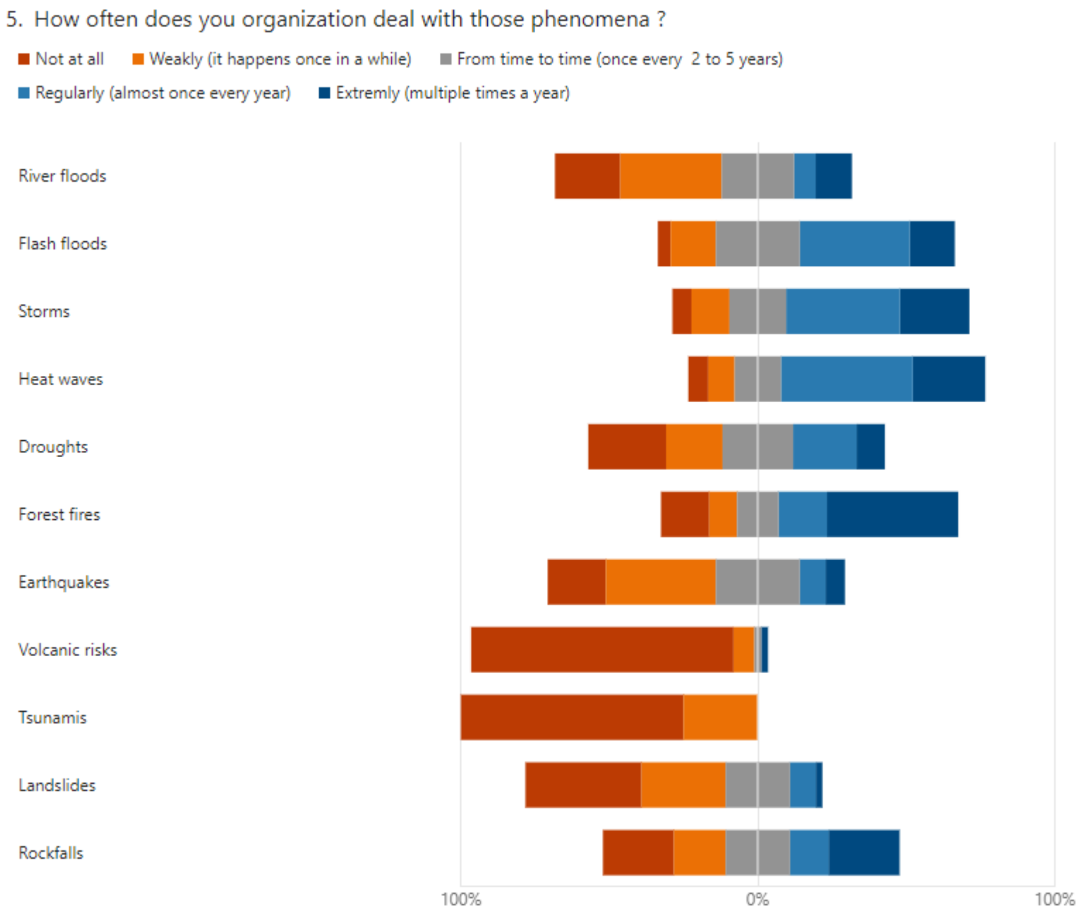


Figure 7 Global answers on hazards frequency

It appears that the hazard types that generate the most concern are meteorological phenomena, especially flash floods, storms, heatwaves and forest fires. Earthquakes are also perceived as having significant impact, but with much less frequency, which is in line with the usually long return periods of damaging earthquakes. Hazards such as volcanoes or tsunamis are very specific and they depend highly on the geographic and geologic context of the pilot site, so that a majority of areas are not feeling exposed to such phenomena. Finally, probably due to their limited spatial extent, landslides and rockfalls are deemed less critical as well.

Regarding open Question #6 (i.e., mains concern regarding these phenomena), many comments point out human casualties as the top priority, followed by damage to buildings (economic losses) and disruption of basic services. Most organizations are concerned with the constitution and communication of prior knowledge of hazard and risk in the prevention and mitigation phase. Then, in the emergency management phase, a critical issue pertains to the response capacity, due to potential lack of resources and difficulties to dimension the event and apprehend its complexity.

Regarding open Question #7 (i.e., objectives and needs with respect to these phenomena), most comments refer to the prevention of loss of life, the consolidation of knowledge in order to have adequate emergency plans in place (i.e., improvement of response capacity), the efficient transmission of information and the need to get forecasts well in advance.

5.1.2. Section 2: Loss indicators for decision support

Results for loss indicators and corresponding actions that may be taken several days before the event are detailed in Figure 8. All indicators are almost equally important, with a slightly stronger focus on the characterisation of the hazard component (intensity and extent of the event). The most relevant actions are found to be the information of the population, the intensification of preventive actions, the pre-positioning of equipment and/or intervention teams and the reinforcement of on-call personnel.

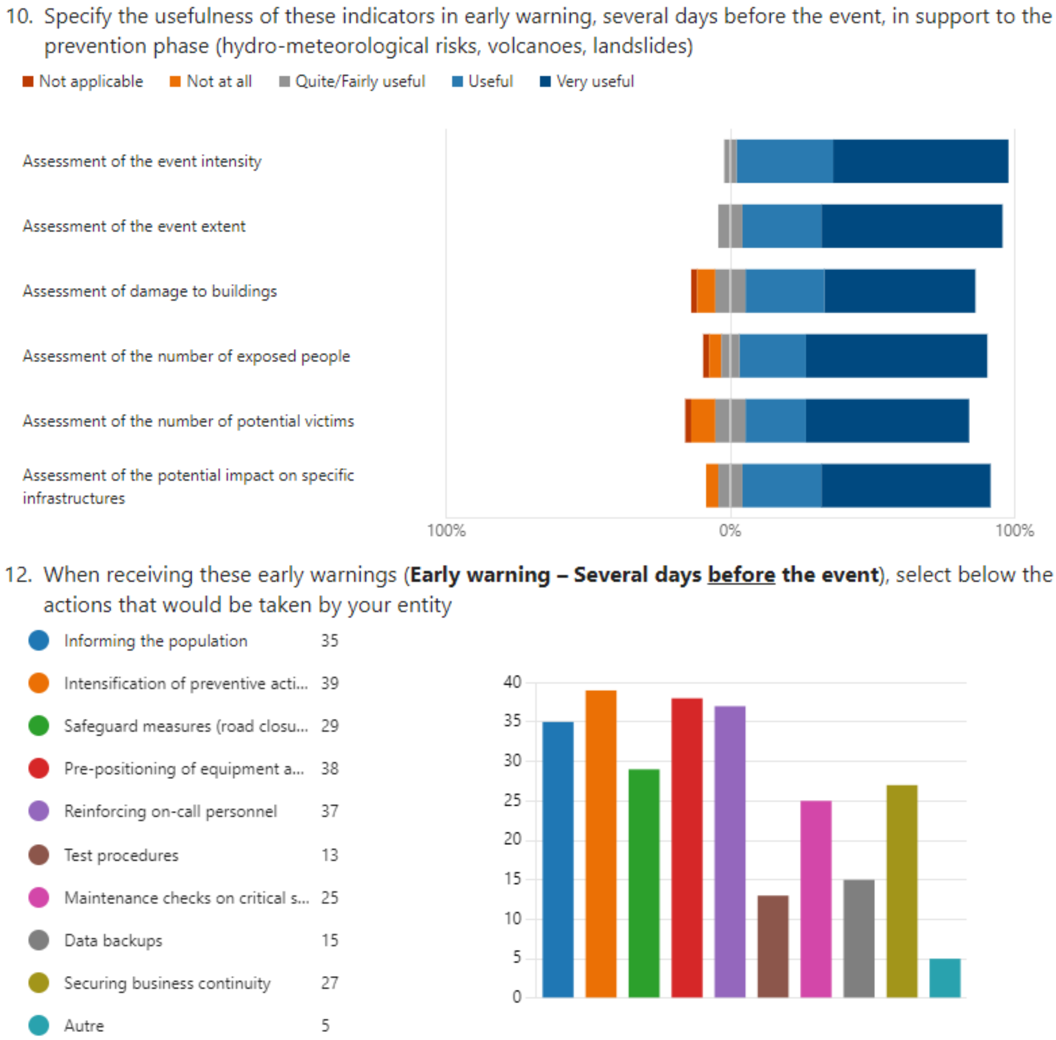
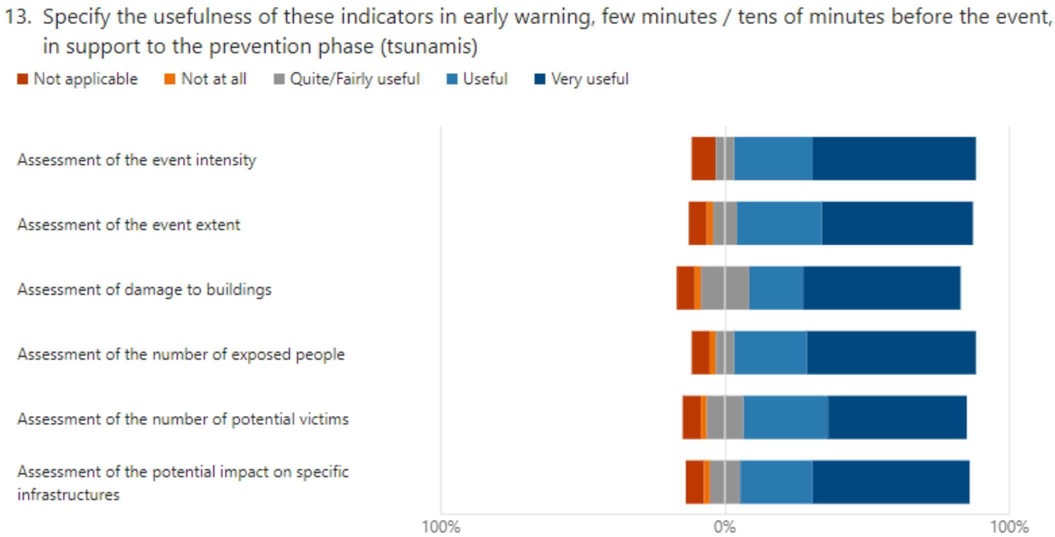


Figure 8 Global answers on early warnings: several days before the event

Results for loss indicators and corresponding actions that may be taken few minutes / tens of minutes before the event are detailed in Figure 9. All indicators are almost equally important. However, a non-negligible number of “Not applicable” ratings have been applied: this result may highlight the inadequacy of such indicators for that specific timeframe or for the mentioned tsunami hazard. The most relevant actions are found to be the alerting of the population and of teams' employees (in both cases, a manual broadcast based on a human decision is much preferred than an automatic broadcast), measures for individual self-protection (reflex actions), evacuation/lockdown measures and the pre-positioning of equipment and/or intervention teams.



