

# RiskPACC

INTEGRATING RISK PERCEPTION AND ACTION TO ENHANCE CIVIL  
PROTECTION-CITIZEN INTERACTION

**COMPLETION OF CROWDSOURCING SOLUTION DEVELOPMENT TO  
THE DIFFERENT CASE STUDY REQUIREMENTS**

**Deliverable 5.1**

**Dissemination Level: Public**



**RiskPACC**

Integrating Risk Perception and Action to enhance Civil Protection-Citizen interaction

## D5.1 COMPLETION OF CROWDSOURCING SOLUTION DEVELOPMENT TO THE DIFFERENT CASE STUDY REQUIREMENTS

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## ABOUT RISKPACC

Increasingly complex and interconnected risks globally highlight the need to enhance individual and collective disaster resilience. While there are initiatives to encourage citizen participation in creating a resilient society, these are typically fragmented, do not reach the most vulnerable members of the communities, and can result in unclear responsibilities for building disaster resilience.

New technologies can also support preparedness and response to disasters, however, there is limited understanding on how to implement them effectively. Awareness of risks and levels of preparedness across Europe remain low, with gaps between the risk perceptions and actions of citizens and between the risk perceptions of citizens and Civil Protection Authorities (CPAs).

The RiskPACC project seeks to further understand and close this Risk Perception Action Gap (RPAG). Through its dedicated co-creation approach, RiskPACC will facilitate interaction between citizens and CPAs to jointly identify their needs and develop potential procedural and technical solutions to build enhanced disaster resilience. RiskPACC will provide an understanding of disaster resilience from the perspective of citizens and CPAs, identifying resilience building initiatives and good practices led by both citizens (bottom-up) and CPAs (top-down). Based on this understanding, RiskPACC will facilitate collaboration between citizens, CPAs, Civil Society Organisations, researchers and developers through its seven (7) case studies, to jointly design and prototype novel solutions.

The “Risk Pack” toolbox/package of solutions will include a framework and methodology to understand and close the RPAG; a repository of international best practice; and toolled solutions based on new forms of digital and community-centred data and associated training guidance. RiskPACC consortium comprised of CPAs, NGOs, associated organisations, researchers and technical experts will facilitate knowledge sharing and peer-learning to close the RPAG and build disaster resilience.

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## Executive Summary

The deliverable presents the results of Task 5.1 of the RiskPACC project. The task focuses on adapting and developing crowdsourcing solutions for the case study contexts based on the needs assessment and input from co-creation lab phases I and II. The deliverable is divided into three main sections: the introduction, the HERMES platform developed by STAM, and the Aeolian AR mobile app developed by ICCS.

The introduction provides a brief overview of the purpose, scope, and structure of the deliverable. The HERMES section presents the technical solution that addresses needs of citizens and Civil Protection Agencies (CPAs) in disaster risk management through a web-application able to create a new communication space in a social-network-like environment. This section describes the combination of user needs and platform functionality, functioning of the technical solution, end-user experience, and possible future improvements.

The Aeolian AR mobile app section describes a mobile application developed by ICCS, which enables users to access information on both anthropogenic and natural hazards, during different phases of the disaster management cycle (and mainly during prevention, preparedness and response) in an interactive and immersive way. It also presents the combination of user needs and platform functionality, functioning of the technical solution, end-user experience, and possible future improvements.

Finally, the conclusion summarizes the key findings and highlights the importance of user-centred design and co-creation in developing effective disaster risk management solutions and in addressing the Risk Perception Action Gap (RPAG).

## Glossary and Acronyms

<b>Term</b>	<b>Definition / Description</b>
<b>AR</b>	Augmented Reality
<b>CDP</b>	Municipality of Padova
<b>CPA</b>	Civil Protection Authority
<b>CPAs</b>	Civil Protection Authorities
<b>FhG</b>	Fraunhofer Gesellschaft zur Foerderung der angewandten Forschung e.V.
<b>ICCS</b>	Institute of Communication and Computer Systems
<b>MoE</b>	Municipality of Eilat
<b>MRP</b>	Municipality of Rafina Pikermi
<b>NLP</b>	Natural Language Processing
<b>RPAG</b>	Risk Perception Action Gap
<b>SPID</b>	Sistema Pubblico di identità Digitale
<b>STAM</b>	STAM
<b>TRI</b>	Trilateral Research Ltd
<b>TRL</b>	Technology Readiness Level

TABLE 1: GLOSSARY AND ACRONYMS

# 1 INTRODUCTION

## 1.1 Purpose and Scope

This document presents the HERMES web-based risk communication platform adapted by STAM and the Aeolian Augmented Reality (AR) app developed by ICCS for the RiskPACC project under Task 5.1. This task focused on adapting and further developing crowd-sourcing solutions for the case study contexts based on the needs assessment and input from the co-creation lab phases. A crucial point for the development of these solutions has been the active participation of end-users, who have defined and reviewed the requirements based on the current gaps within the case studies and have cooperated in the provision of guidance for the technical developments. A solution offered by STAM prior to the initial of RiskPACC project was used as a basis for this task, while the ICCS tool has been developed during the implementation of the project. Based on the co-creation approach adopted in RiskPACC, several potential adaptations of the solutions have been identified. These include the visualization of social media posts in a mapping format for situation assessment by CPAs and the use of crowd-sourcing methodologies to gamify citizen contributions to prevention and preparedness. These adaptations were based on the specifications gathered from CPAs and the community during the needs assessments and lab phases. The solutions developed were integrated into the RiskPACC platform under WP7, where the solutions developed following the co-creation process have been integrated in a unique environment to which the end-users can access with a single account.

## 1.2 Structure of the Deliverable

The deliverable structure consists of five main sections. The introduction outlines the purpose and scope of the document and provides an overview of the structure. The second section focuses on the HERMES platform, developed by STAM, and includes a combination of user needs and platform functionality, the functioning of the technical solution, and the end-user experience. This section also explores possible future improvements. The third section focuses on the Aeolian AR App developed by ICCS, following a similar format to the HERMES section. Finally, the conclusion section, summarizes the key findings and recommendations for future development.

## 2 HERMES WEB-BASED RISK COMMUNICATION PLATFORM

Prior to the development of RiskPACC, STAM utilized an open innovation tool designed to gather information on employees from multiple companies, organizing them based on customer requests. At the time of testing in T3.4, the open innovation tool was at Technology Readiness Level (TRL) 5.

Before the workshops, the tool featured a homepage (Figure 2.1) with diverse content and the ability to filter information by topic, region, or keywords.

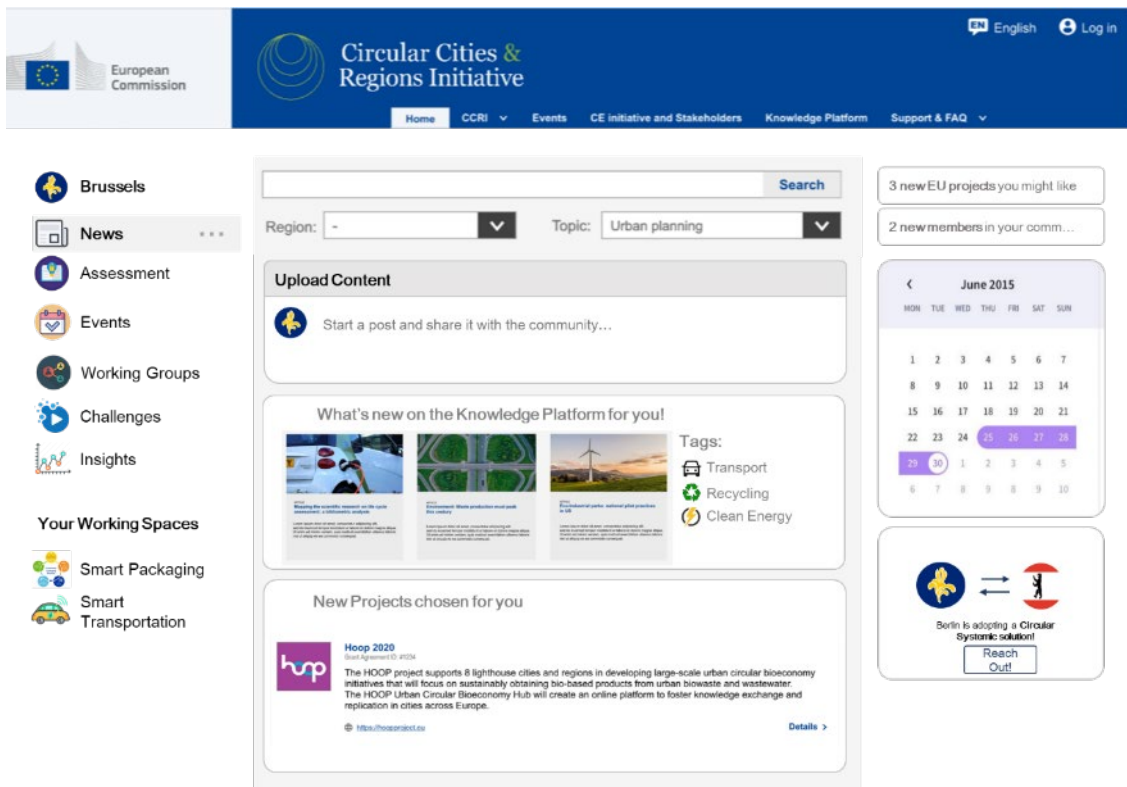


FIGURE 2.1 OPEN INNOVATION - HOME PAGE

In addition, in the new section (Figure 2.2), users were able to generate new content for their community using this section, and the platform offered access to other resources such as funding opportunities, events, assets, and more through this section.

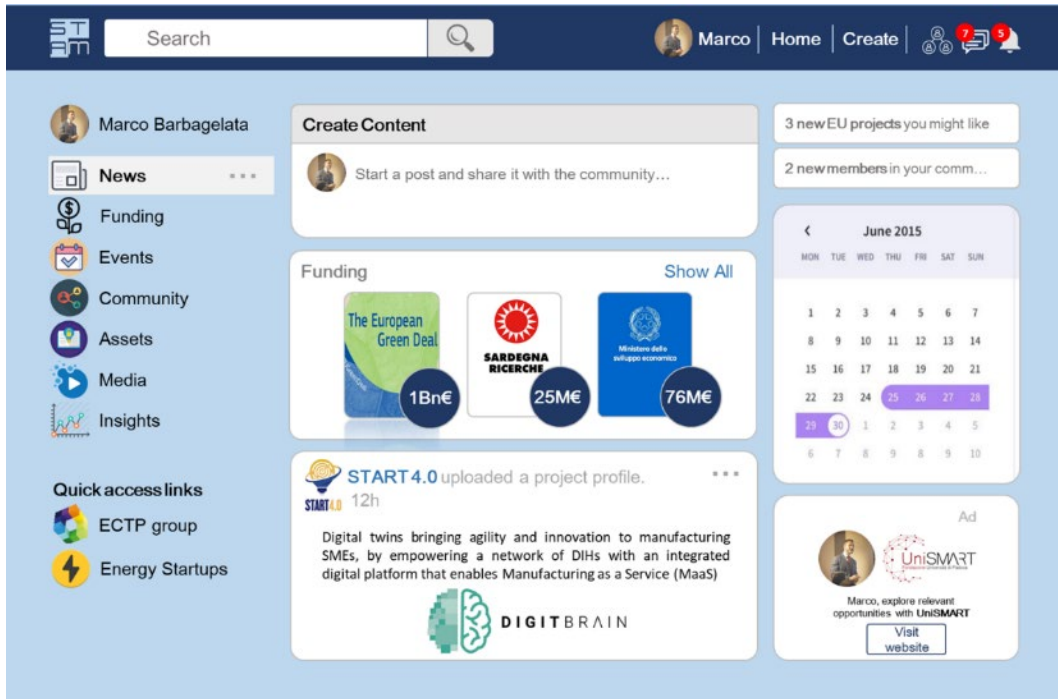


FIGURE 2.2 OPEN INNOVATION - NEWS SECTION

The community section provides a comprehensive list of communities available on the platform, allowing each user to select the relevant community under which they can be categorized (Figure 2.3). In this case, a community is a group of people belonging to same organization or company. This is a good way to filter contents and interest in the platform.

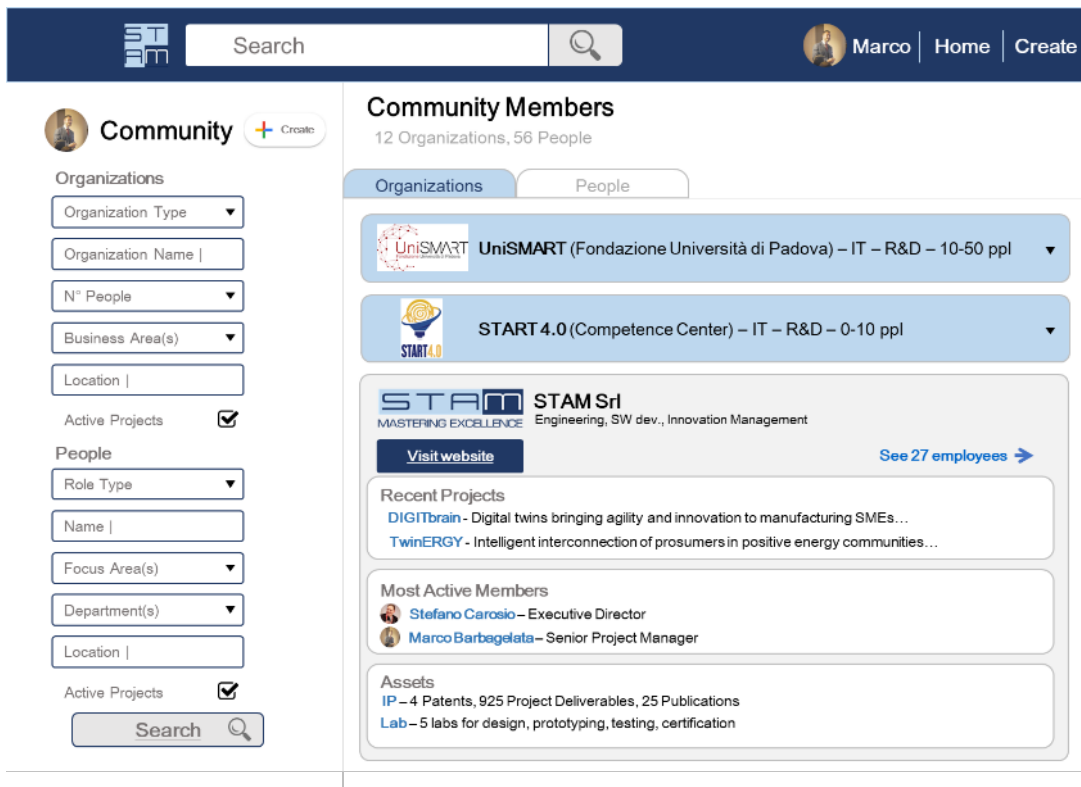
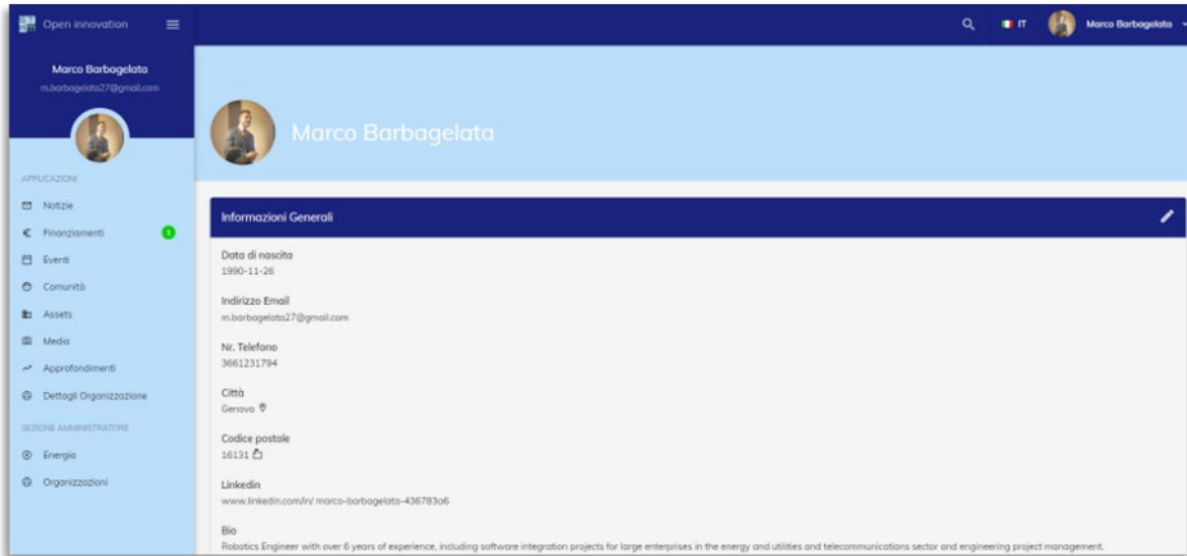


FIGURE 2.3 OPEN INNOVATION – COMMUNITY

Moreover, each community includes relevant information about the community as a whole, as well as its members (Figure 2.4).



**FIGURE 2.4 OPEN INNOVATION - USER AND COMMUNITY PROFILES**

The architecture of the Open Innovation platform is shown in Figure 2.5. User login is managed through Keycloak, an open-source identity and access management solution. Mic anagraphics, a cloud-based platform, is responsible for organizing user profiles, organizations, and their relationships, as well as conducting user research. Angular is used for the frontend development, which populates the SQL cloud database with user and document schemas. The frontend also manages document creation, news feeds, searches, and tag management in the cloud run, and files are stored in cloud storage buckets.