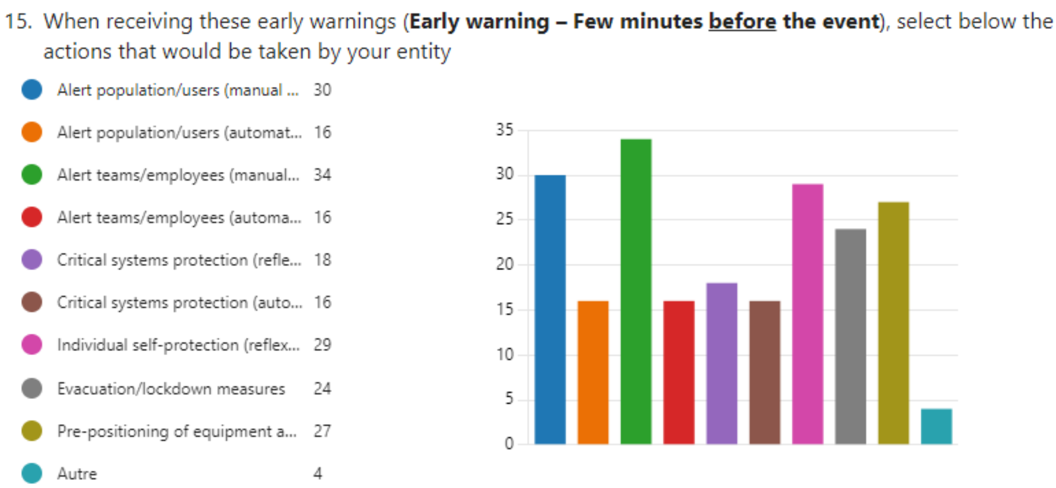
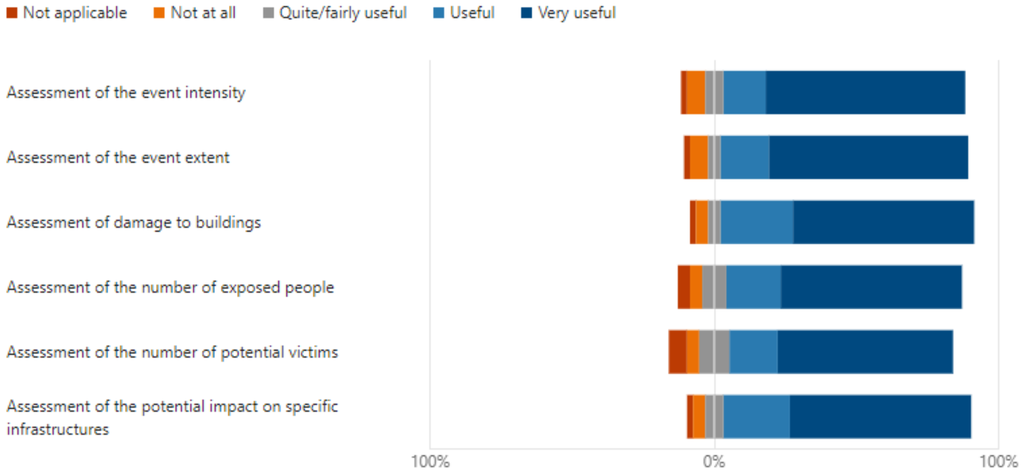


Figure 9 Global answers on early warnings: few minutes before the event

Results for loss indicators and corresponding actions that may be taken few seconds / tens of seconds before the event are detailed in Figure 10. All indicators are almost equally important. However, a non-negligible number of "Not applicable" ratings have been applied: this result may highlight the inadequacy of such indicators for that specific timeframe or for the mentioned earthquake hazard (i.e., specific case of earthquake early warning). The most relevant actions are found to be the alerting of the population and of teams' employees (as before, in both cases, a manual broadcast based on a human decision is much preferred than an automatic broadcast) and measures for individual self-protection (reflex actions).

16. Specify the usefulness of these indicators in early warning, few seconds / tens of seconds before the event, in support to the mitigation phase (earthquake)



18. When receiving these early warnings (**Early warning – Few seconds before the event**), select below the actions that would be taken by your entity

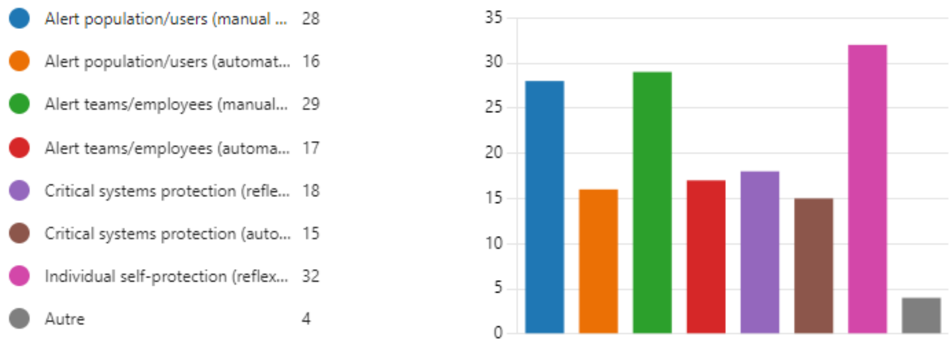


Figure 10 Global answers on early warnings: few seconds before the event

Results for loss indicators and corresponding actions that may be taken few minutes / tens of minutes before the event are detailed in Figure 11. All indicators are almost equally important. Since this timeframe is related to the rapid response phase, mostly for earthquakes but also for all other hazard types, most indicators are expected to be accessible in order to be readily exploited for crisis management operations. The most relevant actions are found to be the consolidation of a common operational picture (situational awareness), the sizing of the response, the prioritization of the reconnaissance and the information to higher decision levels (regional, national, head office, etc.).

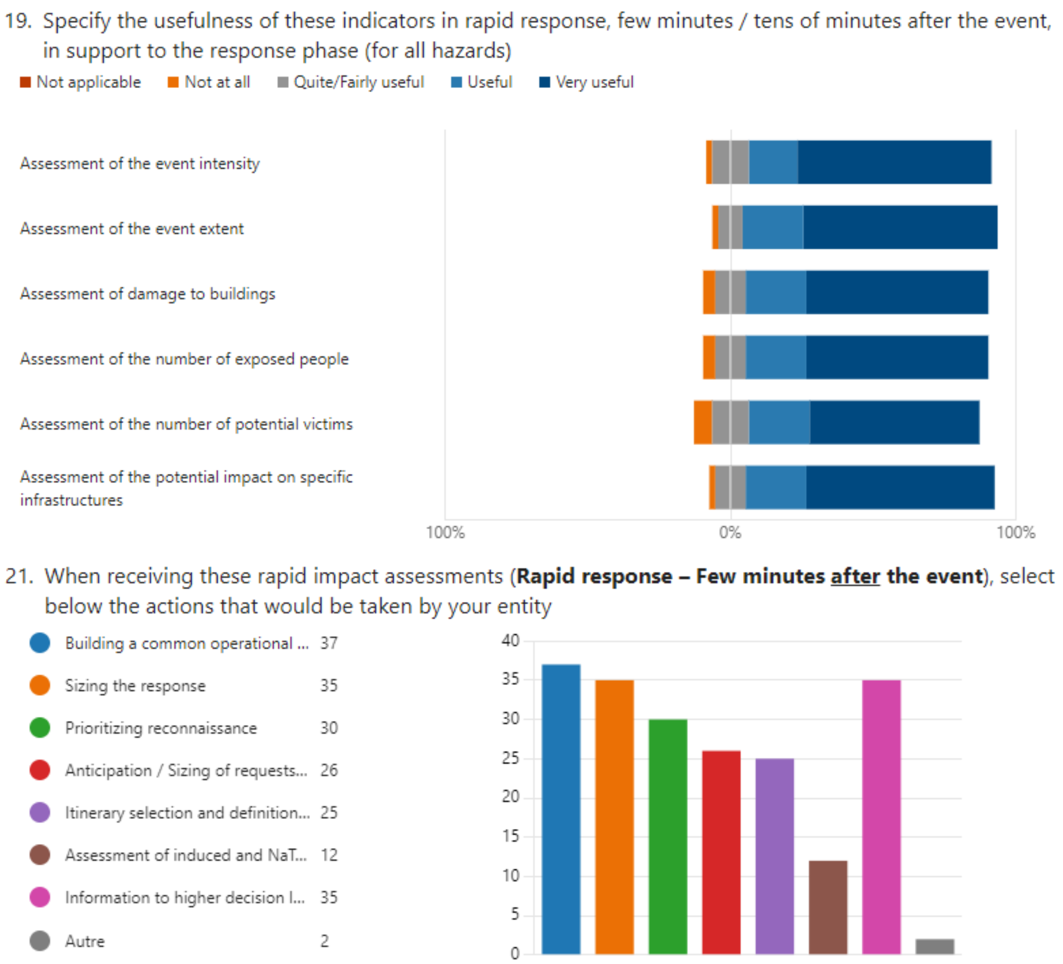


Figure 11 Global answers on rapid response: few minutes after the event

5.1.3. Section 3: Reliability

The rating of the respondents' tolerance to missed alerts and false alarms is presented in Figure 12. As expected, there is a very low tolerance for missed alerts; regarding false alerts, the tolerance is slightly better although it still has a very negative rating. These findings confirm that the developed system(s) should be very robust in terms of prediction accuracy, with a specific focus on the detection of dangerous phenomena (it is slightly preferable to generate fast alarms than to miss an alert).

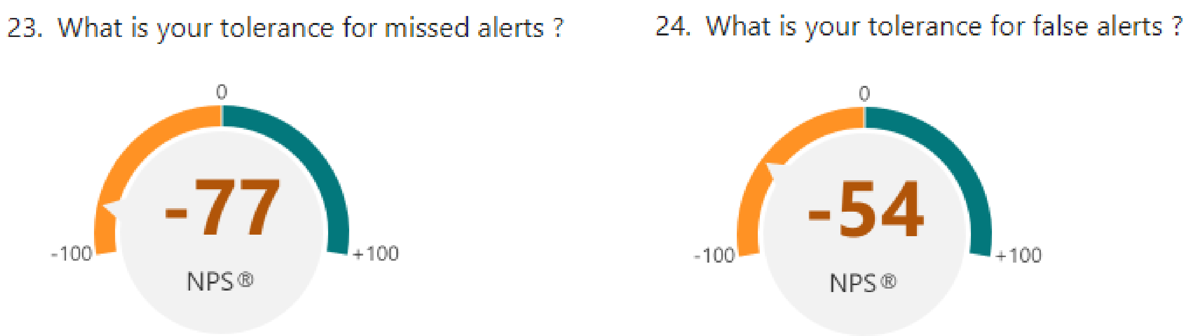


Figure 12 Global answers on tolerance to missed alerts and false alarms

In terms of the representation of prediction uncertainty, three propositions have been evaluated, as shown in Figure 13. It appears that the communication of a qualitative confidence index is preferred by a vast majority of respondents. This solution is preferred over more quantitative representations, such as indicating a simplified probability distribution of possible values or an interval of the most probable value range. A possible reason for this choice is that it delivers a single value, which is more easily interpreted by end users. However, the definition of the confidence index will have to be carefully thought out, in order to avoid any misinterpretation or over-simplification of the disseminated outcomes.

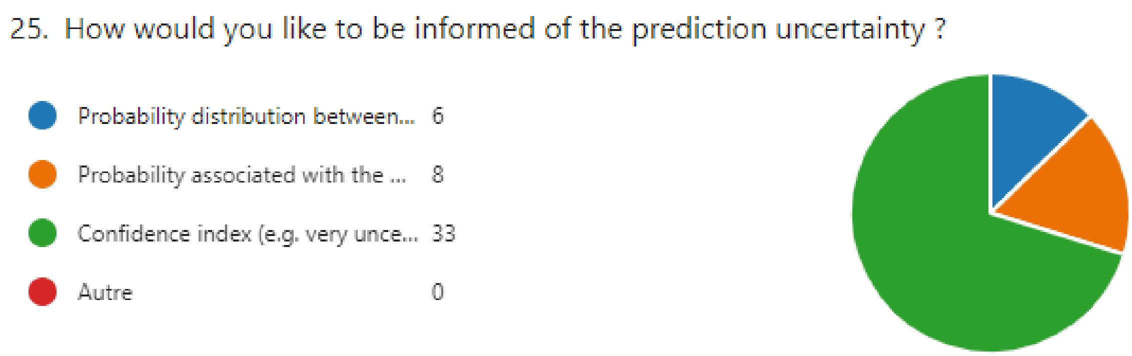


Figure 13 Global answers on prediction uncertainty

5.1.4. Section 4: Tools needs and requirements

The requirements for the platform, expressed within the MoSCoW framework, are detailed in Figure 14.

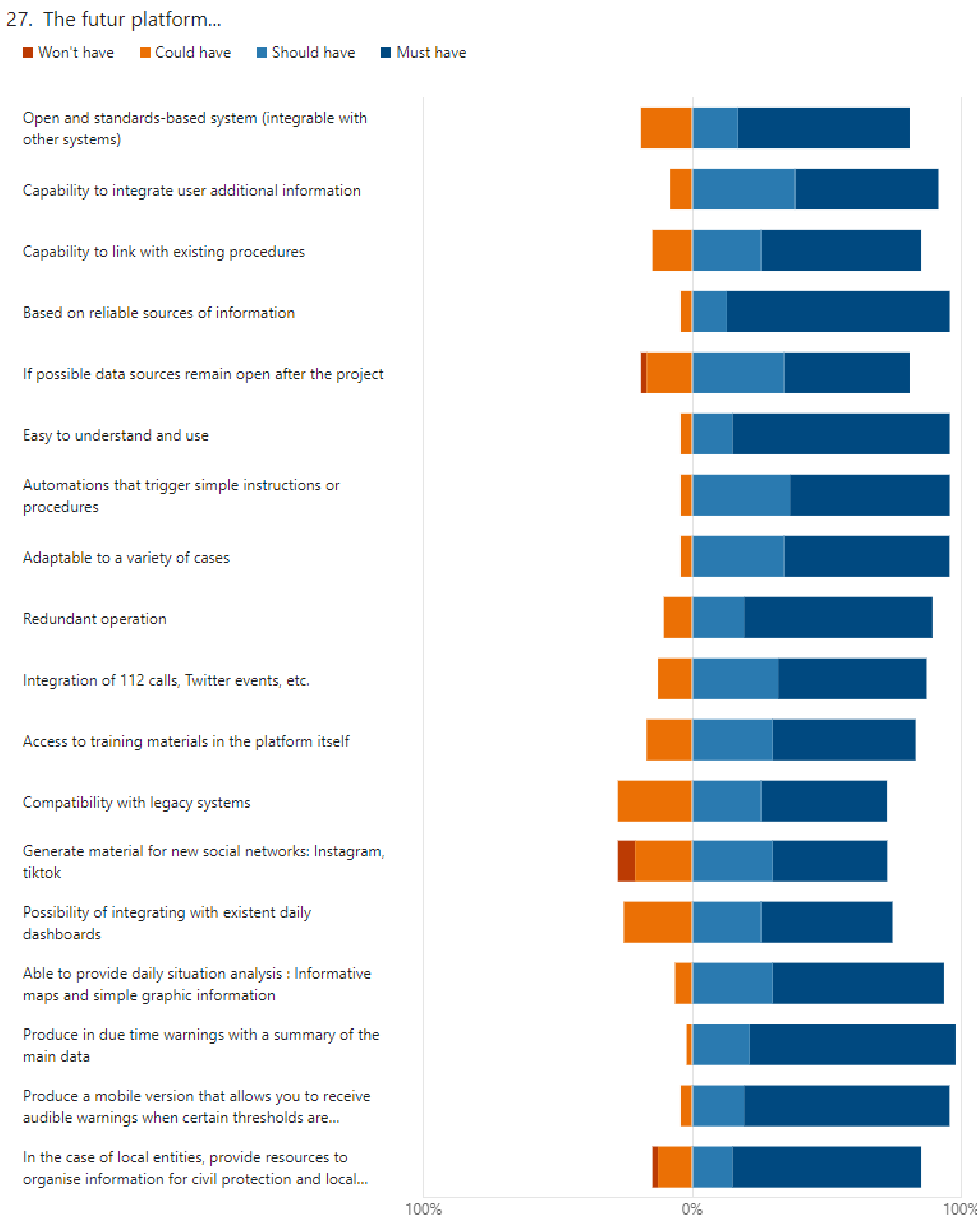


Figure 14 Global answers on expected requirements

All features score very highly, either in terms of “Must have” or “Should have” answers. Some of them stand out as especially critical, such as:

- The use of reliable sources of information;

- A platform that delivers outcomes that easy to understand and use;
- The implementation of automations that trigger simple instructions or procedures;
- An adaptability to a variety of cases;
- The ability to provide daily situation analyses, in the form of informative maps and simple graphic information;
- The production of warnings in due time, with a summary of the main data;
- The production of a mobile version that allows the reception of audible warning when certain thresholds are exceeded.

Albeit quite important, a few requirements are deemed slightly less critical relatively to the others, such as the compatibility with legacy systems, the generation of material for social media, the integration with existent daily dashboard, or the sustainability of data sources after the project's completion.

Regarding open Question #26 ("*what do you expect from the future platform?*"), several topics or requirements have emerged from the answers, such as:

- The platform must be accessible, easy to use and able to deliver reliability indicators;
- The assessment of impacts and consequences of a phenomenon is essential, in order to estimate the risk and not just the hazard;
- The platform must also be usable in the prevention phase, with the objective to consolidate the knowledge of hazard and risk and to improve planning;
- The outputs of the platform must be generated in open standard formats (e.g., CSV or shapefile outputs), in order to guarantee the interoperability between various systems.

Finally, in the closing questions of the questionnaire (i.e., Questions #28 and #29), some very interesting ideas and issues have been mentioned by the respondents:

- The platform could contain a database of available resources that may be mobilized during the crisis
- The exploitation of connected sensors in the area in order to collect real-time field data;
- Produced maps should be constantly updated in order to reflect the temporal evolution of the situation;
- The information provided by the platform should be directly linkable to established procedures.

5.2. Specific results for the pilot sites

In addition to the results of the questionnaire described above, a further analysis was carried out in order to manage the specificity of each of the pilots and to guide the tailor-made solution to be provided within the project.

This information makes it possible to compare the interests of the different pilot sites. It should be noted that the starting point for this diagnosis was established based on several responses (42), with contributions from some pilot sites missing (Switzerland and Morocco), but which have since then provided their responses, or are in the process of doing so, making the assessment more complete.

The initial questions help to profile the individuals and organisations responding to the survey, as mentioned above. The first comparative information is provided in Question 4 and 5.