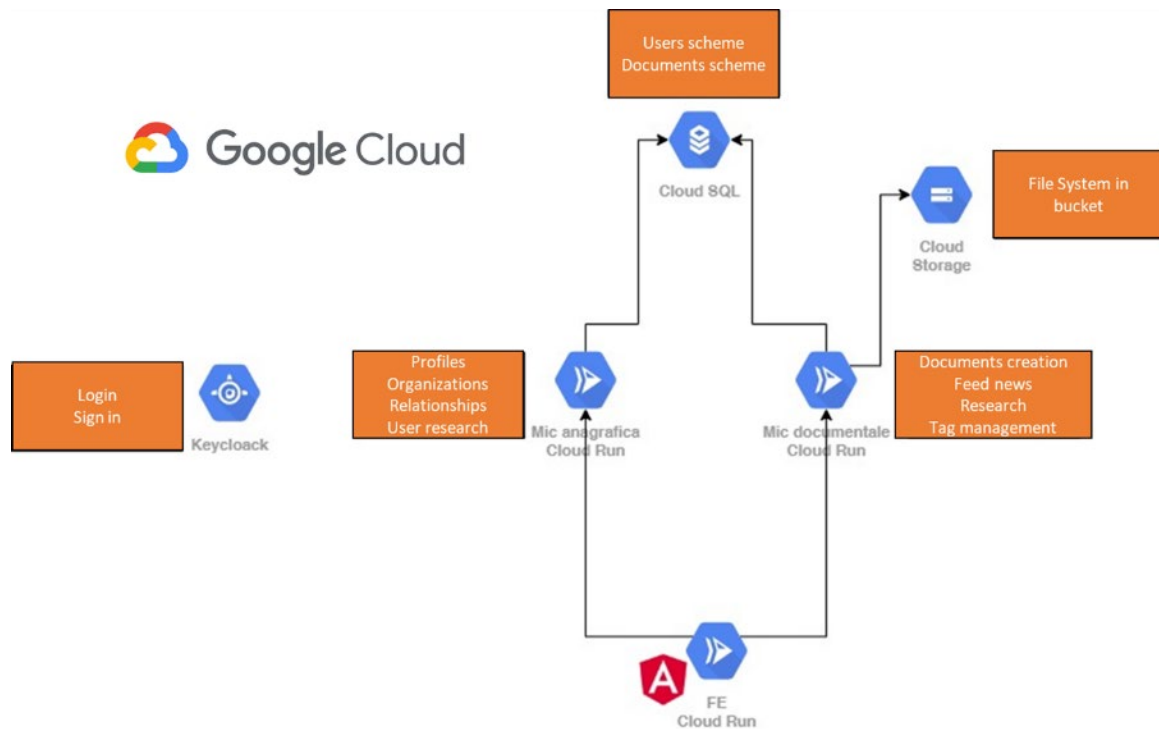


FIGURE 2.5 OPEN INNOVATION - ARCHITECTURE

## 2.1 Combination of user needs and platform functionality

STAM's objective in developing HERMES was to create a platform that offers a range of functionalities to assist communities in preparing for and responding to emergencies. The platform is designed to provide centralized and structured information on events, making it easy for users to access information about potential hazards and threats in their area. The platform offers information and guidance on the local community, including details on volunteers, events, and other resources based on location. This feature helps users to find relevant information quickly and easily and facilitates community building and collaboration. To further enhance community resilience, HERMES provides feeds, updates, and alerts that are relevant to the community users. This feature helps to ensure that users stay informed about potential hazards and events that may affect their community, allowing them to take appropriate action when necessary. HERMES also offers educational materials and training on appropriate behaviour in case of a hazard, such as a weather emergency. This feature aims to help users understand the risks associated with various emergencies and to equip them with the skills and knowledge needed to respond effectively. Therefore, HERMES provides insights into the community, including information on similar profiles, volunteers, professionals like doctors, and more. This feature helps to build stronger connections within the community and facilitate collaboration and resource sharing, which are critical in times of emergency.

The co-creation approach developed in RiskPACC has played a vital role in the development of this solution. It has allowed for active collaboration and engagement of stakeholders throughout the project, ensuring that the HERMES platform evolves based on user needs and requirements. In the following section, we present the



storyline that highlights the evolutionary journey of HERMES, showcasing how it has been shaped and refined through the co-creation process.

### 2.1.1 FEEDBACK FROM USE CASES AND IMPROVEMENTS IN THE FUNCTIONALITIES OF THE TECHNICAL SOLUTION BASED ON END-USER NEEDS

In the co-creation approach several stakeholders have been involved. During the workshop testing, organizers strived for good gender representation of workshop participants. This was accomplished across the workshops with 32 females and 35 males overall. This focus on gender balance was to ensure that different perspectives were considered during feedback and development of the tools. This gender focus will be further elaborated on in D3.7, which is due in M24.

#### *2.1.1.1 Internal workshops*

The workshop was instrumental in the customization of solutions, particularly HERMES, to align with the needs of end-users. Valuable feedback collected during the workshop, documented in deliverable D3.5, shed light on the potential strengths of the solution as well as critical areas requiring attention. The identification of end-user needs and requirements was a key focus in WP3. The process began with two internal workshops, where the STAM tool was showcased to demonstrate its capabilities. These workshops served as an opportunity to align the tool with specific risks, target groups, and case studies. Subsequent discussions with end-users were then held to refine and enhance the functionalities of the tool based on their specific needs and requirements.

#### *2.1.1.2 Interaction and feedback after the internal workshops*

During the initial iteration, HERMES garnered interest from CDP and MoE. The standout functionality that caught their attention was mainly the bilateral communication system, which provides a direct connection to vulnerable individuals within the designated area of interest. This particular feature is crucial for implementing effective and efficient communication strategies, especially during emergency situations where reaching and assisting vulnerable populations is paramount. The ability to directly engage with and provide targeted support to these individuals enhances overall emergency response and preparedness efforts.

#### *2.1.1.3 1<sup>st</sup> round of external workshops (T3.3)*

To facilitate better understanding and engagement with HERMES, STAM prepared informative materials for discussion and sharing. A mock-up of the solution was created, offering an overview of its key sections and functionalities, such as post creation, the documentation section, and the messaging system. The mock-up (elaborated in WP3 and reported in D3.5 and D3.6) provides stakeholders with a clear representation of the key sections and functionalities. Additionally, user stories were developed to provide use cases with a functional example of user flow within HERMES.

For CPD, the storyline sees a grandfather, named Paolo, who wants to bring his nephews to the park. Meantime, a weather alert for a heat wave was published by the CPA for that day. Paolo, who is a registered user of HERMES, received a notification



as soon as the alert has been published. At the end of the story, Paolo and his nephews decided to stay safe at home.

For MoE, the storyline sees Jonathan, a volunteer in his neighbourhood. Jonathan is registered to HERMES in order to give support to his community in case of need or when an event from the local CPA has been published. One day, an earthquake interested the area of Eilat and Jonathan used HERMES to share with the local community additional information on the status of the information. The CPA contacted him through the messaging system asking for his conditions and to get more details about the impact of the event in his area.

This material was precious for the use cases elaborate who have elaborated useful feedbacks on the HERMES functionalities. This collaborative co-creation approach, a core aspect of the RiskPACC project, facilitated effective collaboration between technological and non-technological partners to develop solutions that closely aligned with the needs of the use cases.

#### *2.1.1.4 Interaction and feedback after the 1<sup>st</sup> round of external workshops*

After the presentation of the selected solutions and their corresponding user stories, the participants engaged in two rounds of discussion and filled out technical questionnaires to provide feedback on the solutions. This feedback serves as valuable input for the technical partners, offering a concrete understanding of user needs. Some important points discussed during the session are as follows:

- Interest in the presented tools and user stories: Participants expressed interest in the showcased tools and user stories, providing proposals for improvements and discussing essential aspects to be considered.
- User access to the platform: A highlighted requirement from both groups was the need for the technological solutions to be available in Italian and capable of processing information in Italian. Participants acknowledged the existence of other systems, such as IT Alert, currently being tested but not yet fully operational. IT Alert operates through the cellular network, sending notifications to smartphones based on the user's geolocation. Unlike the system proposed by STAM, IT Alert can reach all potentially at-risk individuals, not just those who have subscribed to the platform. Participants suggested exploring the possibility of interacting with the creators of IT Alert to assess potential synergies with the RiskPACC platform and evaluate the strengths and limitations of a voluntary registration-based system. Additionally, the option of sending messages via Telegram in addition to platform notifications was proposed, citing the example of the system used in the Venice lagoon area for high tide warnings.
- Registration and accessibility: The requirement for registration on the platform was considered a potential barrier to the alert service's effectiveness, as not all vulnerable or at-risk individuals may possess the necessary interest, skills, or knowledge to complete the registration process. Participants suggested addressing this issue by allowing third-party users (e.g., children on behalf of their parents or voluntary and healthcare workers on behalf of their patients) to carry out registration or access. The possibility of linked accounts, such as a

son linked to their father, was also mentioned. User-friendly registration methods, such as using SPID credentials (Sistema Pubblico di identità Digitale: Public System of Digital Identity, it is widely used in Italy for accessing public administration services), were proposed for evaluation. Broadening the user base through intensive communication campaigns in the area to raise awareness and promote platform use was considered essential.

- Management of user-generated information: The production of information, posts, and photographic material by platform users necessitates the presence of a moderator who can assess relevance and approve publication. Effective moderation requires short timeframes between content creation and publication, even during off-peak hours, which would require significant human resources—a potential challenge given limited resources in municipalities. Concerns were raised regarding the possibility of certain population groups monopolizing information creation, rendering the functionality ineffective for its intended purpose. Participants also emphasized how the application could enable citizens acting as vigilantes. End-users expressed a preference for civil protection actors to provide content for the application, and some participants preferred not to have a chat functionality.
- Integration with existing services: Participants suggested exploring the possibility of using the RiskPACC platform to collect all reporting requests from users, including those related to civil protection, environment, medicine, and local police reports. However, they acknowledged the existence of already established services that should eventually be integrated, such as the single emergency number in Italy (112) and the Municipality of Padua's widespread reporting system (Padova partecipa).

The valuable feedback collected during these discussions provides insights for further development and enhancement of the HERMES platform to better align with user needs and requirements.

#### *2.1.1.5 2<sup>nd</sup> round of external workshops (T3.4 workshops) – Iteration I*

Within the scope of the second round of external workshops (T3.4 workshops), two iterative phases were planned, including an intermediate improvement phase to further refine the tools. In the first iteration, STAM introduced the first release of HERMES, which already included all the main functional features that were ready for use. The capability to share posts and materials had been implemented, while the messaging system had recently been implemented and required further refinement.

#### *2.1.1.6 Interaction and feedback after Iteration I of the 2<sup>nd</sup> round of external workshops*

During the workshop discussions, participants expressed reservations about implementing a bilateral messaging system due to concerns about the limited availability of municipal workers to handle the potential influx of citizen requests. To avoid false alarms and ensure the dissemination of accurate information, it was advised that only civil protection authorities have the ability to create posts, thereby

reporting official information. In this stage, STAM carefully processed the feedback received from participants to optimize the functionality of the technical solution, aiming to deliver a user-friendly final product for citizens. While the messaging system was enhanced, the decision was made to retain the functionality for citizens to privately ask questions to the civil protection authority. This approach facilitates swift communication between different entities. Additionally, an ad-hoc architecture was developed to differentiate the available functionalities for different user types.

#### *2.1.1.7 Interaction and feedback after Iteration II of the 2<sup>nd</sup> round of external workshops*

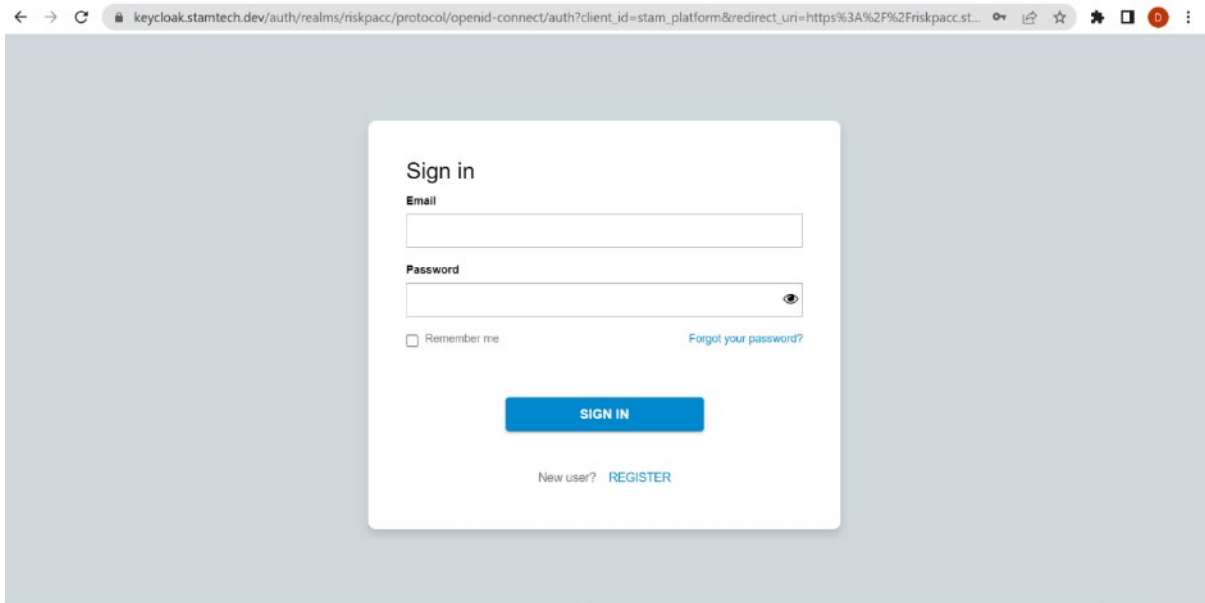
During the second iteration, a comprehensive review of the functionalities discussed and implemented with the use cases took place. This process aimed to refine and enhance the technical solution, solving minor bugs and fine tuning the tool and the functionalities. Valuable feedback on the use of HERMES were collected from the use cases to optimize the functionalities of the tool. The goal was to ensure that the final product addressed the challenges and concerns raised by the use cases, providing an effective and user-friendly solution. By incorporating the insights gained from the feedback, the second iteration sought to further align the tool with the desired outcomes and expectations of the stakeholders, fostering a collaborative and iterative approach to development.

## 2.2 Functioning of the technical solution

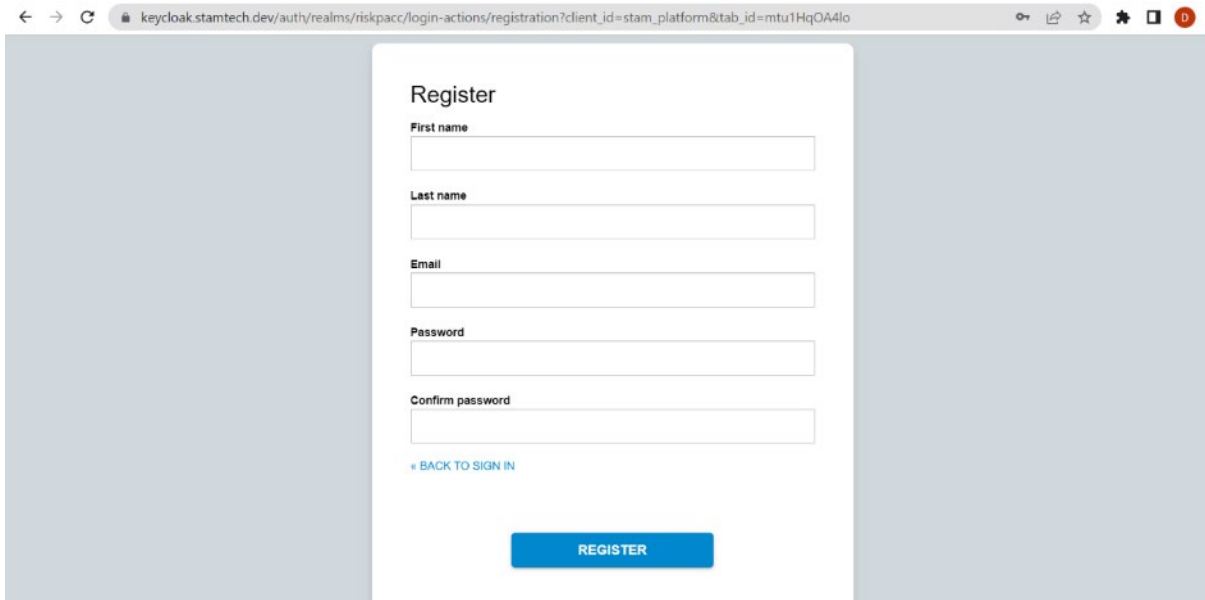
In this section, the functionalities of HERMES are introduced and described.

### 2.2.1 USER REGISTRATION AND LOGIN

HERMES offers a user-friendly registration and login process that allows users to access the platform's features. To register, users must visit the HERMES-related web address: [https://keycloak.stamtech.dev/auth/realms/riskpacc/protocol/openid-connect/auth?client\\_id=stam\\_platform&redirect\\_uri=https%3A%2F%2Friskpacc.stamtech.dev%2Ftimeline&state=7cd4ddc9-dcff-49e2-9712-cd922959c6ce&response\\_mode=fragment&response\\_type=code&scope=openid&nonce=a3de5f98-5ee7-4735-a78c-e571808e5a8a](https://keycloak.stamtech.dev/auth/realms/riskpacc/protocol/openid-connect/auth?client_id=stam_platform&redirect_uri=https%3A%2F%2Friskpacc.stamtech.dev%2Ftimeline&state=7cd4ddc9-dcff-49e2-9712-cd922959c6ce&response_mode=fragment&response_type=code&scope=openid&nonce=a3de5f98-5ee7-4735-a78c-e571808e5a8a) and click on the “REGISTER” button. The user will be directed to a dedicated form where they must provide their name, email, and a new password to access the platform (Figure 2.6 and Figure 2.7).



**FIGURE 2.6 REGISTRATION 1 - SIGN IN HERMES**



**FIGURE 2.7 REGISTRATION 2 - FILL IN THE FORM**

After completing the registration form, the user will receive an email to verify their address. The email will contain a dedicated link that the user must click within five minutes, or it will expire. Once the email address has been verified, the user can set up their profile. The first step is to change personal data such as name, surname, date of birth, telephone number, and location address (Figure 2.9).