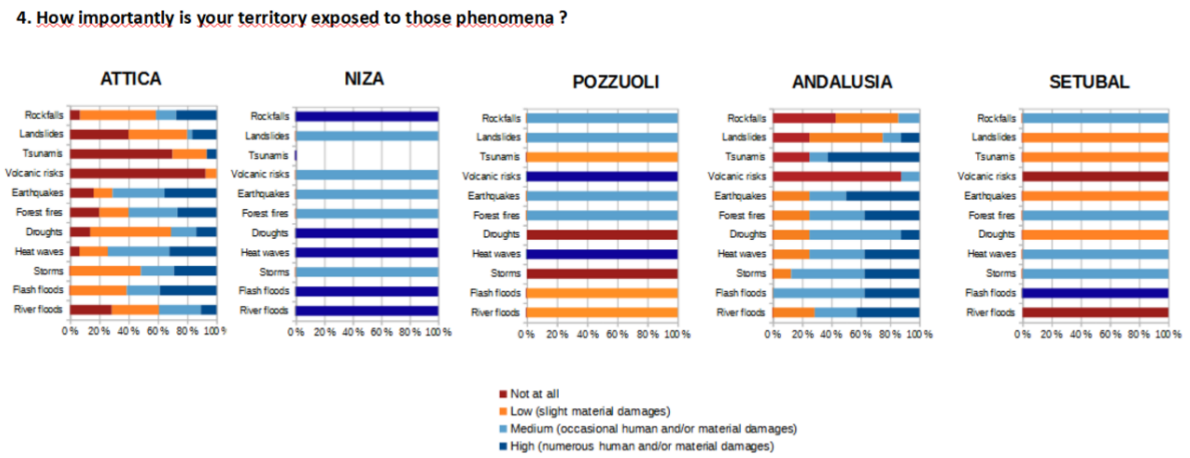


Figure 15 Separate answers on hazards impact

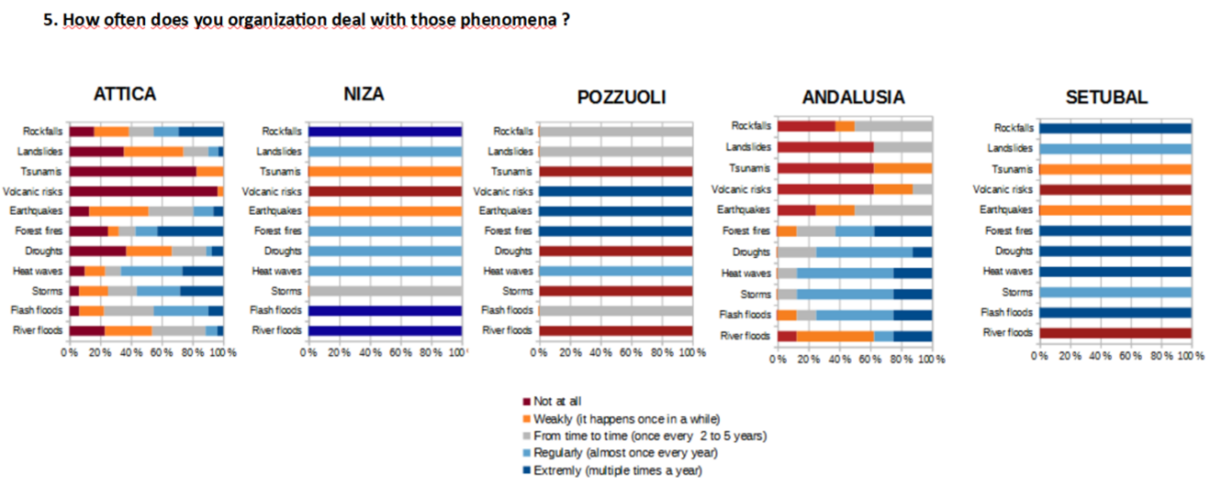


Figure 16 Separate answers on hazard frequency

This information helps us to differentiate the risks that are of more or less interest to the different pilot sites and, for example, to distinguish clearly between some of them, even though they are all in the Mediterranean, but which have differences in the risk that concerns them most. This is the case in Pozzuoli, for example, where the focus is on volcanic risk.

It is also interesting to compare the early warning indicators for the different risks and the actions to be taken based on them, which also shows a difference between the expectations and the actions to be developed in the pilot sites.

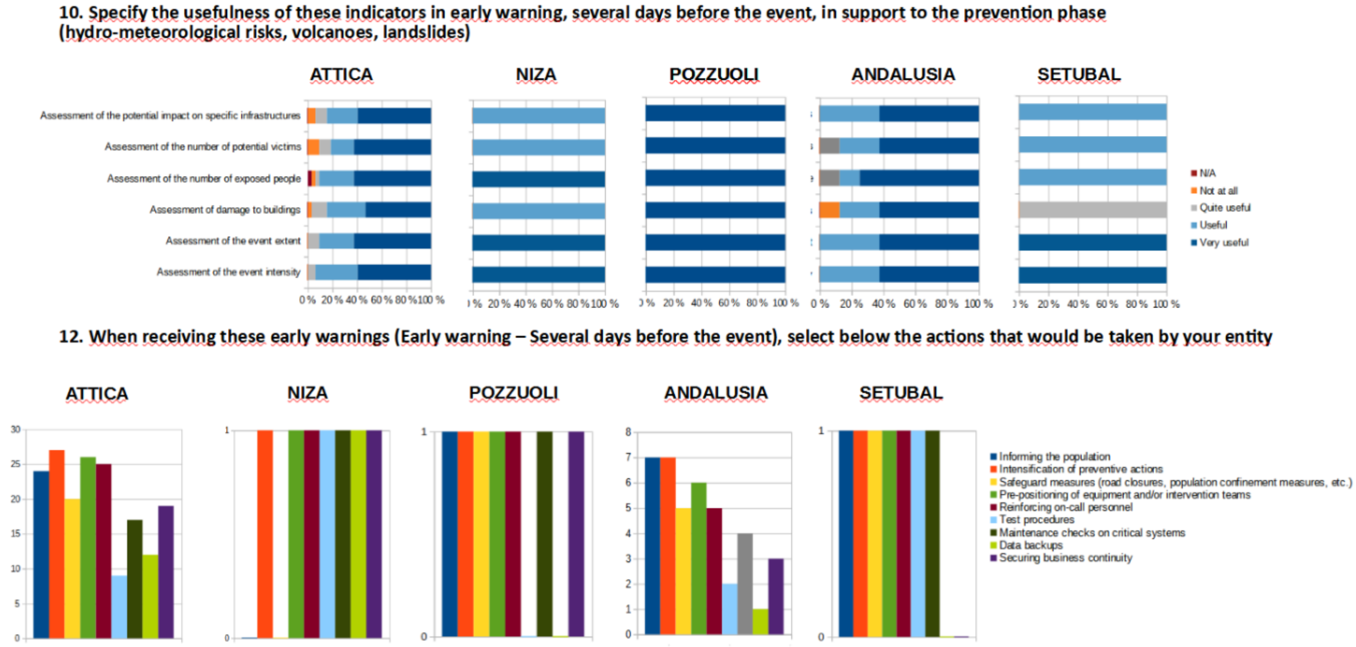


Figure 17 Separate answers on early warnings: several days before the event

In the days leading up to the event, the focus is on obtaining information that is in some way quantifiable and related to the impact rather than the event itself, and to point the most relevant preventive measures that can be taken.

As we get closer to the event, we can also see how the focus shifts between the pilot sites, as well as differences in the actions they plan to take in the event of, for example, an earthquake (Self-protection must be allowed, automatic but supervised systems must be considered, etc.). This can be shown in the answers to Questions #16 and #18.

The same can be said about the analysis of information needs after the event, where there are also different types of information that are of interest to the pilot sites, as well as different actions that will be carried out and for which the support of the tools developed in the project will be needed. This can be shown in the answers to Questions #19 and #21.

For example, we see a need for the platform to produce a report that can be passed on to decision-makers in the answers to Question #21.