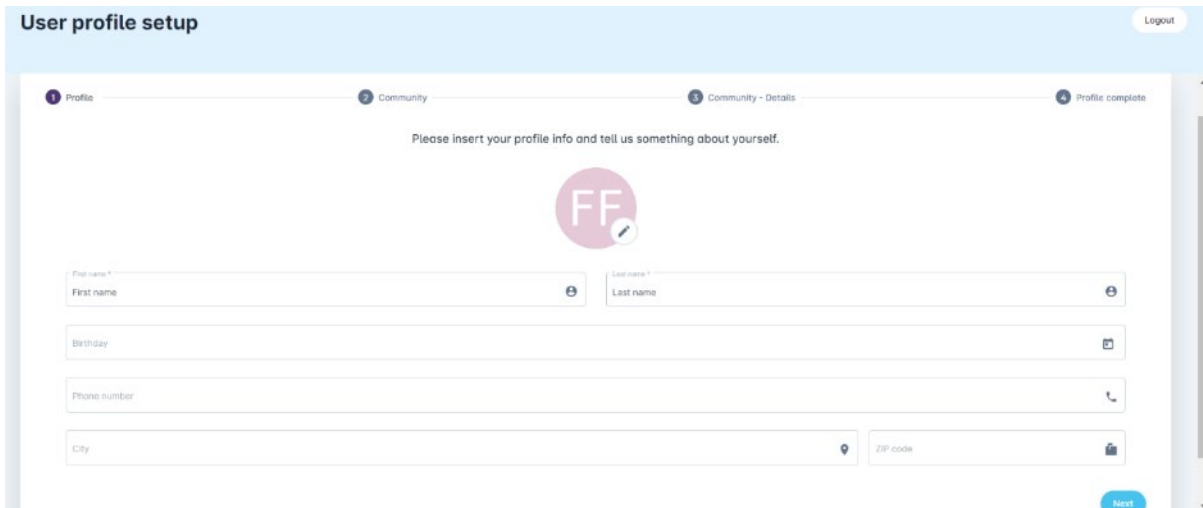
Someone has created a RiskPACC account with this email address. If this was you, click the link below to verify your email address

[Link to e-mail address verification](#)

This link will expire within 5 minutes.

If you didn't create this account, just ignore this message.

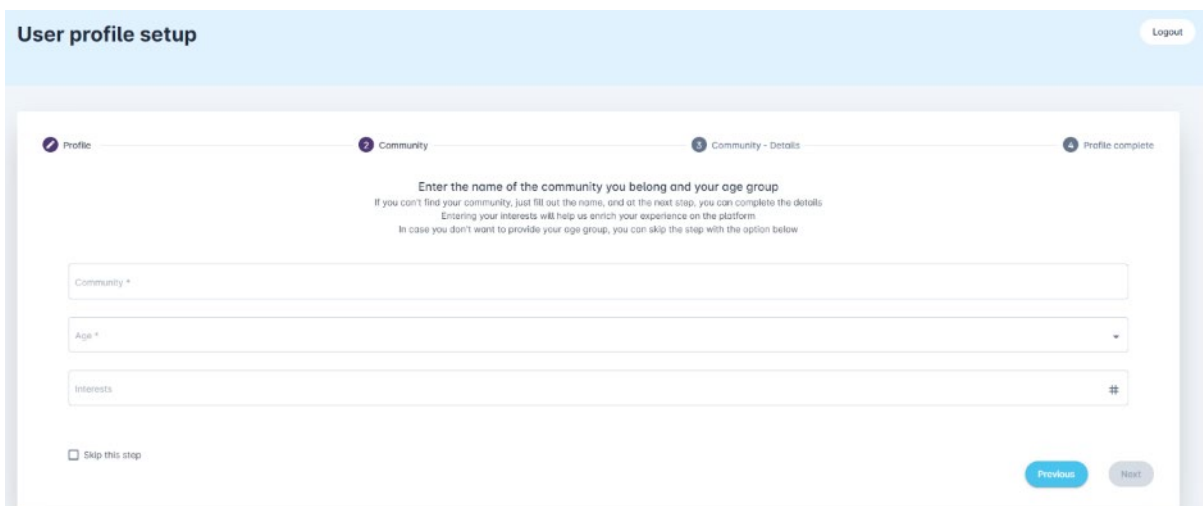
**FIGURE 2.8 MAIL ADDRESS VERIFICATION**



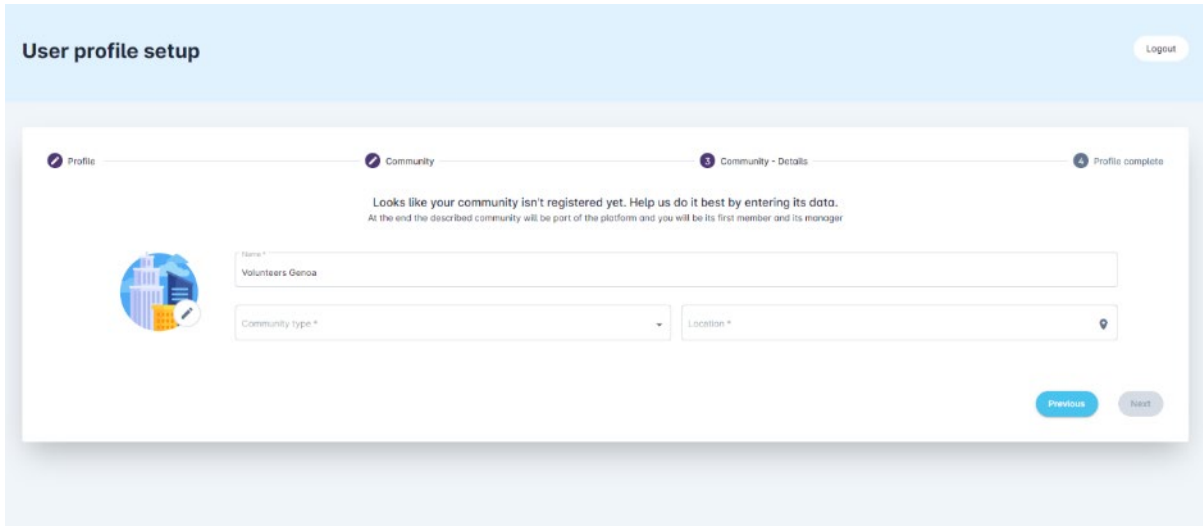
**FIGURE 2.9 USER PROFILE SETUP**

The second step requires the user to identify himself in a community within the platform. This step is optional, but users who choose not to identify themselves in a community will have to edit their profile later. If the user decides to identify themselves in a community (Figure 2.10), they can fill out the form and enter key data to create a new community if it does not exist on the platform. In case of errors in this process, the admin can clean up the platform.

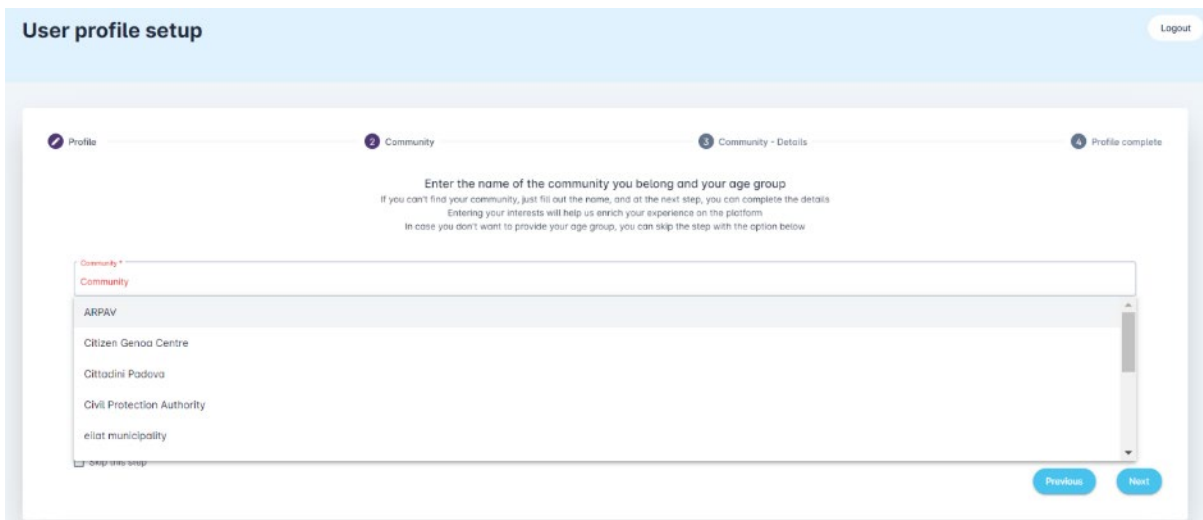
When the user already knows the community within which they want to identify themselves, they can use the search bar to find the community (Figure 2.12).



**FIGURE 2.10 COMMUNITY – NEW COMMUNITY**

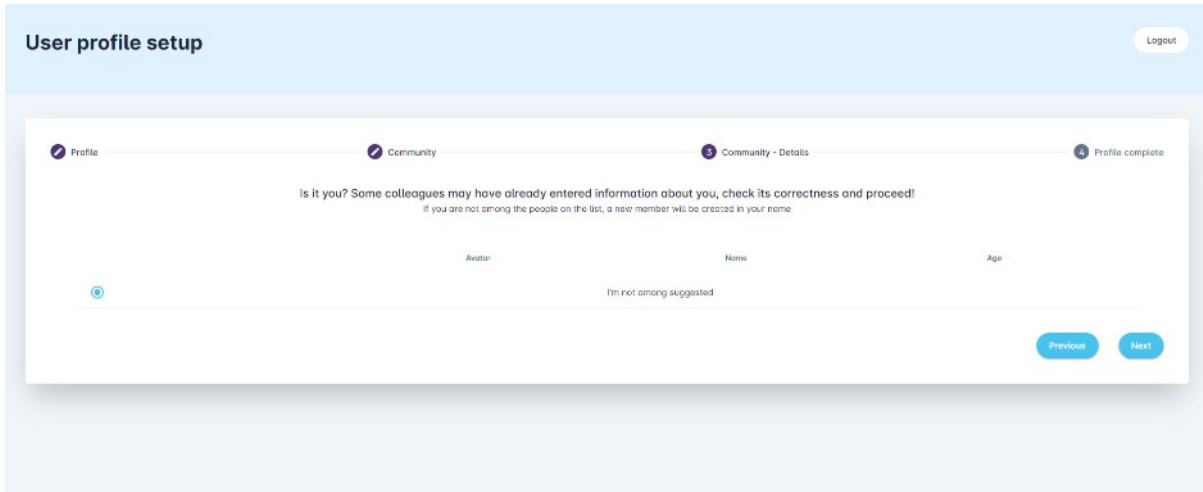


**FIGURE 2.11 COMMUNITY DETAILS – NEW COMMUNITY**



**FIGURE 2.12 COMMUNITY - EXISTING COMMUNITY**

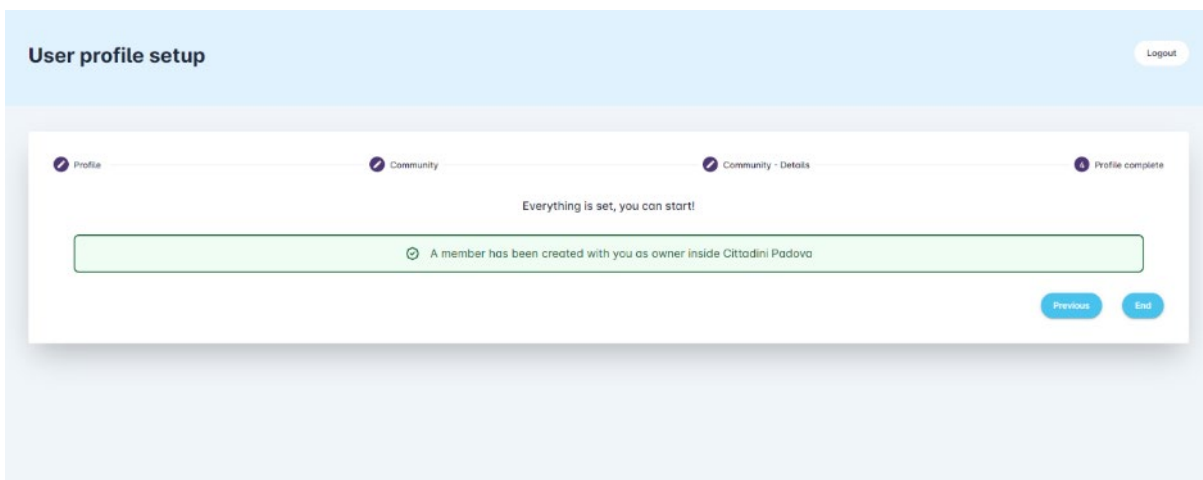
If the user identifies himself in an existing community, he will see the page as shown in the image below. Here the user can select whether he is a person among those already introduced into the platform by third parties or whether he is a new user (as shown in Figure 2.13)



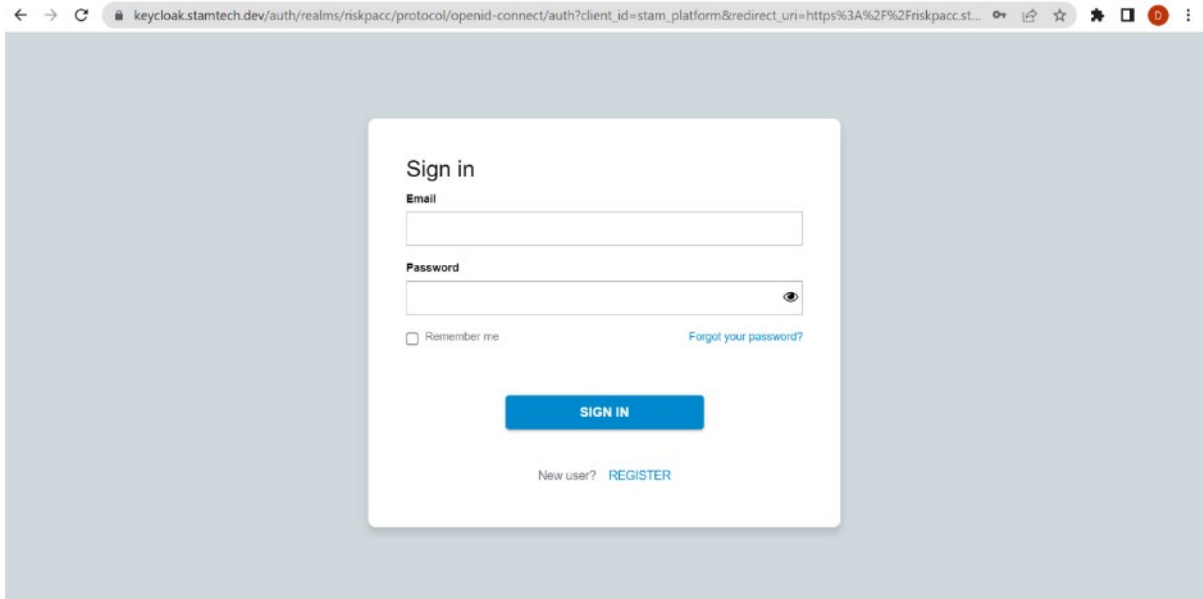
**FIGURE 2.13 COMMUNITY DETAILS - EXISTING COMMUNITY**

Since one does not yet exist, the user can click on next.

Now the registration is completed (Figure 2.14). The user's profile is fully set up and they can access the platform by entering their email and password in the dedicated login box during authentication (Figure 2.15). The user can also edit their profile and change their community affiliation at any time on the dedicated profile setup page. HERMES' user registration and login functionality ensure a secure and efficient experience for users.



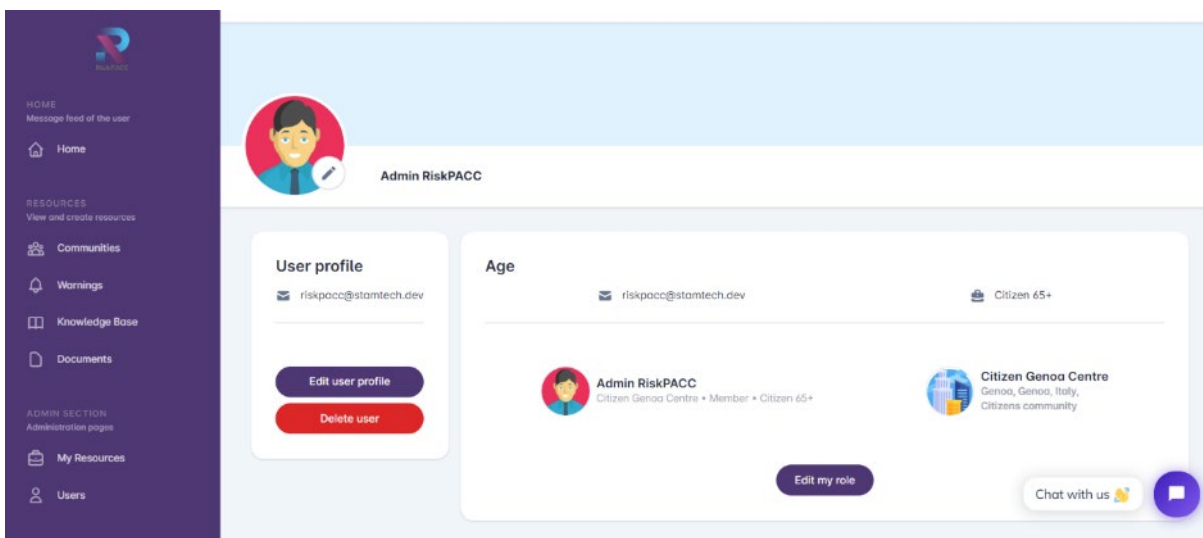
**FIGURE 2.14 COMPLETE PROFILE**



**FIGURE 2.15 CREDENTIALS FOR THE AUTHENTICATION**

### 2.2.2 PROFILE SETUP

The profile setup functionality allows users to customize their user profile and role within the platform (Figure 2.15). Upon accessing this section, users can edit their personal information such as their name, surname, age, etc. Additionally, users can indicate their interests by selecting tags for which they wish to receive notifications. This allows for a personalized experience and ensures that users are notified of relevant updates and events. Users can also edit their community and role within the platform, as well as upload a profile picture. The profile setup functionality is a key component in ensuring a seamless user experience and facilitating effective communication within the platform.



**FIGURE 2.16 PROFILE SETUP**



### 2.2.3 CREATION OF A NEW COMMUNITY

The third functionality of HERMES allows the user, specifically a CPA, to create a new community in order to categorize users based on common characteristics. This is done through the "Communities" section where the CPA can click on the "add Community" button and access a dedicated page as shown in Figure 2.17. On this page, the CPA can enter key information considered most appropriate such as key contacts, a reference website, a phone number as a switchboard, and an institutional email address. In addition, the CPA can insert tags that are important to that community as shown in Figure 2.18. This allows the notification system to work properly by sending notifications to users who have the same tags of interest if it is mentioned in a resource of that community. With this functionality, the platform becomes more user-friendly and enables users to join a community based on their interests and preferences.