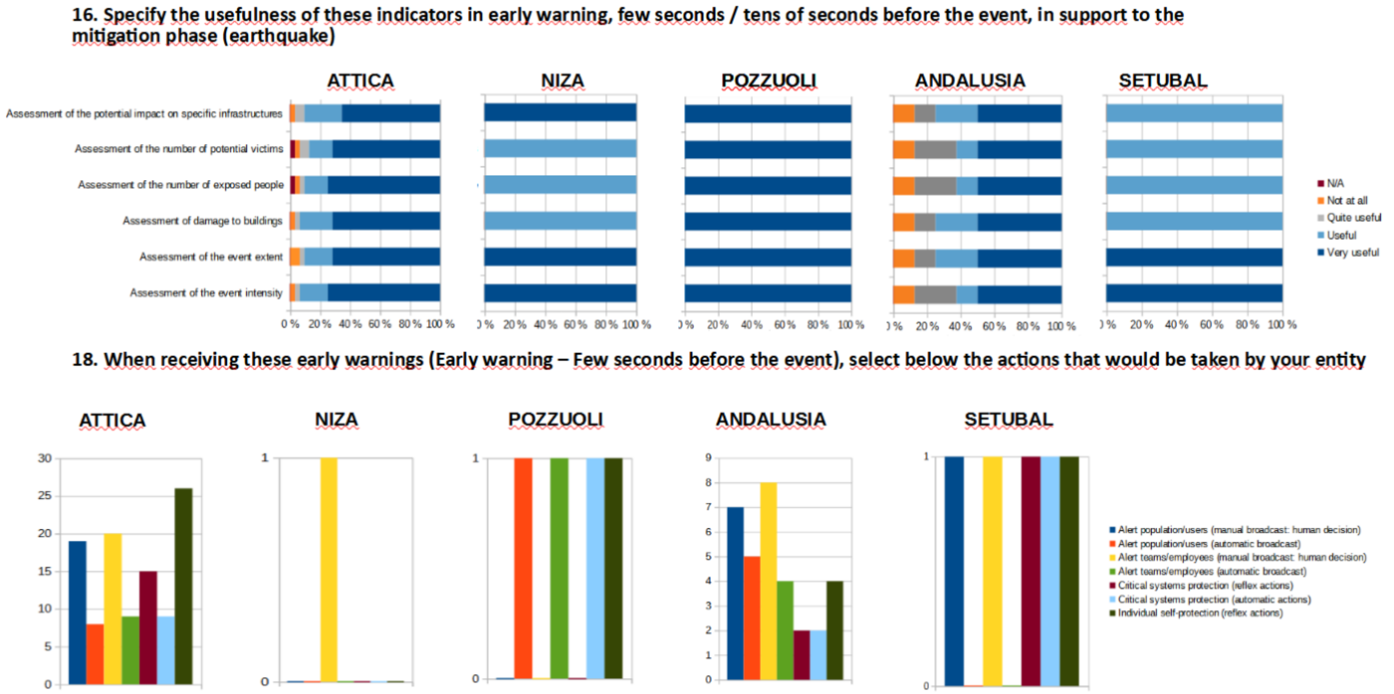


Figure 18 Separate answers on early warnings: few seconds before the event

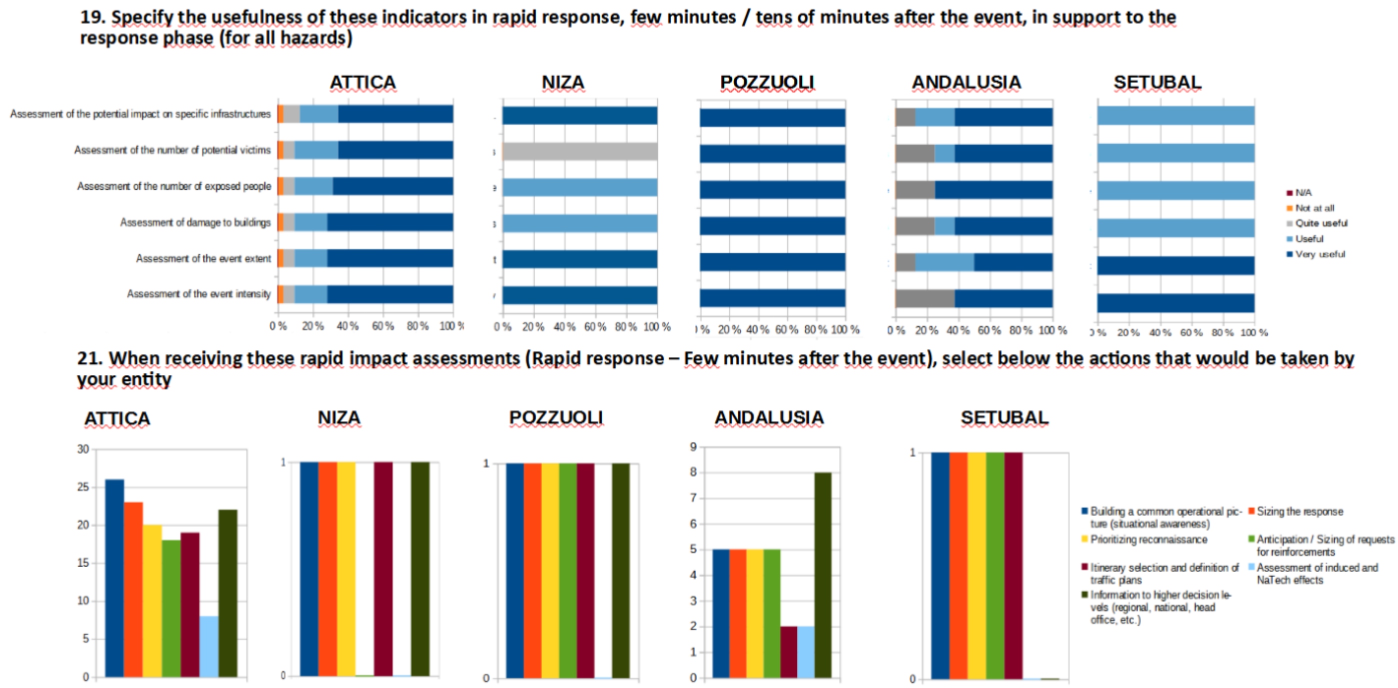


Figure 19 Separate answers on rapid response: fer minutes after the event

Another important aspect on which the survey has been developed relates to false alarms and missed alerts. In this case, although there are some differences between the pilot sites, there is in principle a clear tendency to test the results that the tool can provide without too many restrictions. This can be shown in the answers to Questions #23 and #24.

Responses to Question #25 suggest that pilot sites differ in how they wish to receive uncertainty information regarding the prediction.

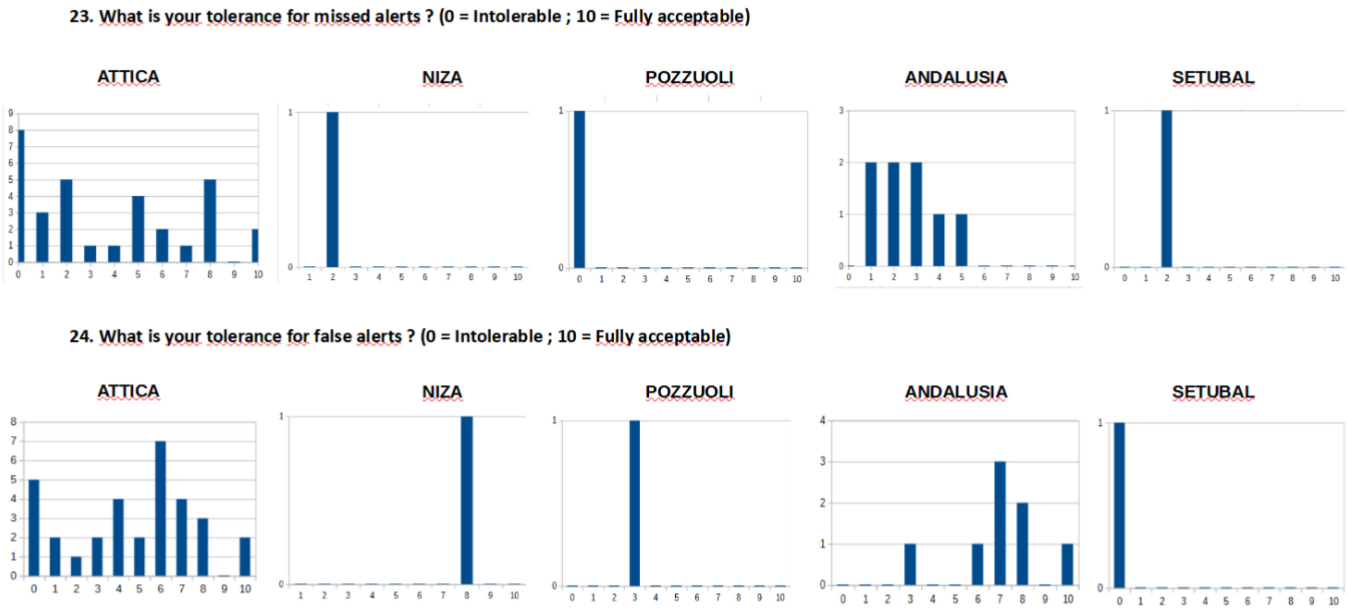


Figure 20 Separate answers on tolerance for missed and false alerts

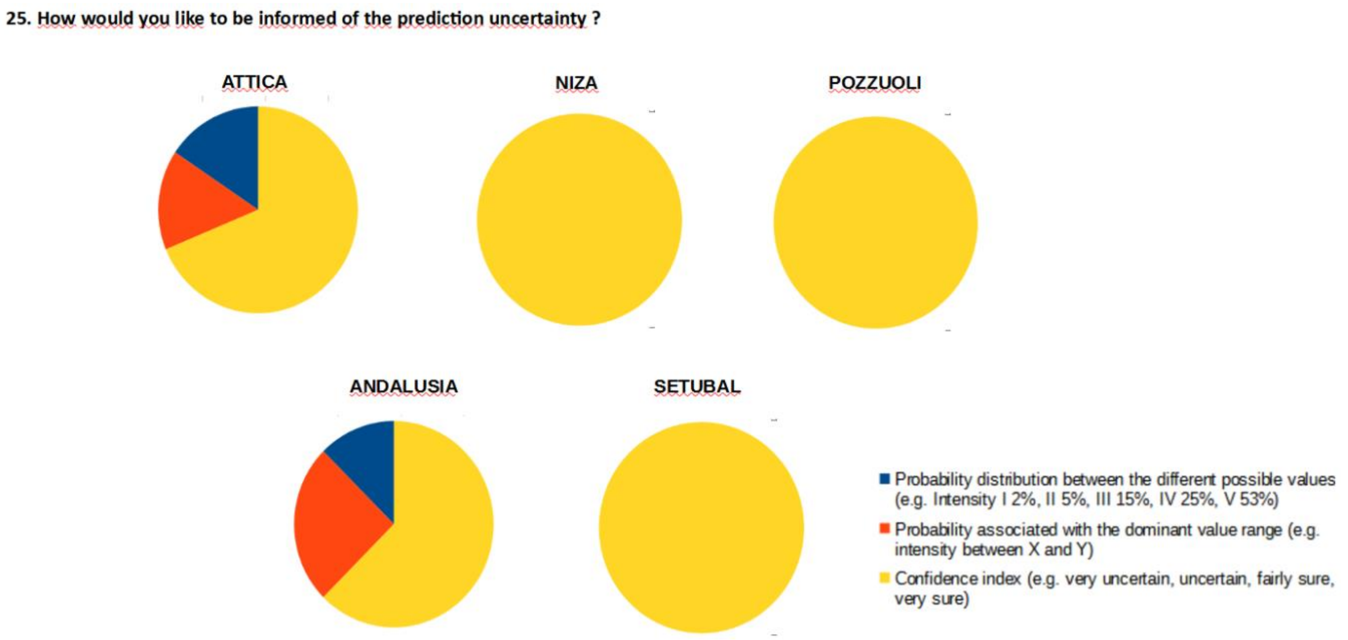


Figure 21 Separate answers on prediction uncertainty

As mentioned above, the last part of the survey focuses on collecting and assessing the needs and requirements to be met by the future platform. The individual responses to these questions reveal differences that will need to be addressed by the specific developments of the platform tailored to the users at each pilot site. This can be shown in the answers to Questions #27.

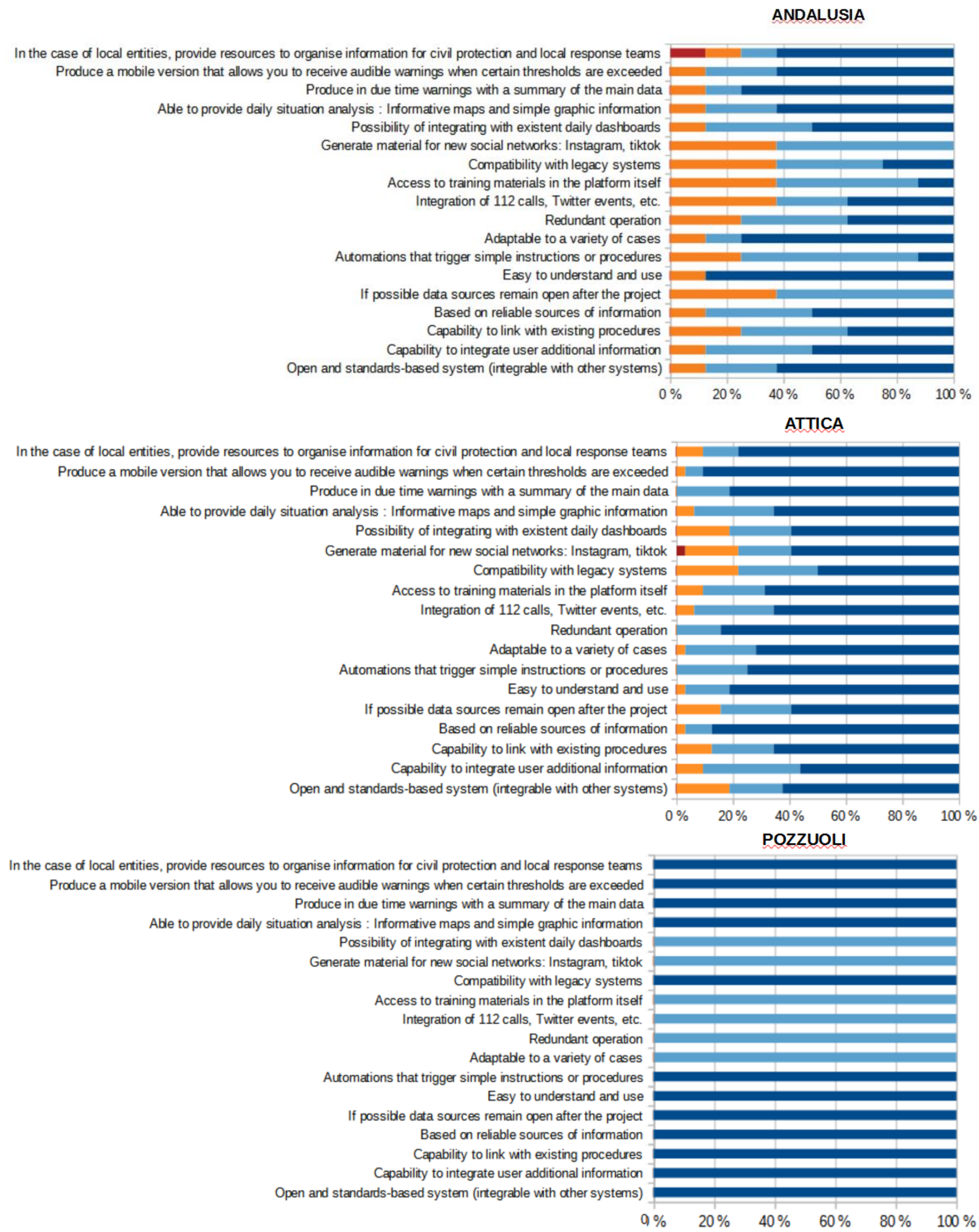


Figure 22 Separate answers to Question #25 under MOSCOW scheme. Andalusia, Attica & Pozzuoli

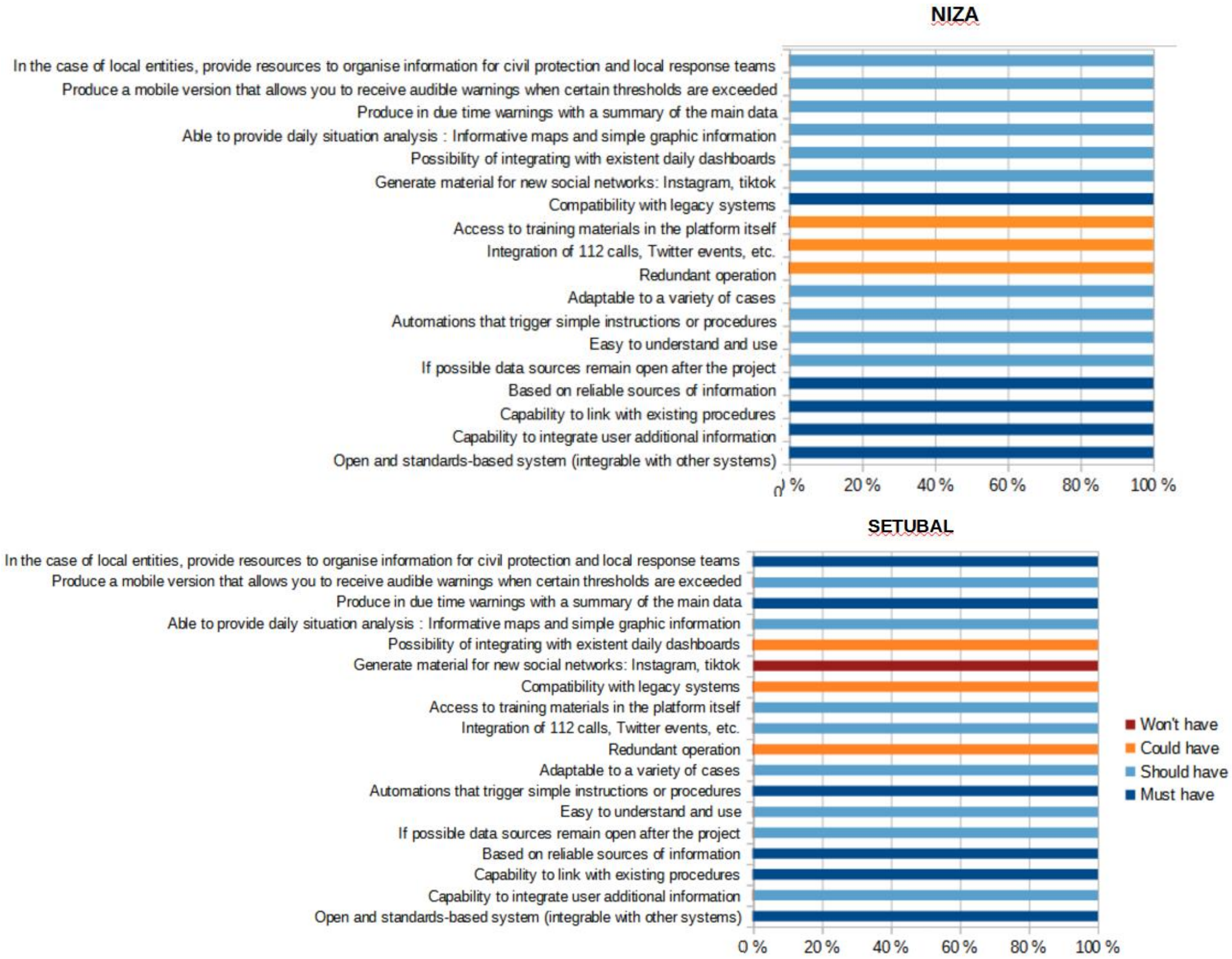


Figure 23 Separate answers to Question #25 under MOSCOW scheme. Nice & Setubal.

6. LL activities in the pilots.

6.1. Living Lab in Attica

During this reporting period, the Living Lab in Attica has been successfully created and established. Concentrated efforts and various online meetings were organized to engage and bring the stakeholders together. In its current form, the lab includes several stakeholders and primarily focuses on actors involved in the pilot site. These actors contain first and second responders, representatives of local and regional authorities, solution providers and developers, and researchers.

The first face-to-face meeting of the Living Lab in Attica took place on July 5th, 2024. It was co-organized by the Civil Protection Department of the Region of Attica and DRAXIS Environmental and was held at the premises of the former (see Figure 24). A summary of the event, along with photos, was published on the **GOBEYOND** website. The event was also promoted on the project's social media through an X (formerly Twitter) post and a LinkedIn post.

Figure 24 Group picture of the face-to-face Living Lab meeting in Attica

The Living Lab followed an interactive approach with the goal of gaining valuable insights into how **GOBEYOND**'s state-of-the-art models and solutions—such as Multi-Risk Impact-based Early Warning Systems and advanced commercial tools with high Technology Readiness Levels—can address the specific needs identified during the meeting. **GOBEYOND** aims to integrate these solutions effectively to manage both geological and weather hazards.

The meeting agenda, designed to support this objective, is presented in Figure 25. It was divided into the following parts:

1. **Introduction and Presentation:** This part involved the introduction of stakeholders and their associated organizations, followed by a presentation of the **GOBEYOND** project. Each partner briefly introduced themselves, described their actions, and outlined their fundamental needs. Presenters emphasized what **GOBEYOND** can offer, highlighting its added value and recommended solutions. The aim was to communicate these ideas in simple, non-technical terms.


Gobeyond
Empowering communities' response

GOBEYOND Living Lab

Agenda

Date: 05.07.2024
Time: 09:00-11:00 EEST
Location: Independant Direction of Civil Protection, Region of Attica
100 Kifisias Avenue & 83 Marathonodromou Street, 15125 Marousi, Attica

09:00-09:10	**Welcome and Introduction**
	Nikos Passas, Region of Attica
09:10-09:30	**GOBEYOND Project Overview**
	Nikolaos Kekatos, DRAXIS Environmental S.A.
09:30-09:40	**Showcase of GOBEYOND pilots**
	Nikolaos Kekatos, DRAXIS Environmental S.A.
09:40-10:00	**Presentation of Attica pilot**
	Ioannis Kapris, Region of Attica
10:00-10:15	**Coffee Break**
10:15-11:00	**Interactive workshop: Identifying Challenges & Opportunities**
	Nikolaos Kekatos, DRAXIS Environmental S.A.

Co-funded by the European Union

This project has received funding from the European Union's Horizon Europe programme for research and innovation under grant agreement No. 101121135.

Organized by:

DRAXIS

Figure 25 Agenda of the face-to-face Living Lab meeting in Attica

2. **GOBEYOND Pilots:** A brief presentation covered the various pilot sites, focusing on the diverse challenges each location faces. These sites were selected for their wide range of hazards, which test even the most advanced disaster management systems, including both warning and response mechanisms. The goal was to highlight the unique difficulties encountered and how the pilots are designed to address them.

3. **Attica Region and Pilot**: Specifically, for the Attica pilot, a general introduction was provided, along with an overview of the regional needs and those specific to the Piraeus municipality, the focal pilot site (see Figure 26). This segment aimed to align the **GOBEYOND** solutions with the specific requirements of the Attica region and Piraeus.