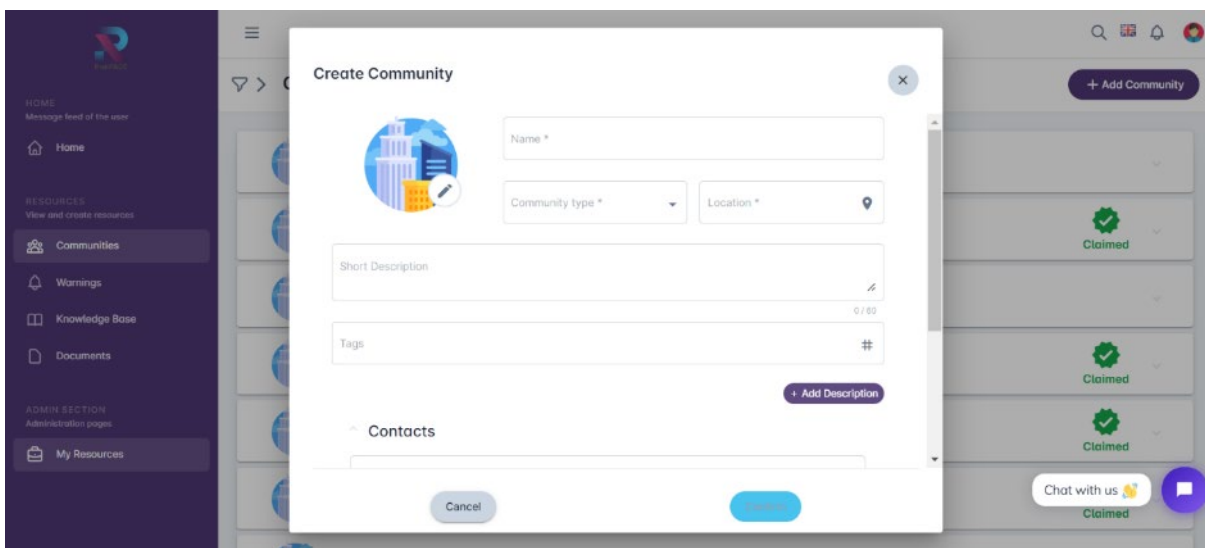


FIGURE 2.17 NEW COMMUNITY

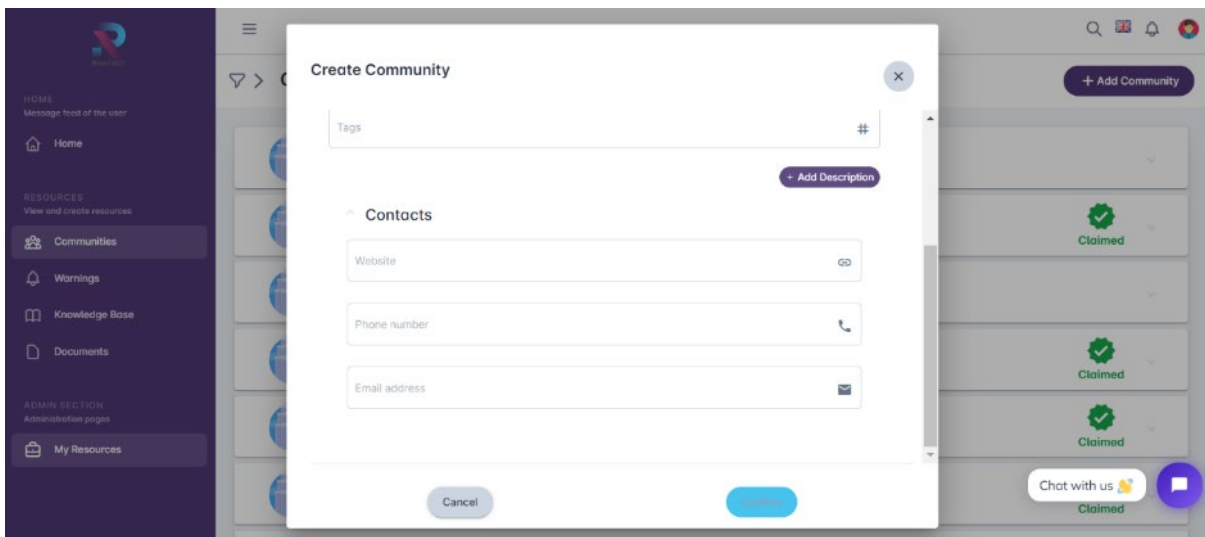


FIGURE 2.18 COMMUNITY DETAILS

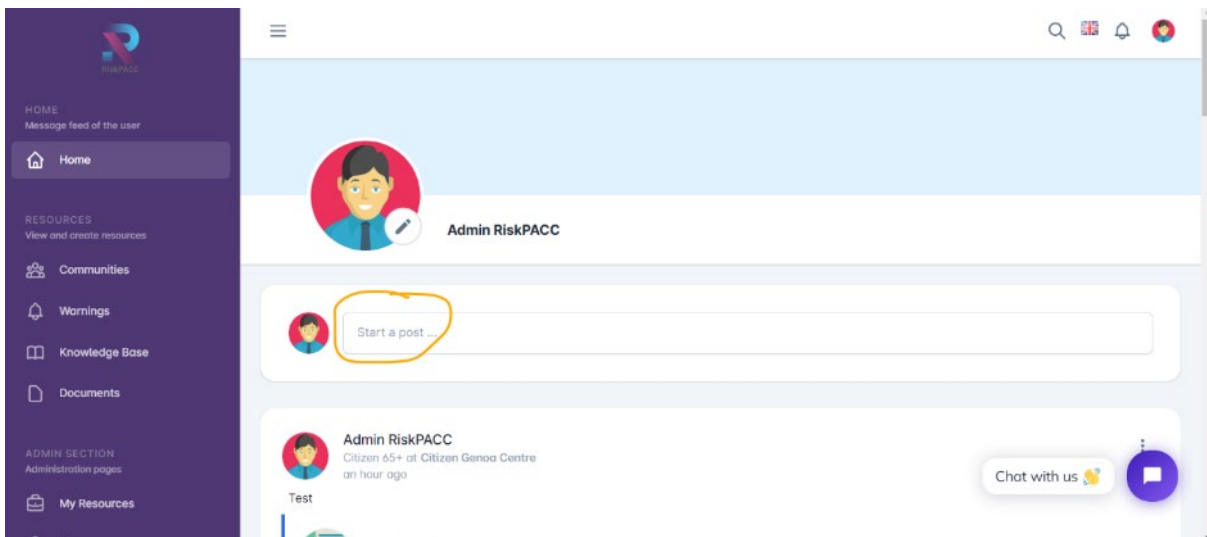
## 2.2.4 SHARING POSTS REPORTING EMERGENCIES, ALERTS, NEWS

The user can create a new post by entering a short description and attaching resources such as a knowledge base, documents or warnings to be communicated to other HERMES platform users.

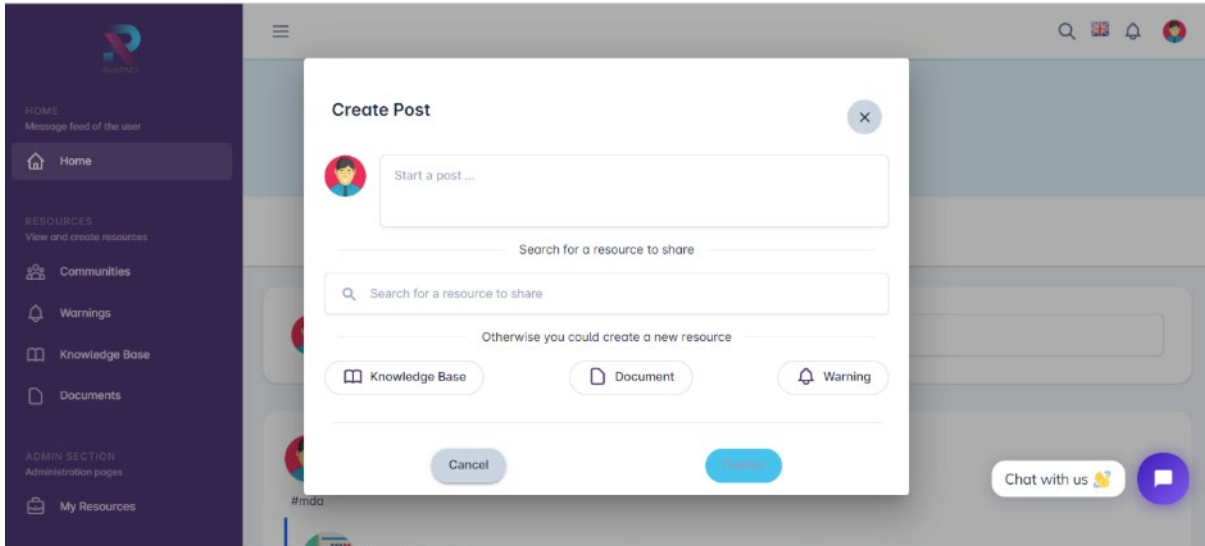
When a user wants to create a new post, he can click in the section shown in Figure 2.19 on the homepage.

After clicking on the "Start a post" space, the platform shows a box with the post creation section. Here, the user can enter a title and a brief description of the post in the dedicated fields. The user can also upload and attach files: a document, a knowledge base, a warning, images, and videos to complement it (Figure 2.20).

After creating the post, other users can interact with it by commenting, sharing, or reacting to it. Users can also report emergencies, alerts, and news through the platform, which will be visible to other users who are part of the same community or who have expressed interest in the same tags.

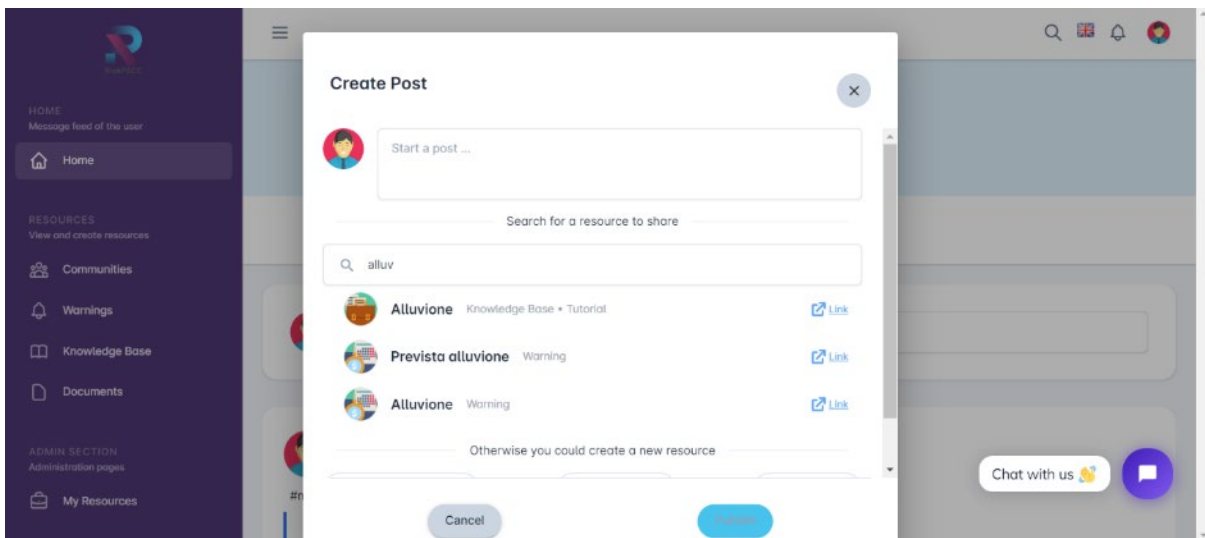


**FIGURE 2.19 START A POST**



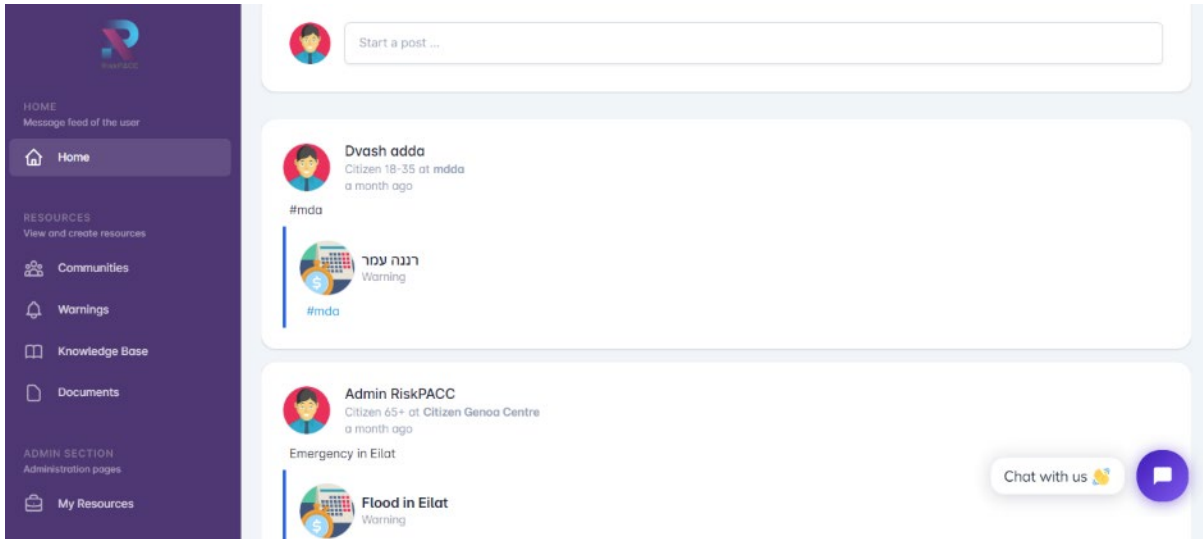
**FIGURE 2.20 CREATION OF A NEW POST**

The user can attach an existing resource using the search bar (see Figure 2.21), otherwise he can create a new one clicking on the dedicated buttons.



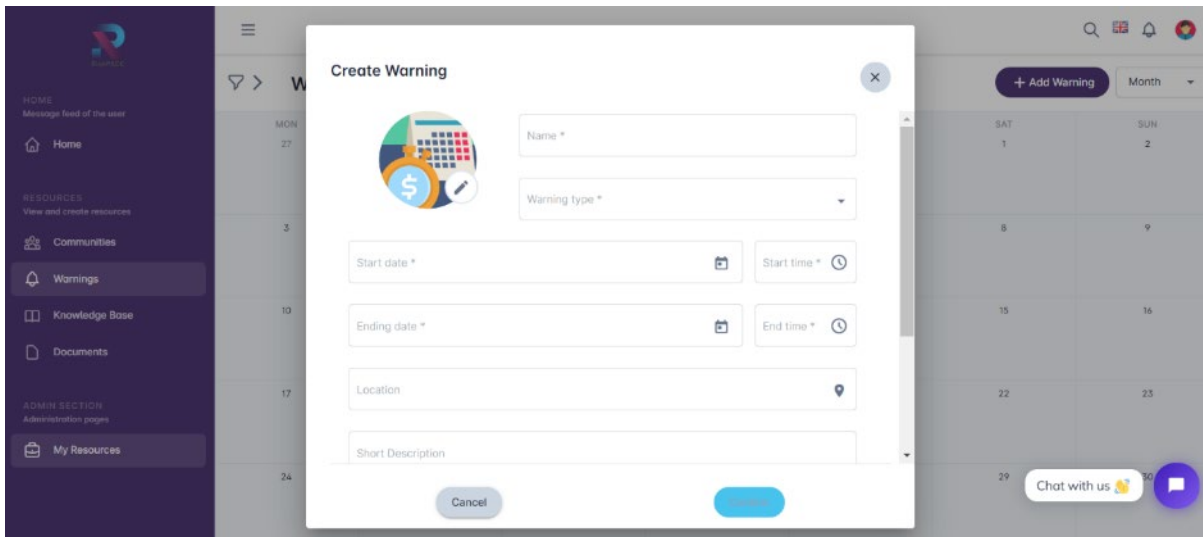
**FIGURE 2.21 NEW POST - ATTACHING AN ALREADY EXISTING RESOURCE**

After the successful creation of a post, the user can see it in the homepage where there are also the other posts published by the different users registered on the platform.

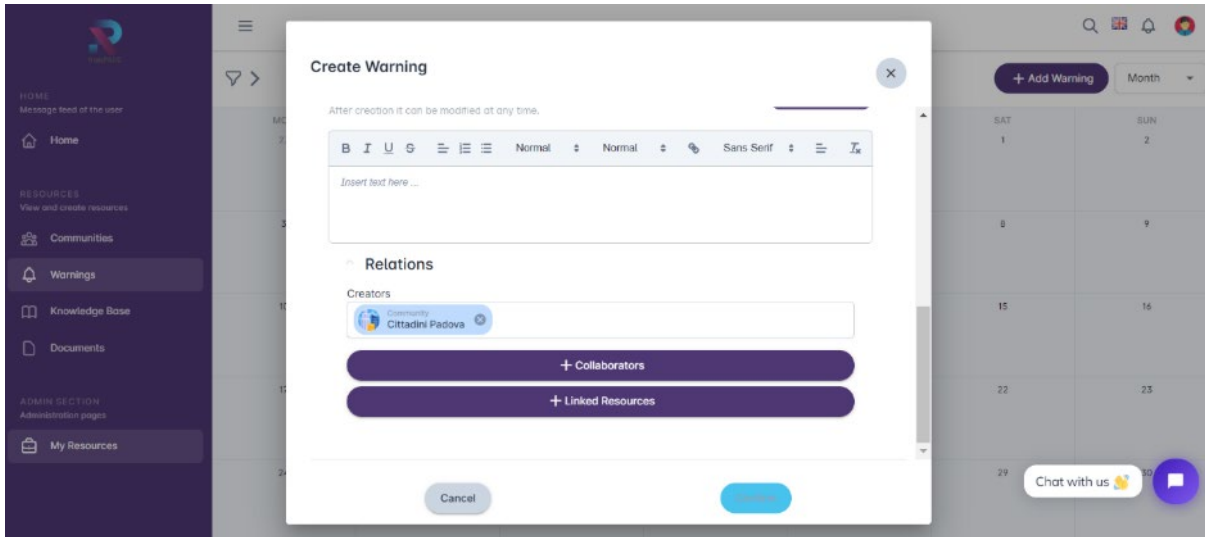


**FIGURE 2.22 HERMES HOMEPAGE WITH THE NEW POST CREATED**

In the same way, the user can create a “Warning”. User as a CPA can upload information about warnings in order to alert citizens that an event/emergency is occurring or is planned. In the Warning section, the CPA user can click an "add Warning" and it can see the page as in Figure 2.23. In addition, he can insert the content considered most appropriate (descriptive parts, links, etc.) and can insert relationships between other resources or communities already on the platform (Figure 2.24).