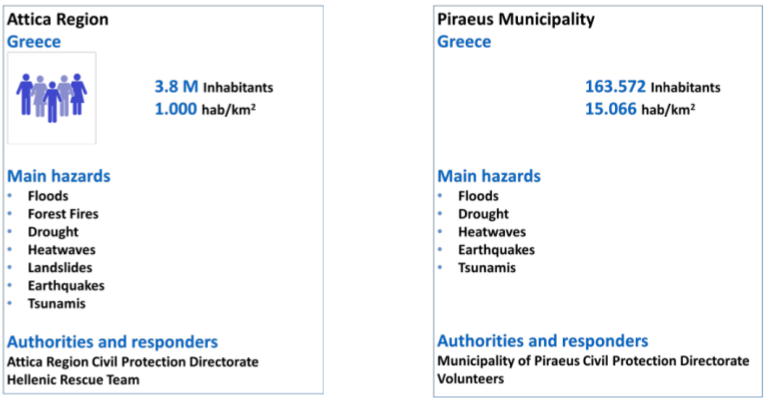


Figure 26 Overview of the primary hazards affecting the Region of Attica and the Piraeus municipality

4. **Interactive Session:** This part involved a detailed discussion with various stakeholders about the list of hazards (both geological and weather-related) that **GOBEYOND** aims to address. For each hazard, we presented a high-level abstraction of how emergency management systems work, including their inputs and outputs. We examined and discussed the specific needs related to these hazards to better align **GOBEYOND**'s solutions with the identified requirements. Figure 27 describes the flash flood hazard case, illustrating the process with inputs (precipitation and basin threshold) and outputs (maps, nowcasts, and

assessments). Leading questions about existing technologies were posed, and suggestions for the **GOBEYOND** solutions, specifically the flash flood EWS by UPC-CRAHI, were provided.

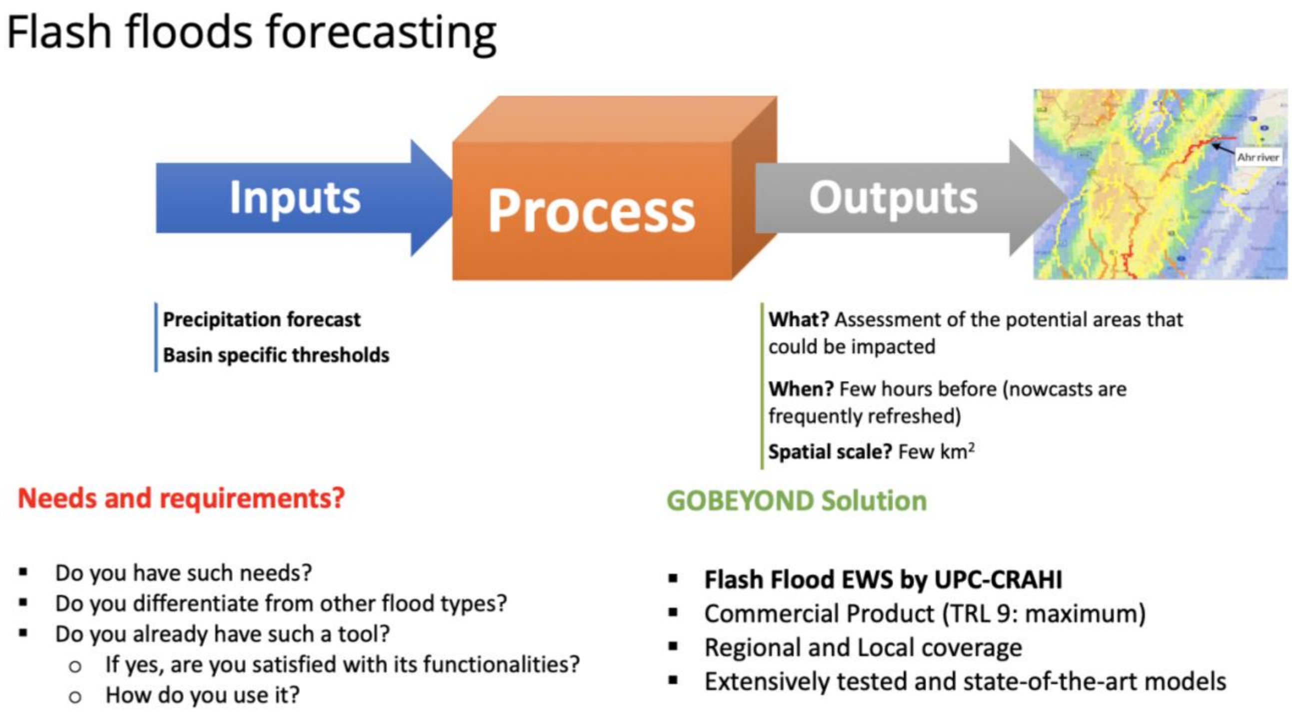


Figure 27 Example slide from the workshop session at the face-to-face Living Lab meeting in Attica, illustrating the Flash Flood hazard

Representatives from the Region of Attica and three local municipalities—Piraeus, Vyronas, and Voula-Vouliagmeni—participated in the meeting, expressing significant interest in developing local solutions. Many existing systems primarily support larger regions, but Attica's diverse geomorphological characteristics—including mountainous areas, seaside ports, islands, and densely populated urban neighbourhoods—highlight the need for customized solutions to address the unique challenges of each area. Piraeus, being a coastal city, faces minimal wildfire risks, while Vyronas, with its forested areas, and Voula-Vouliagmeni, with its mountainous regions, are more prone to wildfires.

The discussions with stakeholders revealed major differences between the municipalities. Vyronas and Piraeus, for instance, contend with overpopulation and narrow streets, which hinder the movement of emergency services. Vyronas also encompasses areas with military facilities and fuel tasks, which heightens the risk of fires or wildfires. Additionally, legislative requirements impact civil protection efforts, as all citizen requests must be reviewed, regardless of their validity. The head of the Civil Protection Directorate of Piraeus provided examples where resources were diverted to address unfounded citizen complaints about flooding, which detracted from addressing actual risks.

Further discussions highlighted coordination issues among different actors and inconsistencies in the information provided, often due to varying tools and protocols. A significant risk is the challenge faced by first and second responders, particularly during the summer when numerous events occur, and resources are limited and dispersed. Although the Hellenic Rescue Team (HRT) and volunteers are typically involved, the Fire Brigade is the primary operational responder in emergency situations in Attica, as mandated by legislation.

6.2. Living Lab in Andalusia

After the project Kick-Off meeting in Castelldefels, where the partners involved in the Andalusia Living Lab had their first direct contact, it was decided that a face-to-face meeting would be the most productive way to launch the LL. The different stakeholders in Andalusia represent roles such as first and second responders, administrations and authorities or service developers with an interest in launching the LL.

Prior to this launching meeting, another meeting was held on 29 November, attended only by the Andalusian entities, to report on the implementation of the project, to present it and explain the desired internal organisation, and to anticipate the next meeting to be held.

Figure 28 Project summary for Andalusia LL meeting

After several contacts and communications, it was agreed to hold the launching meeting on 10th January 2024. The meeting was attended by all the entities from Andalusia involved in the project (apart from Estepona partner which finally could not attend), both partners and associated partners in the field of regional and local civil protection, as well as HYDS as the ones to technically develop the application for Andalusia. Main agreements where on a list a needs and requirements and starting the work to access required data (constructing a list of data) in the frame of the project. The minutes are included in Annex A.

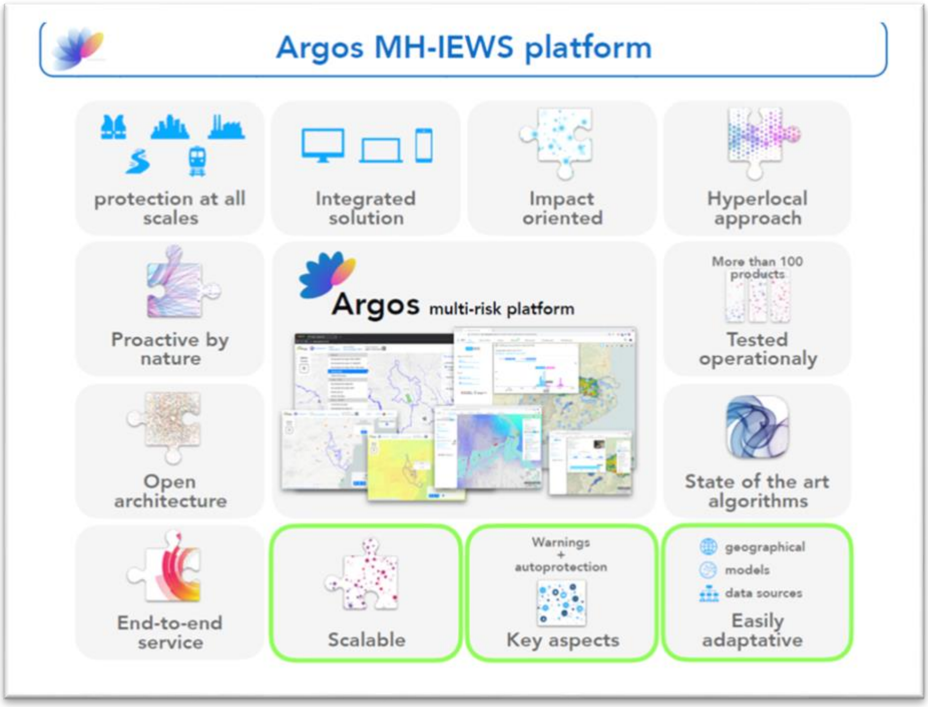


Figure 29 ARGOS (HYDS) capabilities presented during the meeting

The LL meeting followed an interactive approach to identify, as a first attempt, how **GOBEYOND**'s state-of-the-art models and solutions provided by HYDS - the current version of ARGOS - can address the specific needs identified by end-users and the capabilities and information to be included in the future. An iterative work plan should be put in place from WP2 to the demonstration phase (WP5) to channel the improvements from the first prototypes.