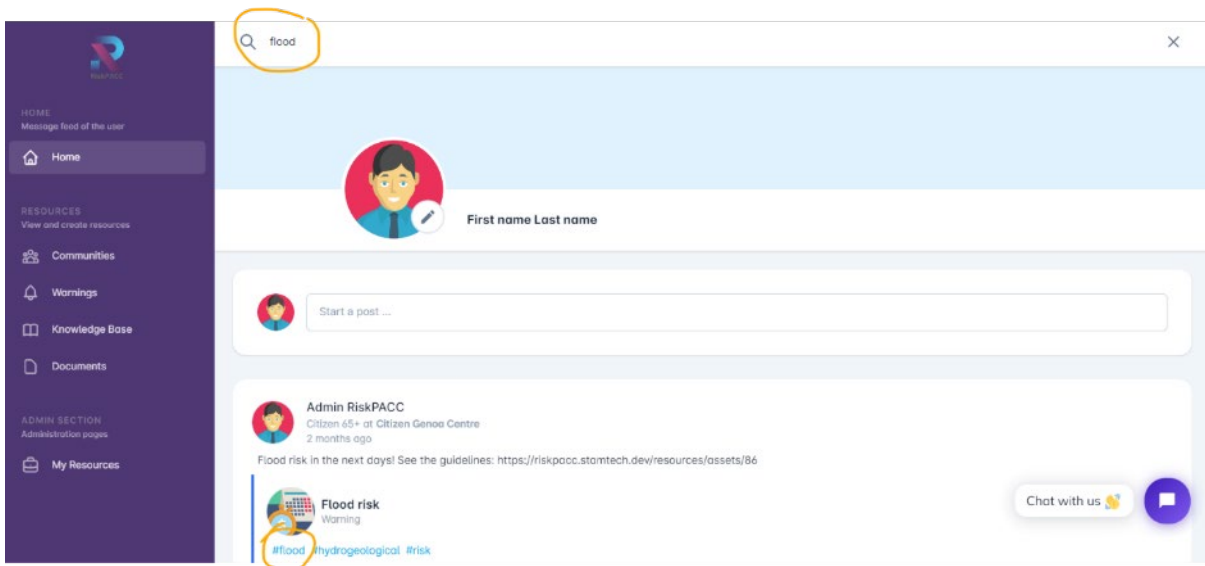
**FIGURE 2.23 NEW WARNING**



**FIGURE 2.24 WARNING DETAILS**

### 2.2.5 SEARCH USING THE DEDICATED BAR WITH TAGS

The search functionality with tags allows users to quickly and easily find relevant posts based on specific topics. Users can use the dedicated search bar on the homepage and enter the name of the tag they are interested in filtering by. For example, if a user wants to find posts related to floods, they can enter "flood" in the search bar and the platform will display all posts with the "flood" tag. The research results will include the list of the posts with the descriptions, and the linked tags for easy reference. This feature helps users efficiently find the information they need without having to scroll through all the posts on the platform.



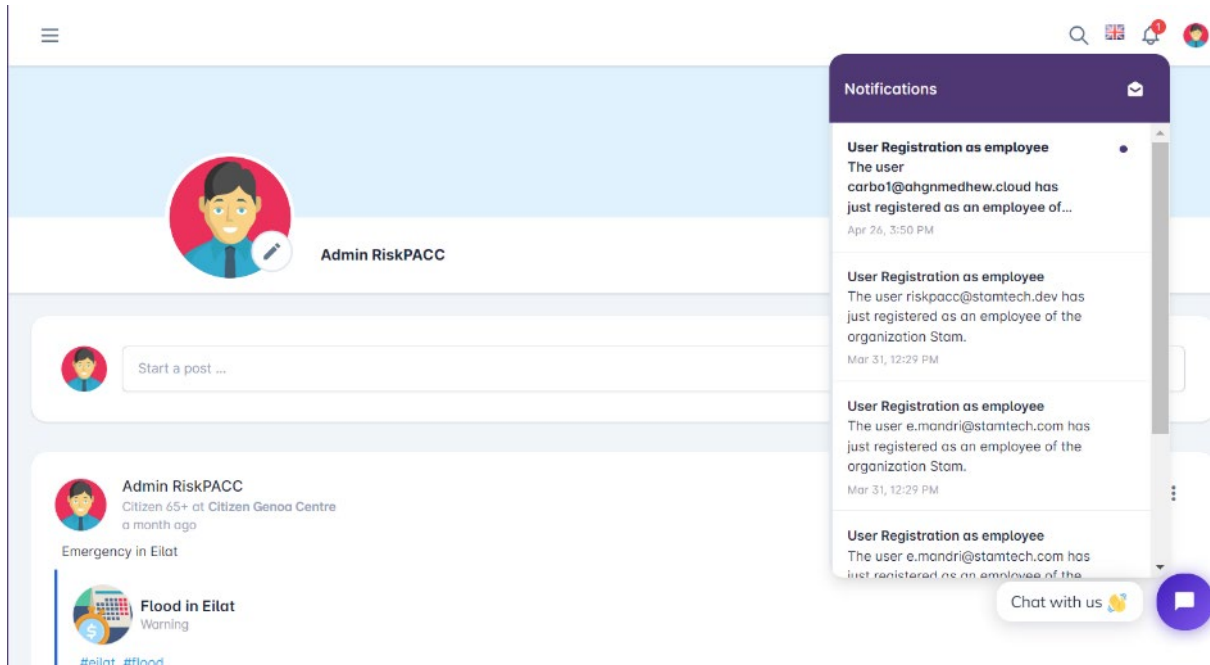
**FIGURE 2.25 SEARCH BAR**

### 2.2.6 NOTIFICATION SYSTEM

The HERMES platform has a built-in notification system that sends users custom notifications based on the tags they have entered as their interests in their profile setup. When a user logs into the platform, they can view their received notifications by

clicking on the bell icon in the upper right corner of the homepage, as shown in Figure 2.30.

CPA users also receive a notification every time a new user registers on the platform. This feature helps them keep track of the content within HERMES and stay informed about new users joining the platform.



**FIGURE 2.26 NOTIFICATION SYSTEM**

### 2.2.7 MESSAGING SYSTEM FOR BILATERAL COMMUNICATION CITIZENS-CPAs

HERMES includes also a messaging system for bilateral communication between citizens and CPAs. The system allows citizens and volunteers to send private messages to CPA users. The messaging system is accessed through a chat bubble icon in the HERMES platform. By clicking on the icon, users can send and receive private messages from CPAs. This feature facilitates bilateral communication between users and CPAs and allows for the exchange of important information and updates.

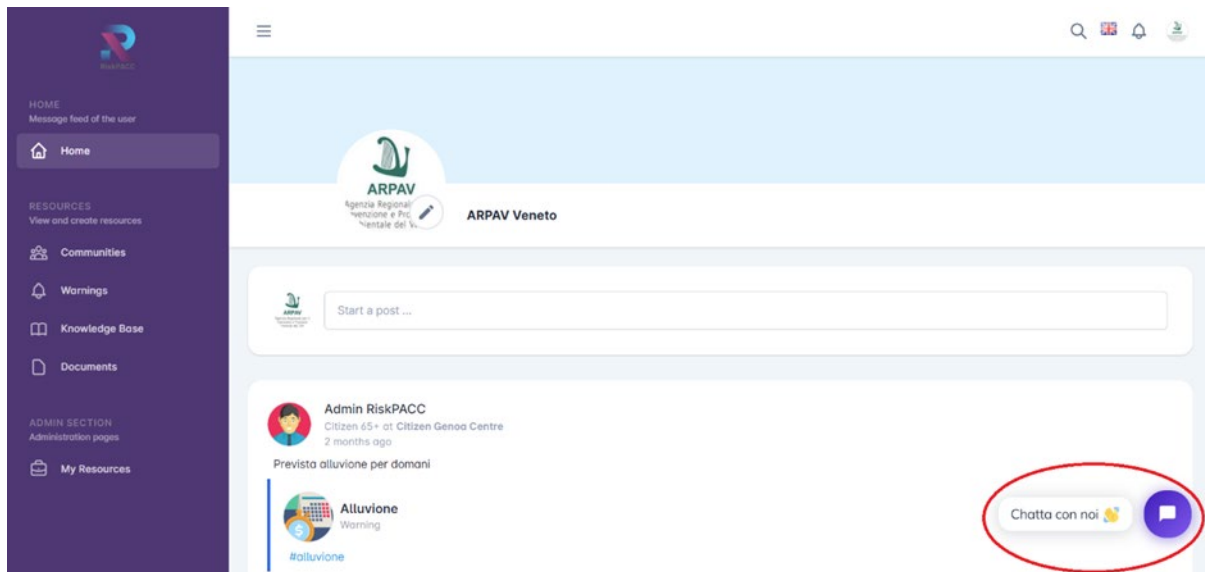


FIGURE 2.27 CHAT BUBBLE

### 2.2.8 REPOSITORY OF INFORMATIVE DOCUMENTS AND POSTS DISSEMINATED BY CPAs WHEN SOME HAZARDS HAPPENED IN THE CITY

The repository is a useful functionality of the HERMES platform. Users can access a range of informative documents and posts related to hazards or emergency situations in their city. These documents may contain important information and instructions on how to deal with various hazards or emergency situations. The users can also filter the contents based on their needs. To access the informative documents and posts, the user needs to select the appropriate section from the menu on the left side of the HERMES tool. The four sections available are “Communities”, “Warnings”, “Knowledge base”, and “Documents”. In each of these sections, the user can find useful resources related to different aspects of hazards and emergencies. For example, the warnings section may contain warnings related to severe weather conditions, while the knowledge base section may contain information on how to deal with a heat wave. In each section, there is a filter icon that allows the user to filter the contents based on different criteria such as key words, location, and date of publication. This feature helps the user to quickly find the information that is most relevant to their needs. The informative documents and posts in the repository are disseminated by CPAs who are responsible for providing accurate and timely information to the public in case of emergencies.



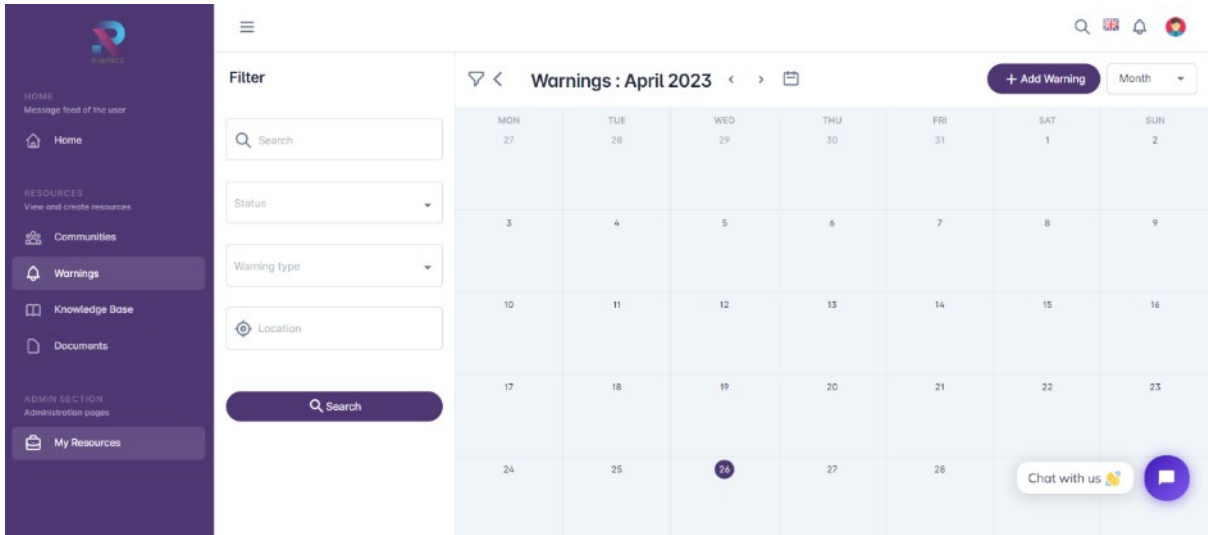


FIGURE 2.28 READ ALERTS

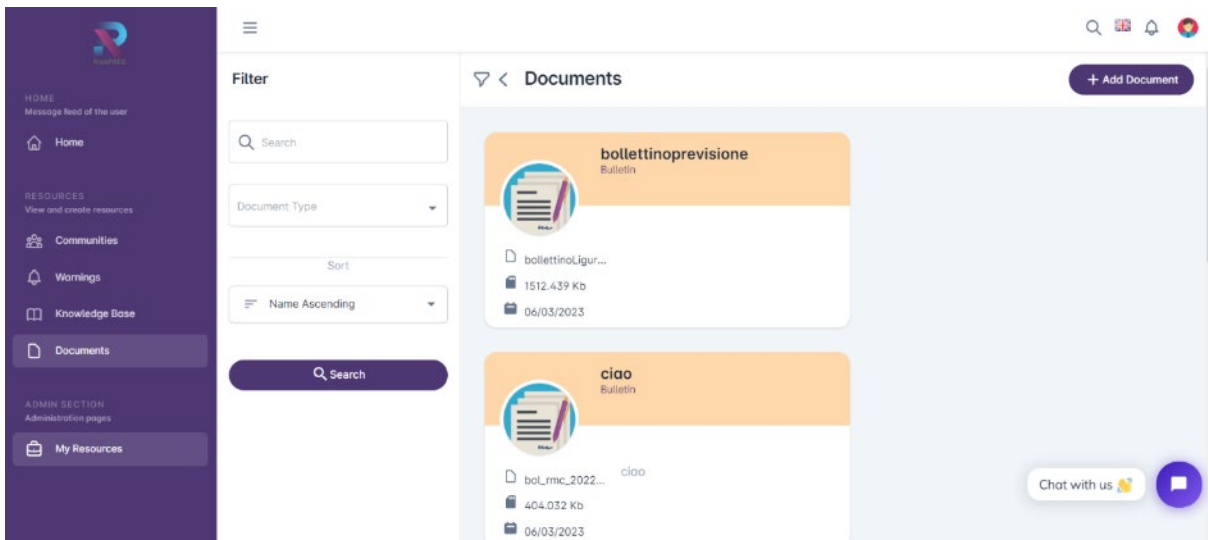


FIGURE 2.29 READ DOCUMENTS

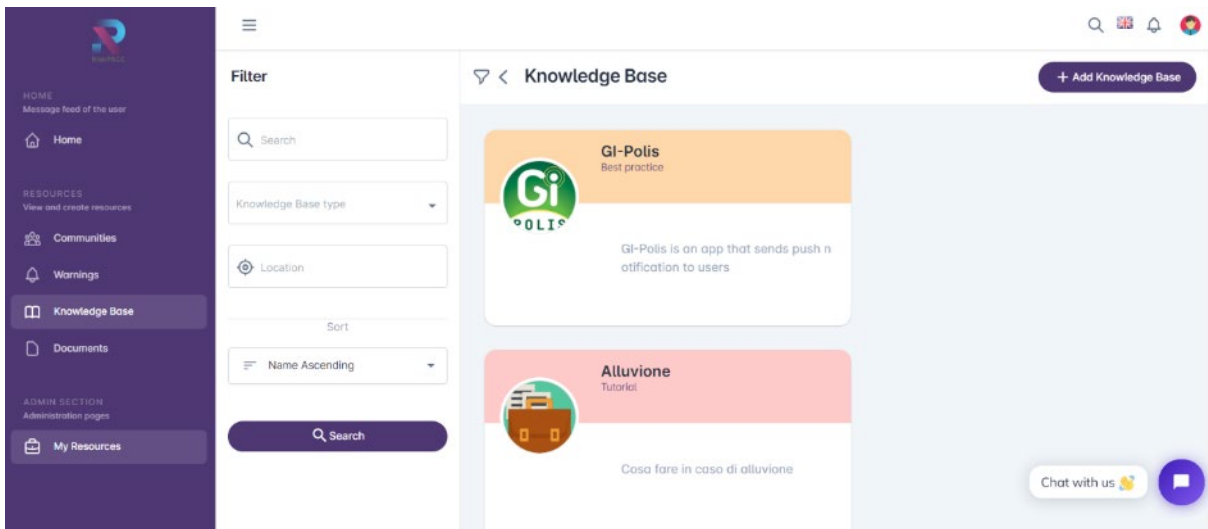


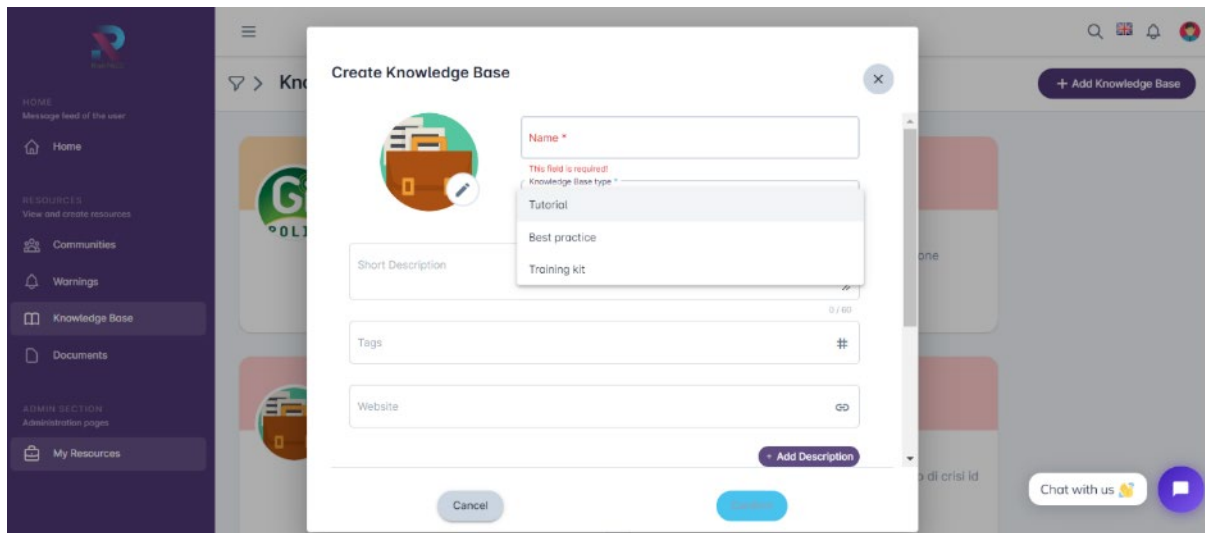
FIGURE 2.30 READ KNOWLEDGE BASE



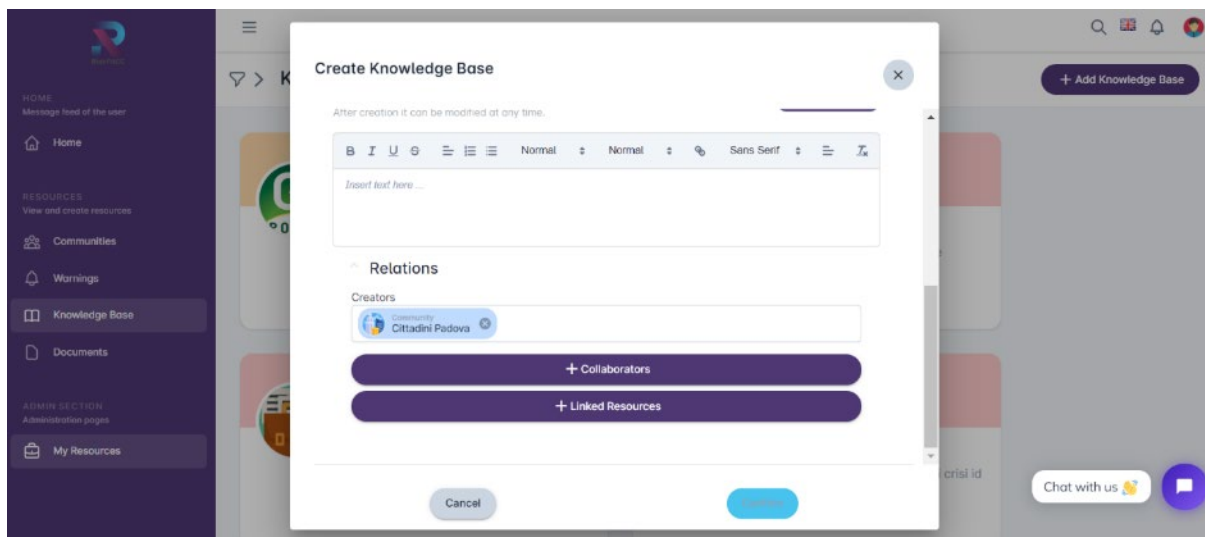
### 2.2.9 UPLOADING NEW KNOWLEDGE BASE MATERIALS

As a CPA, the user has the ability to create and upload information materials in the form of best practices and guidelines to help citizens deal with emergencies. This can be done in the Knowledge Base section of the HERMES platform. To upload new materials, the CPA user can click on the "add Knowledge Base" button (Figure 2.31), which will direct them to a page where they can create a new entry. On this page, the CPA can enter the content they deem most appropriate, including descriptive parts and relevant links.

Additionally, the CPA can establish relationships between other resources or communities already on the platform (Figure 2.32). This allows for better organization and categorization of the knowledge base materials, making it easier for users to find the information they need. Overall, this functionality empowers CPAs to share their expertise and knowledge with the wider community, helping to improve overall emergency preparedness and response.



**FIGURE 2.31 NEW KNOWLEDGE BASE**



**FIGURE 2.32 KNOWLEDGE BASE DETAILS**

### 2.2.10 UPLOADING NEW DOCUMENTS IN THE PLATFORM

One of the functionalities of HERMES is the ability for CPAs to upload documents and photos to the platform. This allows for a more visual and informative experience for users who are seeking information about emergencies or other important events. To upload a document, the CPA user can go to the "Documents" section and click on the "add Documents" button. This will take them to a page where they can upload the document and include any relevant information such as a description or links. They can also link the document to other resources or communities already on the platform to provide more context and make it easier for users to find related information.

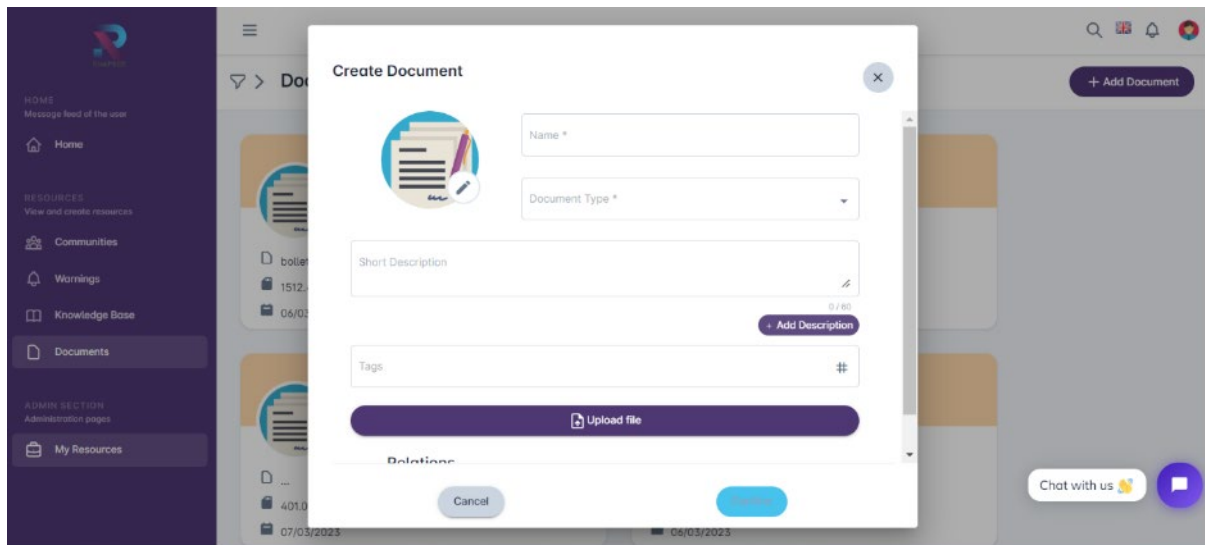


FIGURE 2.33 NEW DOCUMENTS

## 2.3 Possible future improvements

HERMES is a low TRL solution that presents a huge potential to be expressed. There are several aspects of the platform that can be improved to be more useful, versatile and more user-friendly.

The **user interface** can be further enhanced to make it more intuitive and user-friendly. For example, the layout can be made more visually appealing, and navigation can be made more intuitive. While HERMES has a lot of useful features, the interface can be overwhelming for some users, particularly those who are not tech-savvy. Simplifying the interface by removing unnecessary elements, consolidating similar features, and using intuitive icons can make it easier to navigate. It is important to ensure that the platform is accessible to all users, including those with disabilities. This can be achieved by using clear and simple language, providing alternative text for images, and allowing users to adjust the font size and contrast. Users have different needs and preferences, so it is important to provide options for personalization. This can include allowing users to choose their preferred language, customizing the layout, and providing the ability to select relevant tags or topics. Users need to know that their actions on the platform have been successful or not. Providing clear feedback when an action is completed or when there is an error can reduce frustration and improve the user experience. For new users, it can be helpful to provide onboarding and

tutorials that explain the features and how to use them. This can reduce confusion and make it easier for users to get started.

Another important aspect is related to **mobile optimization**. With the increasing use of smartphones and tablets, many users access online platforms from their mobile devices. Therefore, optimizing the platform for mobile devices is crucial to make it accessible to a wider range of users. To optimize the platform for mobile devices, the user interface should be designed to fit the smaller screen sizes of mobile devices. This can be achieved by implementing responsive design techniques that allow the platform to adapt to different screen sizes and resolutions. In addition to resizing the interface, the mobile version of the platform should also prioritize important information and features, making it easier for users to navigate and access essential functionalities. For example, menus and buttons should be large enough to be easily tapped, and the most critical features and functionalities should be highlighted. Moreover, the platform should be optimized for slower internet speeds, which are common in many areas affected by natural disasters. This can be achieved by minimizing the size of images and other media on the platform and by prioritizing text-based content.

An interesting feature regards the implementation of **Machine learning and AI**. Integrating machine learning and AI can bring significant benefits to the risk communication solution. One potential use case is to leverage natural language processing (NLP) to automatically extract relevant information from posts and messages on the platform. For example, the system could automatically identify posts related to emergency situations, extract key details such as location and severity, and notify relevant stakeholders accordingly. This would reduce the need for manual review and increase the speed and accuracy of information dissemination. Another potential use case is to use machine learning algorithms to analyse patterns and trends in user behaviour on the platform. This could help identify areas where communication efforts may be lacking or where there are gaps in information sharing. For example, the system could identify users who are not engaging with the platform as much as others and provide targeted outreach efforts to increase their participation. Finally, AI-powered chatbots could be implemented to provide real-time support to users on the platform. These chatbots could be programmed to answer frequently asked questions, provide guidance on how to use the platform, and assist with common issues. This would reduce the burden on human support staff and provide users with immediate assistance, improving their overall experience on the platform. The platform can leverage machine learning and artificial intelligence to provide more personalized recommendations to users. For example, it can use AI algorithms to suggest the most relevant information to users based on their profile and preferences.

Given the nature of the platform, **multilingual support** is an essential feature that can significantly enhance the user experience of the web-based risk communication solution. By enabling users to access the platform in their native language, it can reduce language barriers and improve the platform's accessibility to a wider range of users. To implement multilingual support, the platform can provide an option for users to select their preferred language during the registration process.

**Social media integration** is another potential improvement for the technical solution. By integrating the platform with popular social media platforms such as Facebook, Twitter, and Instagram, users could easily share information and updates with their social media networks, thereby increasing the visibility and reach of the platform. For example, when a user posts information about a disaster or emergency on the platform, they could have the option to share that information on their Facebook or Twitter accounts with a single click. This would allow the information to reach a wider audience, potentially increasing the chances that those who need it will see it. Furthermore, social media integration could also be used to gather information and feedback from users. For instance, the platform could automatically track mentions of certain keywords or hashtags related to emergencies or disasters on social media platforms, and use this information to inform decision-making and resource allocation.

## 3 AEOLIAN AR MOBILE APP

This section will detail the development of the AR App created by ICCS. In an initial phase, prior to the development of the Aeolian AR mobile app, a mutual understanding among technology providers and case study owners had to be achieved. During this interaction, the core functionalities of the tools were presented to case study owners, based on their use case requirements. As mentioned in the introduction, core functionalities of tools were either already in place and would be further expanded or refined in the framework of the RiskPACC project, as is the HERMES tool, or foreseen to be implemented for the tools that would be developed in the framework of the RiskPACC project, as is the case with the Aeolian AR mobile app.

Then the tools were matched with the different use cases and their functionalities were further shaped and refined during several interaction phases with CPAs, citizens and volunteers. ICCS tool, the Aeolian AR mobile app, was matched with the MRP, the Eilat and the Olomouc Region case studies. Interaction of ICCS with CPAs was taking place during the implementation of relevant WPs (mainly WP3 and more specifically during the internal workshops) and during dedicated meetings, when necessary, while interaction with citizens and volunteers was taking place during the co-creation workshops foreseen in WP3. Additional information about the tool, the initial planning and the evolution of its functionalities, as well as possible future improvements are presented in the following sections.

### 3.1 Combination of user needs and tool functionality

#### 3.1.1 FEEDBACK FROM USE CASES AND IMPROVEMENTS IN THE FUNCTIONALITIES OF THE TECHNICAL SOLUTION BASED ON END-USER NEEDS

##### *3.1.1.1 Internal workshops*

As also mentioned above, the elaboration of end-user needs and requirements was performed in WP3. Initially, two internal workshops took place on 14 and 24 March 2022, respectively. During these workshops, the functionalities of the ICCS tool presented above were proposed, the ICCS tool was matched with risks, target groups and case studies and discussions with end-users followed so as to further shape and, when necessary, expand these functionalities based on the end-user needs and requirements. Additional information for this interaction between ICCS and case study owners is presented in D3.2 and D3.5.

##### *3.1.1.2 Interaction and feedback after the internal workshops*

The user needs were shaped during the external workshops foreseen in T3.3. Prior to the 1<sup>st</sup> round of workshops, ICCS team interacted during dedicated meetings with the CPAs from the three related case study owners and came up with a more concrete view over the functionalities of its tool.

At that stage, CPAs expressed their interest to address not only natural-hazard-, but also **anthropogenic-hazard-related issues** with the ICCS app. Further to that, CPAs were also interested in having the option to somehow address the **recovery** phase of the disaster management cycle. Therefore, the ICCS tool had to be designed in such



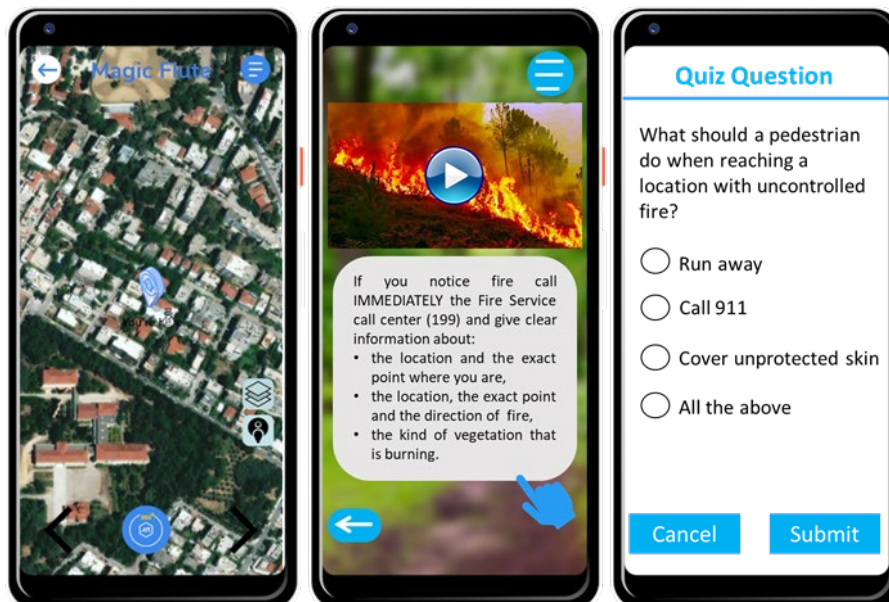
a way so that its core functionalities, as presented above, would be expanded to cover these aspects.

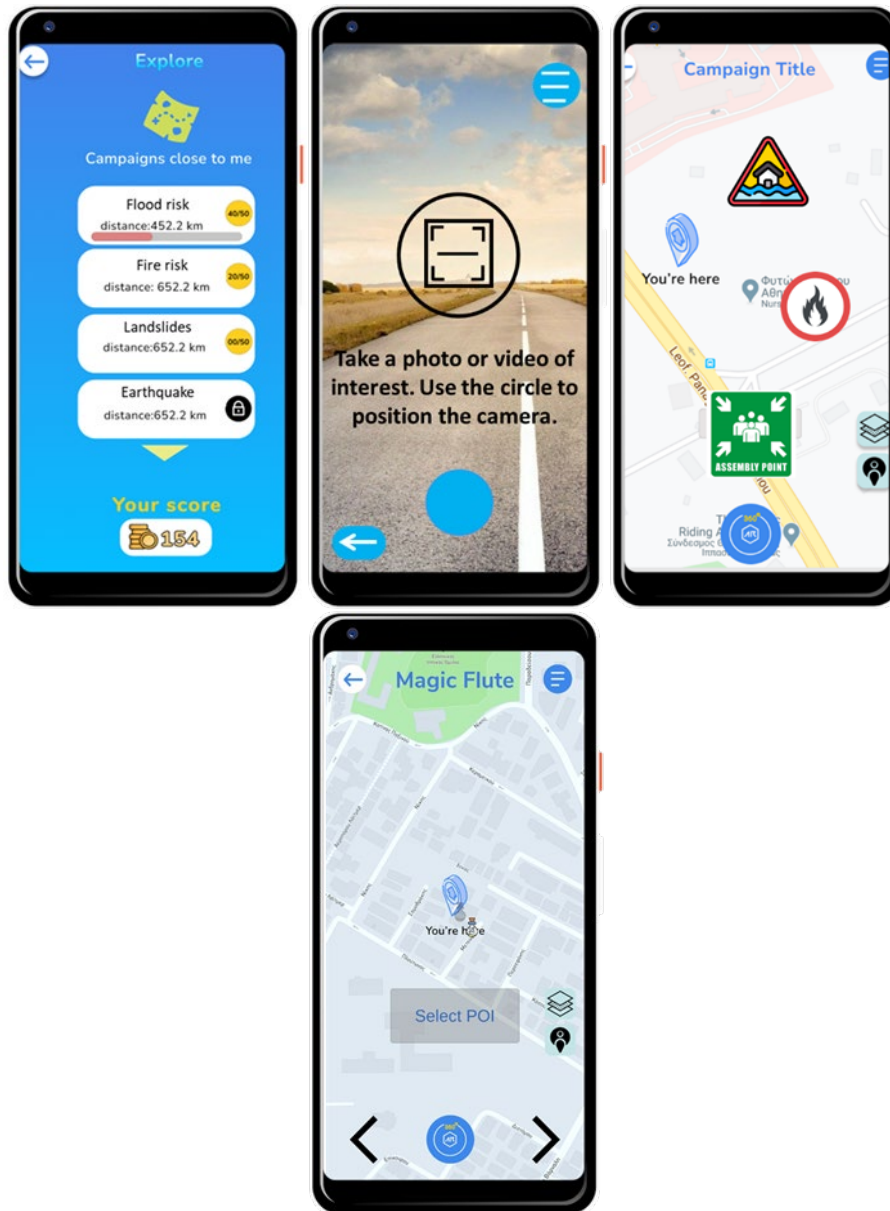
### 3.1.1.3 1<sup>st</sup> round of external workshops (T3.3)

The 1<sup>st</sup> round of external workshops took place in May 2022 (10 May 2022 in MRP and Eilat case study and 20 May 2022 in Olomouc Region case study). During these workshops **mock-up screens** and related **user stories** were presented to CPAs, citizens and/or volunteers who attended the workshops and group discussions on the tools followed.

In an attempt to better illustrate the functionalities of its app, ICCS prepared a story concerning a hazardous situation at the outskirts of a city in an area frequently subjected to forest fires and floods. In that story, as also discussed in D3.5, a citizen of the area downloaded the app and conducted the training for a specific event that is likely to occur in the greater area. Some time prior to the occurrence of a hazard, when relevant and once available, or during its first stages, the CPAs can send an alert through the app to inform the citizens about an impending hazard or its onset. Moreover, some citizens who happened to be close to the starting point(s) of the hazard and captured a photo they can upload these photos and relevant text, if they want, to share it with the other end-users. By this way, the CPAs can be informed about dangerous locations at an early stage. Finally, thanks to the navigation features of the application, the CPAs would be able to navigate the citizens to safety collection points, away from dangerous zones.