Figure 30 Iterative Process in Agile: Optimizing Software Development

Representatives from the Region of Andalusia and the local municipality - Isla Cristina - attended the meeting and expressed great interest in developing customised solutions, but also stressed the importance of interconnectivity (regional to local). Some specific issues were discussed, such as the treatment of confidentiality when integrating 112 calls into the platform, or the challenge of managing the change in population during the summer in coastal communities.

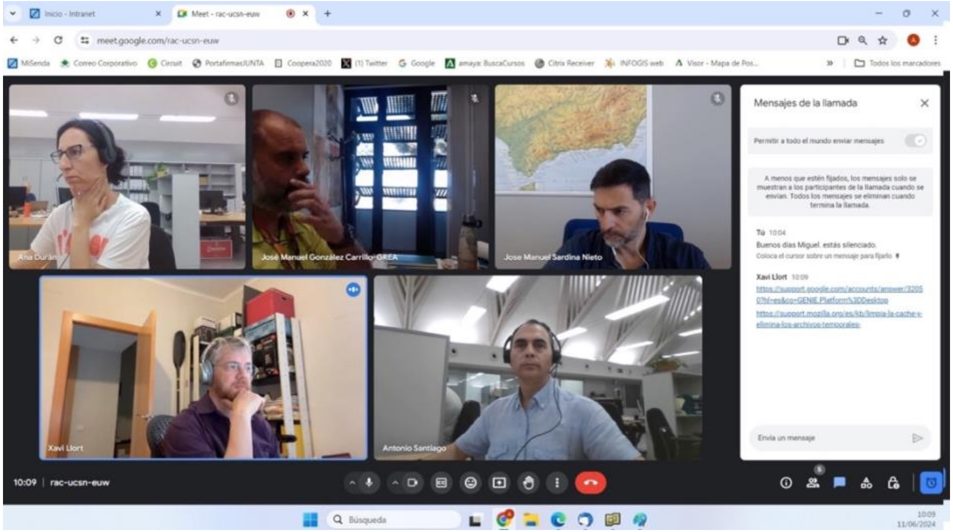


Figure 31 Screenshot during the LL meeting in June

In preparation of the general meeting of all living labs in June 2024, a previous online meeting was held in Andalusia on 11 June 2024 to discuss the status of the work, to inform about the status of the prototypes created by HYDS for the different users, as well as to discuss the results that could be extracted from the questionnaire completed from Andalusia in relation to the needs and requirements identified. The minutes of this meeting are included in Annex A.

The main issues discussed were access to the prototypes created by HYDS and a review of their main functions, as well as a review of the priorities for Andalusia in terms of needs and requirements to be transferred to the June meeting with the rest of the LL.

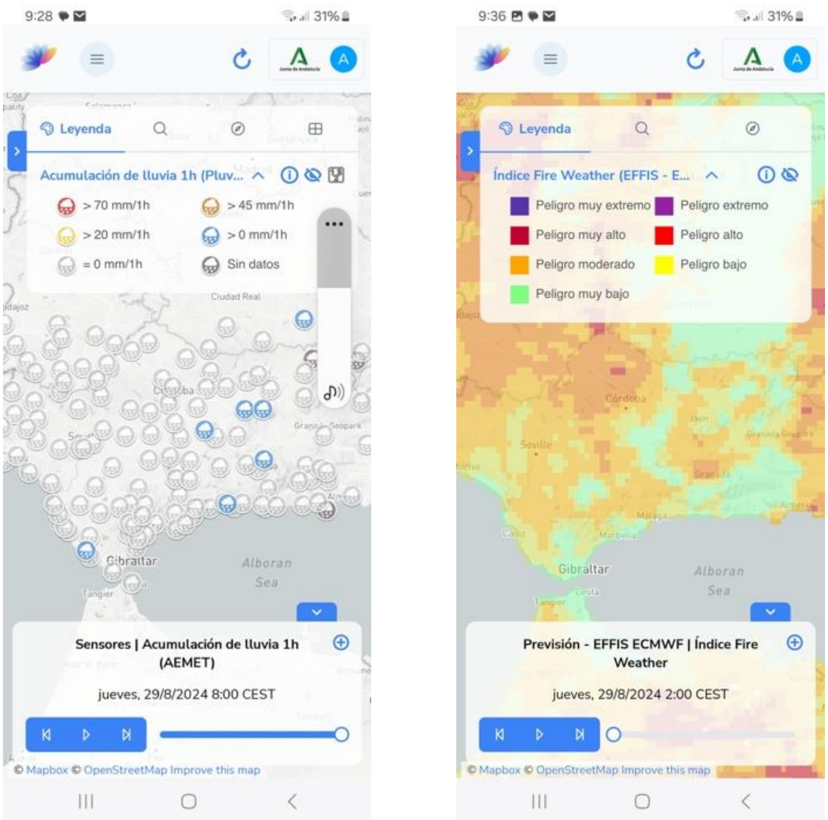


Figure 32 Screenshots of ARGOS mobile version for Andalusia

6.3. Living Lab in Campania

The first meeting for the implementation of the Living Lab in Campania was held in Pozzuoli (IT), at the headquarters of Pozzuoli Civil Protection (via Elio Vittorini 1, Monterusciello), on March 7, 2024.

Figure 33 Campania LL meeting in March 2024

The meeting was organized by the Municipality of Pozzuoli in collaboration with UNINA-PLINIVS. The meeting participants were:

- UNINA (RISSCLab and PLINIVS),
- HYDS,
- Municipality of Pozzuoli (including the mayor) and the staff of the Civil Protection of Pozzuoli,
- INGV (National Institute of Geophysics and Volcanology), with the headquarters of the Vesuvius Observatory, responsible for seismic and volcanic monitoring of the Campi Flegrei area.

The aim of the meeting was to better understand the management issues of the territory of Pozzuoli, with reference to the seismic and volcanic risk caused by the Campi Flegrei caldera and to discuss the methods of integrating in the platform to be developed by HYDS inside the **GOBEYOND** project the EASE application, developed by UNINA-PLINIVS to support the planning and management of the volcanic emergency, already available at the Municipality of Pozzuoli and the Italian National Civil Protection.

After the various presentations, carried out according to the agenda below, a round table was held. From the discussion it was decided that the best way to proceed was to use the HYDS platform as a viewer of the EASE simulations, through a continuous server connection.

For this purpose, the authorization of the Italian Civil Protection is necessary to share the simulations carried out at the Campi Flegrei, also due to the bradyseismic crisis currently underway in the area. Waiting for this authorization, in order to configure and to test the procedure, UNINA-PLINIVS we will transmit to HYDS some simulations developed in the past for Vesuvius. In particular, UNINA-PLINIVS will share, through one ad hoc account, the processing data and results of EASE tool, with reference to the following specific events:

ASH FALL: the data of the load on the ground due to the last available simulation of a volcanic eruption at Vesuvius (dataset updated once per day), and the consequent impact data produced by our procedures (collapsed buildings and homeless people), on a square mesh grid, 250x250m;

EARTHQUAKES: the data of the macroseismic intensity of a simulated event and the consequent impact data produced by our procedures (collapsed buildings, unsafe buildings, dead, injured and homeless) on the same square mesh grid, 250x250m.

GOBEYOND

GeO and weather multi-risk impact **B**ased **E**arly warning and response systems supporting rapid deplo**Y**ment of first resp**ON**ders in EU and beyon**D**

GOBEYOND MEETING IN POZZUOLI

Pozzuoli Municipality : March 7, 2024
via Elio Vittorini 1, Monterusciello

AGENDA

10.30 Welcoming greetings and Meeting introduction
Luigi Manzoni (Pozzuoli Mayor), *Aldo Zollo* (UNINA- RISSCLab), *Giulio Zuccaro* (UNINA-PLINIVS)

10.45 Volcanic hazards in Campi Flegrei caldera
Mauro Di Vito (INGV)

11.10 Attenuation law and shaking maps at Campi Flegrei caldera
Antonio Scala (UNINA- RISSCLab)

11.30 Crisis at Campi Flegrei Caldera: risk assessment activities in the emergency planning and management
Giulio Zuccaro (UNINA-PLINIVS)

11.50 Activities of Pozzuoli Civil Protection in the volcanic risk framework
Annamaria Criscuolo (Pozzuoli Municipality)

12.10 From ANYWHERE project to GOBEYOND activities
Xavi Llort (HYDS)

12.30 Round Table

13.30 Light lunch

15.00 Pozzuoli visit

17.00 End works

Figure 34 Agenda of the meeting in Campania (March-2024)

The co-creation exercises will continue as an ongoing exercise along the project (WP5), in future meetings with the working teams already established in the LL described above.

7. Conclusions: Perspectives and future actions.

In Task T2.1, the initial steps have been taken to establish the three regional Living Labs (LL) outlined in the project. Each LL has now set up a basic operational structure, with necessary personal contacts established and collaboration tools reviewed and implemented.

A standardized questionnaire has been adopted to systematically gather information from each Living Lab, allowing for a comprehensive analysis of their individual and collective characteristics. This will help identify the requirements and needs of end-users, which will be addressed in later phases of the project.

Several key lessons have emerged from the work conducted under Task T2.1. First, it is crucial to engage first and second responder end-users from the very beginning of the process, ensuring that their involvement is simple and flexible enough for them to actively contribute to solution development.

Secondly, the importance of creating dedicated working groups for each LL has been highlighted. This targeted approach enables a detailed understanding of specific needs, ensuring that the developed tools are tailored to address real-world challenges effectively.

Additionally, applying the LL concept within the context of end-user-focused innovation has proven valuable. Consequently, there has been an agreement to extend this approach beyond the LLs to all pilot sites, enhancing user involvement across the project.

The work of Task T2.1 will be closely linked to that of Task T2.2, which focuses on guiding the adaptation of models and methodologies developed in WP1 to the specific needs of users within each LL. The combined outcomes of these two tasks, T2.1 and T2.2, will inform the development of specifications for the MR-IEWS platform, which will be the focus of Task T2.3.

The collaborative framework initiated in WP2 will be further intensified during the WP5 demonstrations, where the LL methodology of co-design, co-creation, and co-evaluation will continue to be applied. This approach ensures that feedback collected during real-time validation at the pilot sites during the demonstrations can be effectively used to refine and enhance the evolving design of the DSS platforms along the project.

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