A detailed overview of the main outcomes of these workshops is presented in D3.5. The setting-up of the functionalities of ICCS tool at that phase is presented below.





**FIGURE 3.1 MOCK-UPS OF ICCS TOOL, AS PRESENTED IN THE 1<sup>ST</sup> ROUND OF EXTERNAL WORKSHOPS**

#### 3.1.1.4 Interaction and feedback after the 1<sup>st</sup> round of external workshops

Feedback from these workshops was retrieved from a technical questionnaire for the ICCS tool filled-in by the attendees. The questionnaires were pre-processed and provided to ICCS, serving as useful feedback to have a more concrete view over the user needs.

CPAs were particularly interested in providing both educational and training sessions to the citizens and volunteers, expressing at the same time their interest to exploit AR technology as a means to more efficiently approach and interact with them through the ICCS tool. On the other hand, citizens and volunteers participated actively in the workshop demonstrating their interest to interact with CPAs and expressed their interest in the AR component and overall gamified functionalities. A detailed overview of the main outcomes of these workshops, as well as statistics and aggregated

comments from evaluation from workshop participant and workshop facilitators is presented in D3.5.

It needs to be highlighted that during the workshop, organisers strived for good gender representation of workshop participants. This was accomplished across the workshops with 13 females and 15 males overall. This focus on gender balance was to ensure that different perspectives were considered during feedback and development of the tools. This gender focus will be further elaborated on in Deliverable 3.7, which is due in M24 of the project.

At that stage, the main functionalities of the Aeolian app were decided upon and had to be populated and then further refined until the final release of the app. These functionalities included: Hazard Map, Report, Training (including Disaster Training, AR Campaigns and Good to know), Notifications and Emergency call.

As a follow up, ICCS interacted with case study owners to provide specific input for the app. In particular, case study owners, with the support of their scientific partners, provided specific input for disaster trainings including True/false and multiple-choice questions, photograph and list tasks, AR Campaigns (including relevant text, icons, figures and videos) and relevant material for the Good to know section (files and/or links). This input was imported by ICCS in the application and was in place prior to the next round of workshops so as to be tested by CPAs at first and then by the app users.

Prior to Iteration I of the 2<sup>nd</sup> round of external workshops, ICCS organized a **training session** with all three groups of case study owners, so as to demonstrate at real-time signing-in details and the functionalities of the Aeolian app. Following that, case study owners were strongly encouraged to download the app from a provided **QR code** to their mobile devices and test it on their own so as to become familiar with that. In support of this, the **Aeolian manual** was prepared by ICCS team and provided to the CPAs, including simplified instructions on how to use the app and relevant supportive screenshots.

### *3.1.1.5 2<sup>nd</sup> round of external workshops (T3.4 workshops) – Iteration I*

In the framework of the 2<sup>nd</sup> round of external workshops (T3.4 workshops) two iteration phases were foreseen with an intermediate improvement phase for further refinement of the tools.

During the first iteration (Lab Phase II – Part A) the functionalities of the Aeolian app were presented and the app was tested in the MRP, the Eilat and the Olomouc Region case studies. The workshops took place on 31 January 2023 in Eilat case study, 03 February 2023 in MRP case study and 09 February 2023 in Olomouc Region case study.

During the workshops, attendees scanned a QR code to download the Aeolian app and installed the app in the mobile devices. Indoors testing of some of the main app functionalities, including disaster training, AR Campaigns and reporting, was performed by the end-users.

Several screenshots from the different tabs of the app, as it was during the first round of T3.4 workshops (Lab Phase II – Part A) are presented in Figure 3.2.



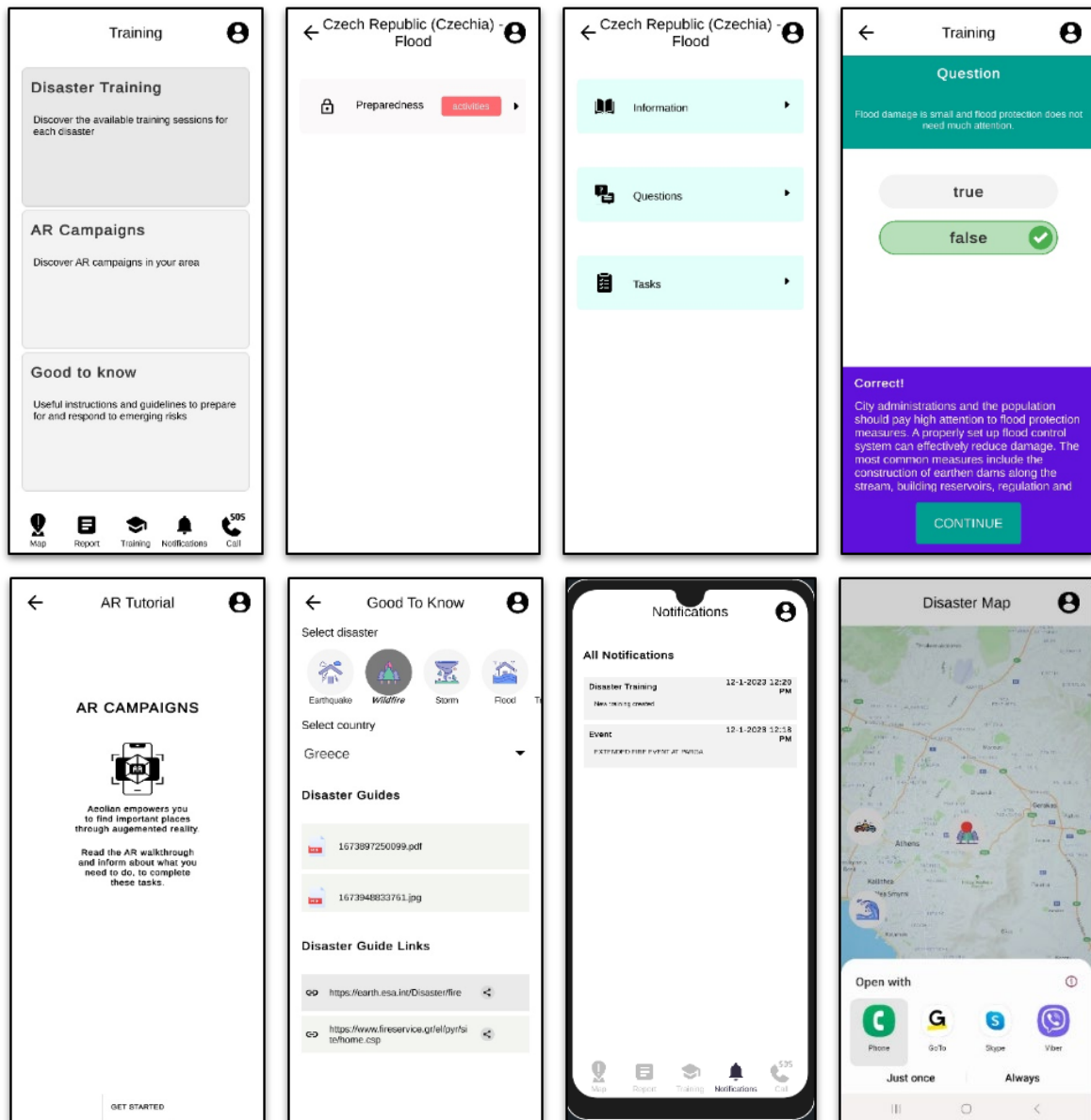
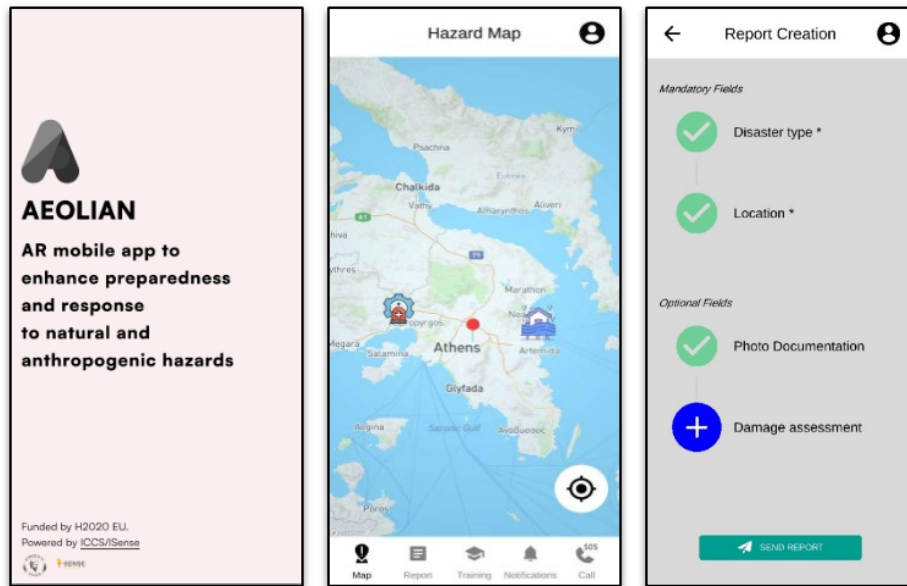


FIGURE 3.2 APP SCREENSHOTS DURING THE FIRST ROUND OF T3.4 WORKSHOPS

### 3.1.1.6 Interaction and feedback after Iteration I of the 2<sup>nd</sup> round of external workshops

As was the case with the 1<sup>st</sup> round of external workshops, after the completion of the workshop, attendees filled-in a questionnaire providing *inter alia* scoring for the app and (optionally) indicated aspects that could be improved so that the app would be more user-friendly and efficient. This feedback was pre-processed and provided to ICCS. Especially for the MRP workshop, where ICCS team was physically present, a number of attendees provided targeted feedback for the UI/UX design of the tool retrieved by the ICCS team.

It is noted here that also during the 1<sup>st</sup> round of external workshops, organisers strived for good gender representation of workshop participants. This was accomplished across the workshops, to ensure that different perspectives were considered during feedback and development of the tools, with 31 females and 29 males overall. As also mentioned above, this gender focus will be further elaborated on in Deliverable 3.7, which is due in M24 of the project.

Then, ICCS merged feedback from different use cases (together with special feedback on UI/UX design available for MRP workshop) and set-up an extended list including all comments received from end-users. These comments were classified into **bugs** identified by the end-users during the app use and **suggestions for app improvements** to be examined, and when relevant and feasible addressed, by Iteration II of the 2<sup>nd</sup> round of external workshops. Considering that the functionalities of the app were already completed during the previous development phases, the suggested improvements focused on interface and user-friendliness aspects.

Indicative **bugs** included *inter alia*:

- login issues (with predefined credentials or after user registration),
- gallery access issues,
- issues with sending messages through the chat functionality,
- issues concerning visibility on the map of hazard events add by CPAs and
- issues concerning visibility of different elements of the AR campaigns or the campaign as a whole.

Particularly for the Israeli use case, CPAs as well as workshop attendees set the provision of the training and educational material in Hebrew as a top priority. This provision was technically quite demanding, considering the particularities of the Hebrew language in comparison to the other languages for which content was uploaded in the app (reverse order of letters, specific symbols *etc.*).

Besides the bugs mentioned above, feedback from questionnaires concerned also **user-friendliness** issues. Suggested improvements included *inter alia*:

- more user-friendly and easy to follow AR tutorial,
- filtering option for available disaster trainings, AR campaigns and Good to know footage,
- overlapping icons in hazard map,

- select the name of files and videos uploaded in Good to know footage (so as to be descriptive of the content).

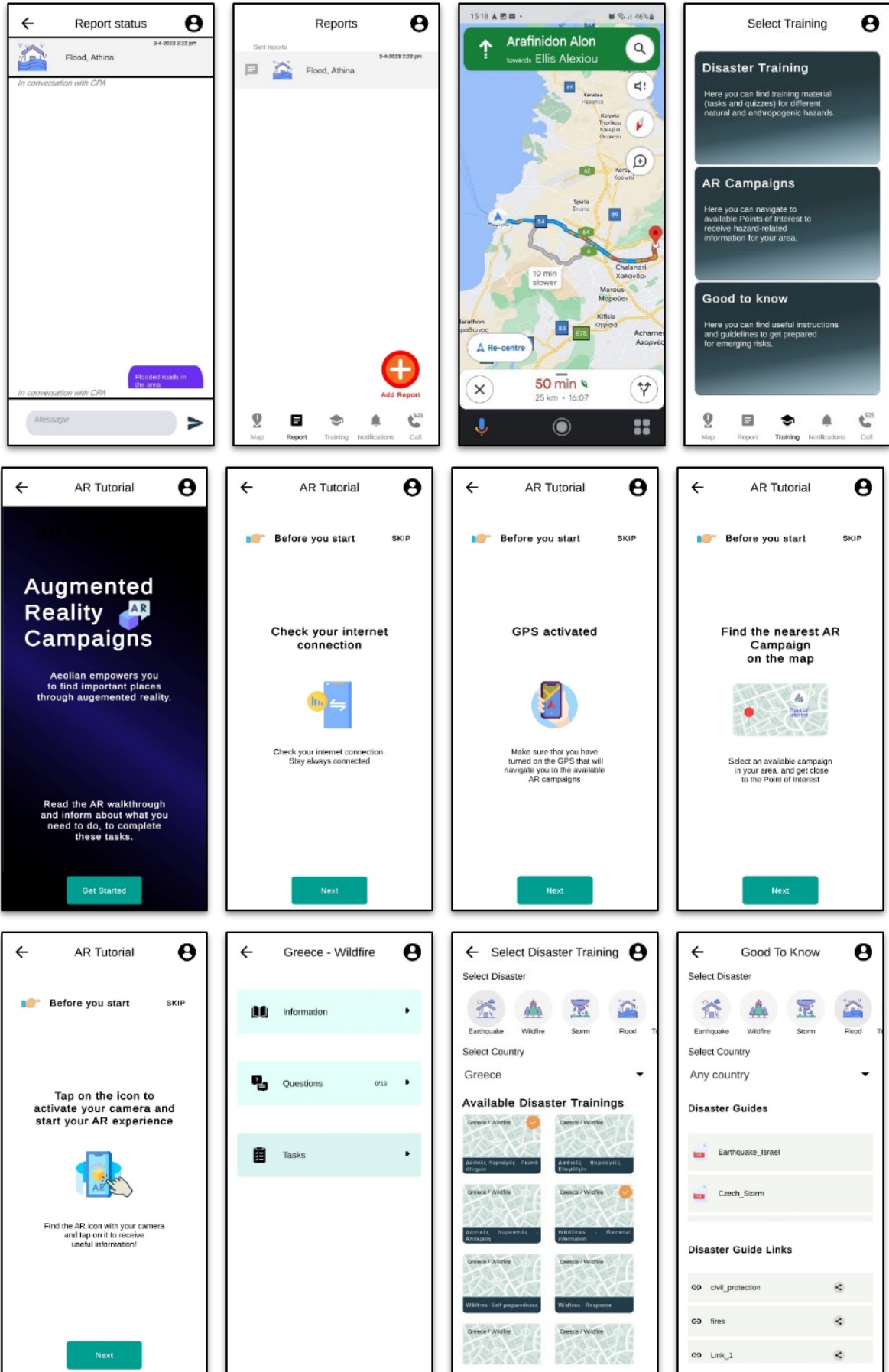
Prior to Iteration II of the 2<sup>nd</sup> round of external workshops (Lab Phase II – Part B), the prioritized bugs and suggested improvements were all successfully addressed by ICCS. Then, ICCS organised a **training session** on the Content Management System (CMS) which has been developed along with the Aeolian app with all three groups of case study owners, so as to demonstrate at real-time signing-in details as well as the functionalities of the CMS. Following that, case study owners, representing local CPAs were strongly encouraged to sign-in the RiskPACC platform with predefined credentials and become familiar with that. More specifically, the CPAs were encouraged to familiarize themselves with posting new (or editing existing) hazard events and adding (or editing existing) training material (*Disaster Training, AR Campaigns* and *Good to know footage*). In support of this, the **CMS manual** was prepared by ICCS team and provided to the CPAs, including simplified instructions on how to navigate in the platform and use the CMS and relevant supportive screenshots.

#### *3.1.1.7 2<sup>nd</sup> round of external workshops (T3.4 workshops) – Iteration II*

During the second iteration (Lab Phase II – Part B) the updated version of the Aeolian app as well as the CMS (Content Management System) of the Aeolian app that is incorporated in RiskPACC platform were tested by the participants in the same three use cases. The workshops took place on 21 March 2023 in Olomouc Region case study, 28 March 2023 in MRP case study and 04 April 2023 in Eilat case study.

During the workshops, attendees downloaded the updated app from the Google store and installed it in their mobile devices. Indoors testing of some of the main app functionalities, including disaster training, good to know footage and reporting and outdoors testing of AR Campaigns prepared by local CPAs was performed by the end-users.

Several screenshots from the different tabs of the app, as it was during the second round of T3.4 workshops (Lab Phase II – Part B) are presented in Figure 3.3 below.



### FIGURE 3.3 APP SCREENSHOTS DURING ITERATION I OF THE SECOND ROUND OF T3.4 WORKSHOPS

Several significant improvements have been made in the updated version of the app, as it can be concluded from the indicative screenshots above. These improvements are summarized in the following:

- the user interface is improved so as to be more user-friendly,
- the AR tutorial is prepared in an easy to follow way,
- the option to use Hebrew as a language for importing material in the app is available
- the name of files and videos uploaded in Good to know footage are descriptive of the content,
- the trainings completed by the users are indicated,
- the option to externally trigger google maps and/or waze for navigation to the Point Of Interest of an AR campaign has been added and
- the filtering option for available disaster trainings, AR campaigns and Good to know footage is available.

#### 3.1.1.8 Interaction and feedback after Iteration II of the 2<sup>nd</sup> round of external workshops

After the completion of the workshop, attendees filled-in a questionnaire providing *inter alia* scoring for the updated app and (optionally) indicated aspects that could be further refined so that the final version of the app would be more user-friendly and efficient. This feedback is currently being pre-processed and is expected to be provided to ICCS, so as to proceed with the final refinement and release of the final version of the Aeolian app.

It is noted here that as was the case with the other workshops, also during the 2<sup>nd</sup> round of external workshops, organisers strived for good gender representation of workshop participants. This was accomplished across the workshops, to ensure that different perspectives were considered during feedback and development of the tools, with 32 females and 25 males overall. As also mentioned above, this gender focus will be further elaborated on in Deliverable 3.7, which is due in M24 of the project.

## 3.2 Functioning of the technical solution

This section will introduce the different functionalities of the Aeolian AR mobile app.

### 3.2.1 DOWNLOAD, INSTALLATION AND LOGIN

In order to download and install the Aeolian mobile app, the user needs to follow the steps presented below.

- Step 1: Uninstall previous version of the Aeolian AR app (if already installed).
- Step 2: Download Aeolian AR app from Google Play Store.
- Step 3: Install the app in your mobile device.
- Step 4: Login in the app.
- Step 5: Upon installation, allow the app to access the device's location (preferably "While using the app", or at least "Only this time").

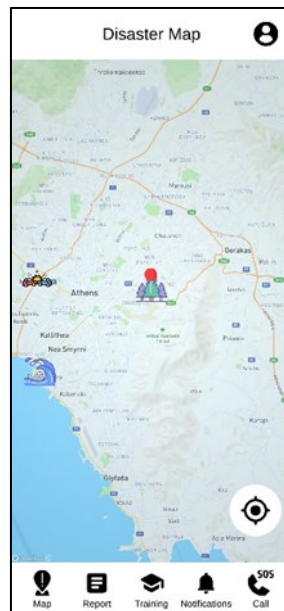
In order to login in the app, a user may sign in to his/her account either with the credentials provided in Table 2 below or by registering with his/her email and creating a new account.

**TABLE 2 THE CREDENTIALS FOR DIFFERENT END-USERS TO SIGN-IN THE APP**

Role	Username	Password
Citizen	<a href="mailto:citizen@riskpacc.eu">citizen@riskpacc.eu</a>	CitizenUser2022!
Volunteer	<a href="mailto:volunteer@riskpacc.eu">volunteer@riskpacc.eu</a>	VolunteerUser2022!
CPA	<a href="mailto:cpa@riskpacc.eu">cpa@riskpacc.eu</a>	CpaUser2022!

### 3.2.2 USER PROFILE

A user icon, which is always accessible at the top right corner of the screen, can be selected anytime during the running of the Aeolian app. Upon its selection, the User Profile tab is activated and the user has the option either to Update his/her role (e.g. from citizen to volunteer) or to Logout.



**FIGURE 3.4 USER PROFILE**

The initial screen of the application is the Hazard map. The icons of hazard events reported by CPAs are displayed on the map, as well as the option to return back to ones' current location, as provided from the phones' GPS. Upon selection of the corresponding icons, brief information on the posted hazards is presented. The additional information disappears when the icon of the hazard is selected for a second time.



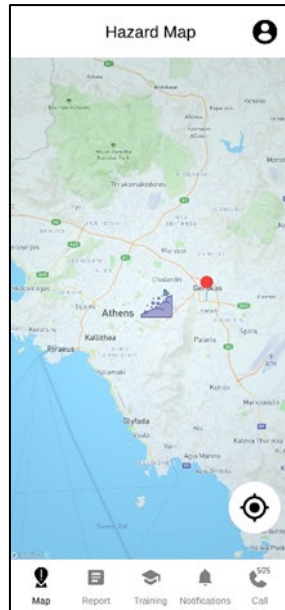


FIGURE 3.5 HAZARD MAP – INITIAL SCREEN

### 3.2.3 REPORT

#### Report History

A list of all the reports made by the user is presented in this tab.

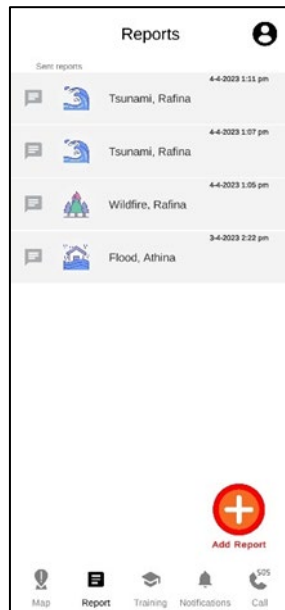


FIGURE 3.6 REPORTING HISTORY

The user can either **select a report** and then edit text in a chat box and send it to the CPAs or select the appropriate icon (bottom right) to **create a new report** and send it to the CPAs.

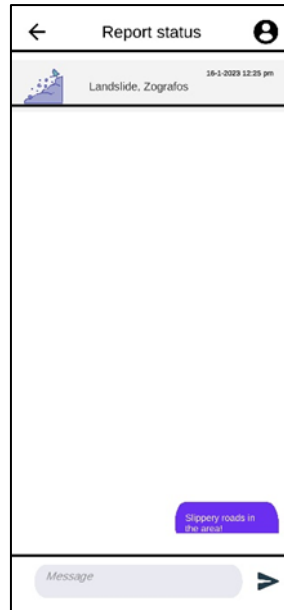


FIGURE 3.7 CHATTING FUNCTIONALITY IN THE REPORTS

### Report creation

Initially, the user needs to allow the app to take pictures and record videos in order to proceed with report creation. Then the fields presented below need to be filled in.

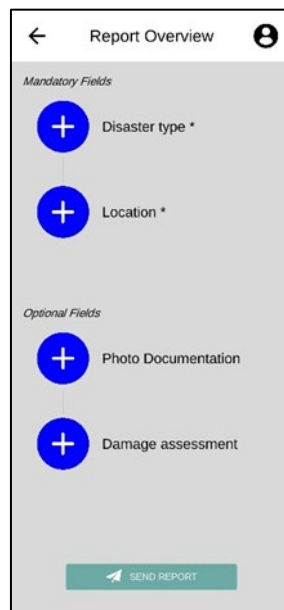


FIGURE 3.8 CREATION OF A REPORT

The Mandatory fields that need to be filled-in include:

- *Disaster type*, where the user is prompted to select a disaster and
- *Location*, where the user is prompted to add a pinpoint on a map of the greater area and confirm his/her selection.

Optional fields include:



- *Photo documentation*, where the user is prompted to upload proof of evidence either by taking a photo or by selecting a photo from the mobile gallery and
- *Damage assessment*, where the user is prompted to fill-in a questionnaire so as to send more detailed information about the disaster to the CPAs.

Then the user can send the created report to the CPAs.

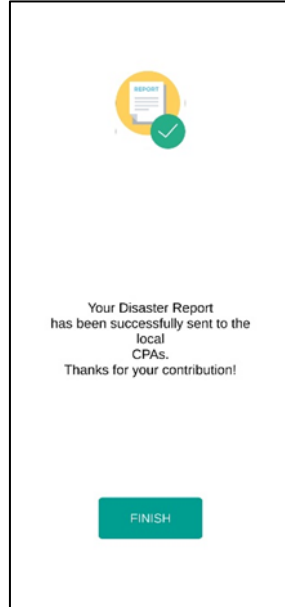


FIGURE 3.9 SUBMISSION OF A REPORT

### 3.2.4 TRAINING

Upon selection of training, the user is prompted to select among three different options, which are presented in detail in the following.



FIGURE 3.10 TRAINING OPTIONS

### 3.2.4.1 Disaster training

The user is prompted to select **one or more of the following disaster types**: Earthquake / Wildfire / Storm / Flood / Traffic Accident / Radiation / People/Animal Rescue / Chemical Accident / Landslide / Tsunami / Technological Emergency / General Damages and/or **the country of interest** so as to see available trainings.

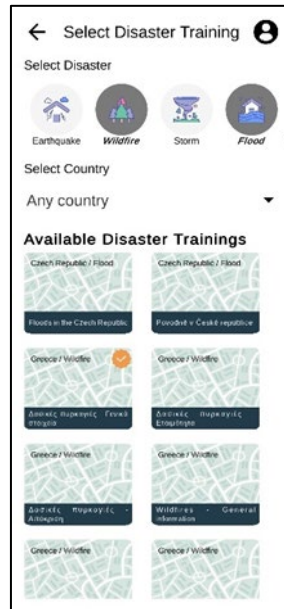


FIGURE 3.11 AVAILABLE DISASTER TRAININGS

When a training is selected, the disaster phase(s) for which the training was created are displayed and the user may select one phase (if there are more than one options) to start the relevant training. Then, the user may select one of the three available options (*i.e.*, Information, Questions or Task) presented in detail in the following.

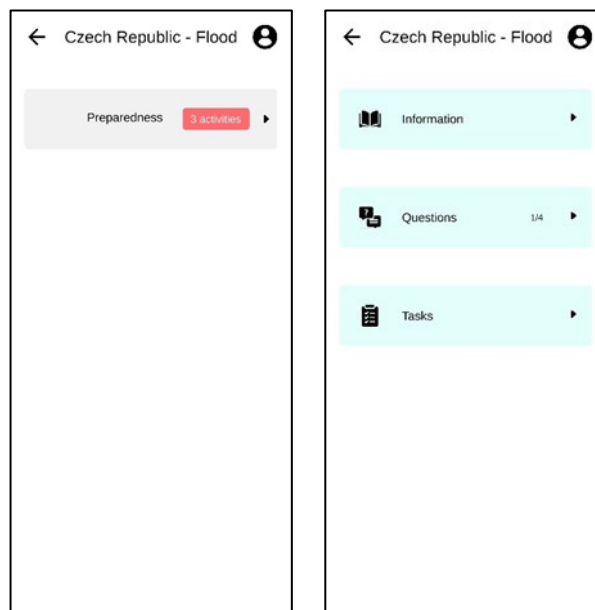


FIGURE 3.12 DIFFERENT FUNCTIONALITIES WITHIN A DISASTER TRAINING

- i. **Information:** The user needs to go through available background information about the hazard of interest and select “*I finished reading*” in order to proceed.

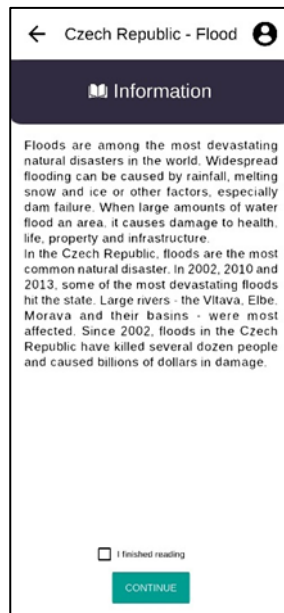


FIGURE 3.13 INFORMATION SECTION WITHIN A DISASTER TRAINING

- ii. **Questions:** The user needs to go through a list of close-ended questions on the selected hazard and disaster phase and provide answers. The questions may be either True/False or multiple-choice questions.

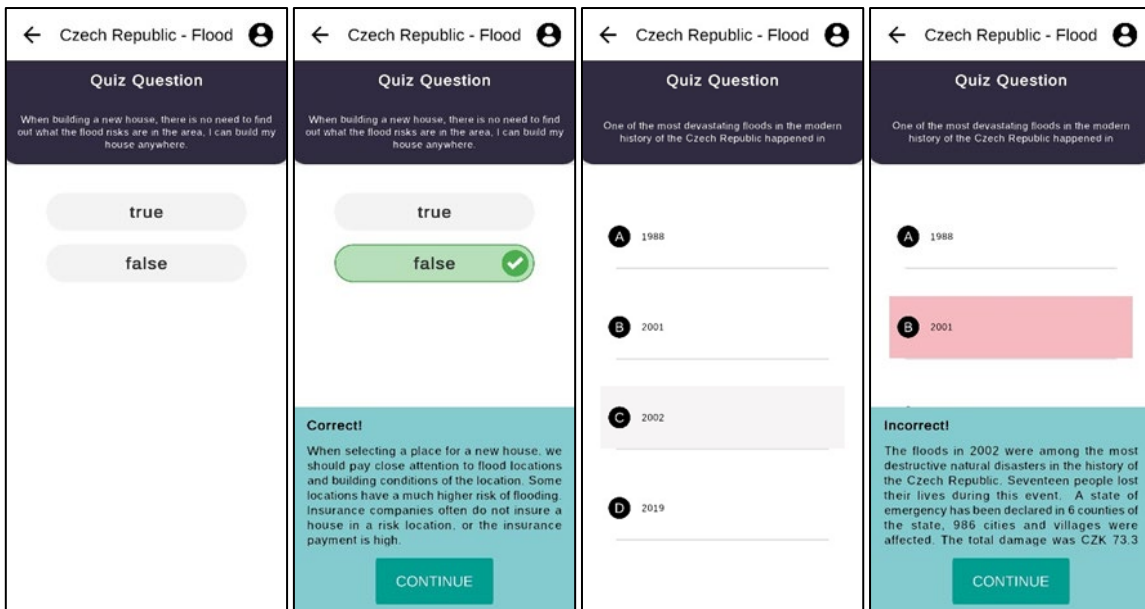


FIGURE 3.14 QUESTIONS SECTION WITHIN A DISASTER TRAINING

- iii. **Tasks:** The user may undertake some predefined Tasks, e.g. check the boxes of lists that need to be prepared and/or upload (proof of evidence) photos, if asked.

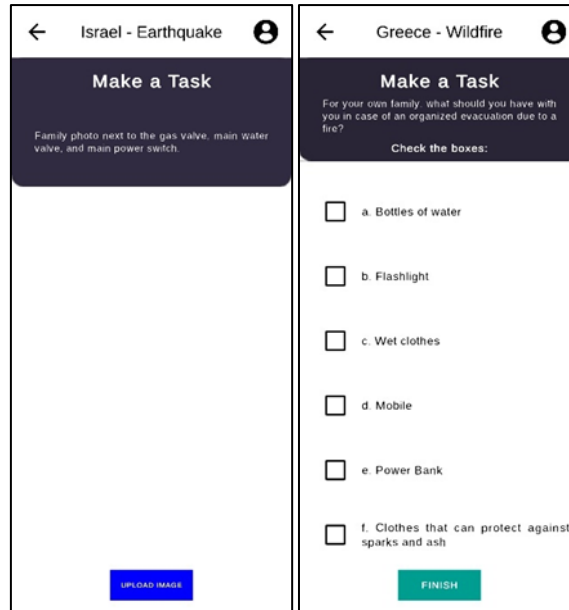


FIGURE 3.15 TASKS SECTION WITHIN A DISASTER TRAINING

### 3.2.4.2 AR Campaigns

The user is prompted to **select a disaster** and/or the **country of interest** so as to see available AR Campaigns.

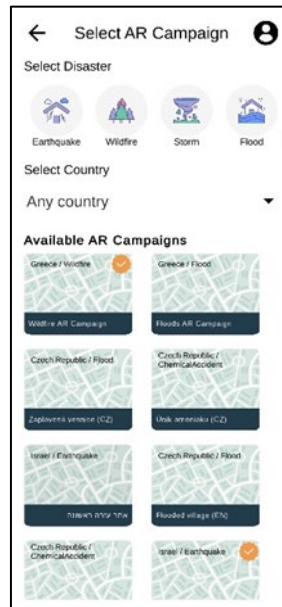
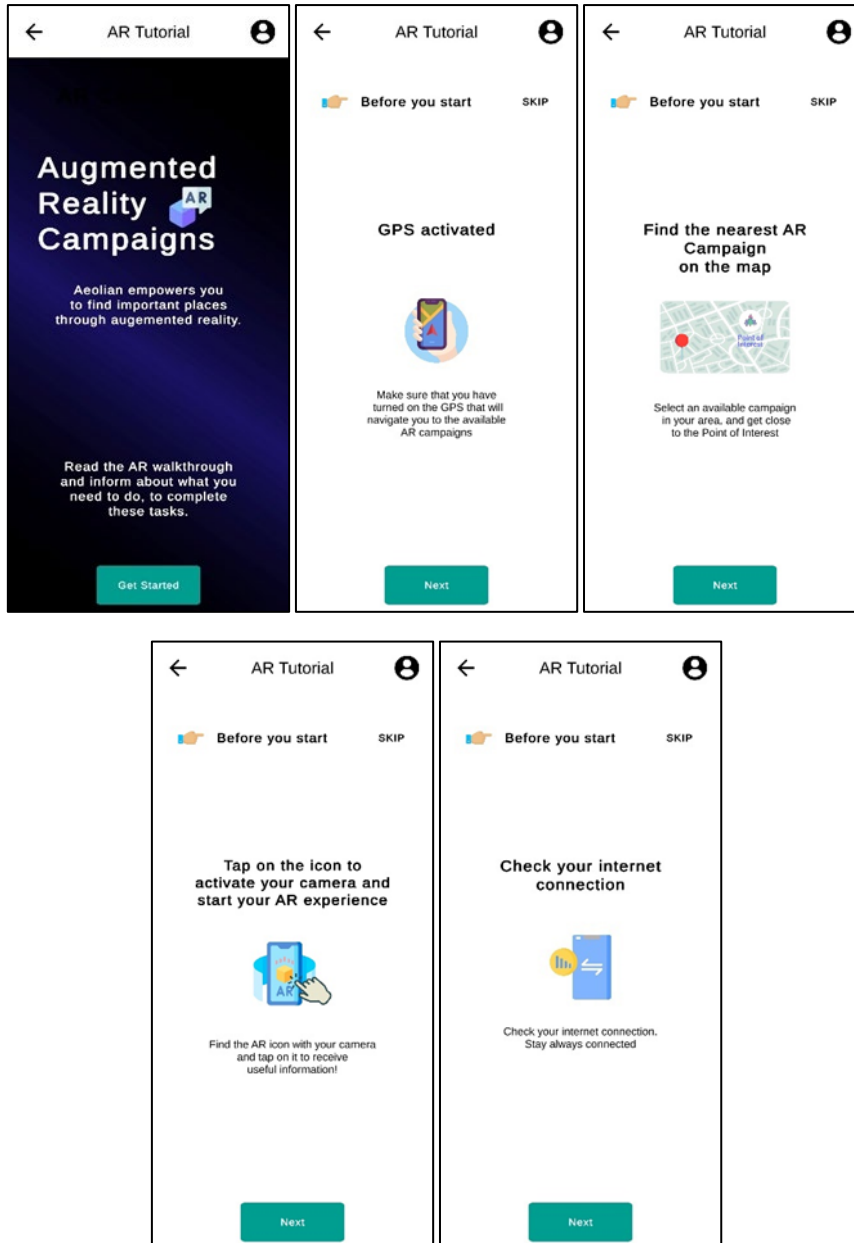


FIGURE 3.16 AVAILABLE AR CAMPAIGNS

Upon selection of the available AR Campaign, the user is prompted to go through a quick AR Tutorial, as presented below, before proceeding with the running of the campaign. When the user is close to the location of the AR POI, a relevant message appears on the screen, informing the user to press on the closest POI icon in order to activate the AR.



**FIGURE 3.17 AR TUTORIAL**

When AR is activated, the user needs to track an object with the mobile camera and once located press on its icon. Then additional information of the disaster for which the AR Campaign has been set up is displayed, together with the relevant images and videos, when provided by the CPA. When the campaign is completed the user returns to the map the AR icon is marked with a tick point to indicate that this campaign was completed successfully.

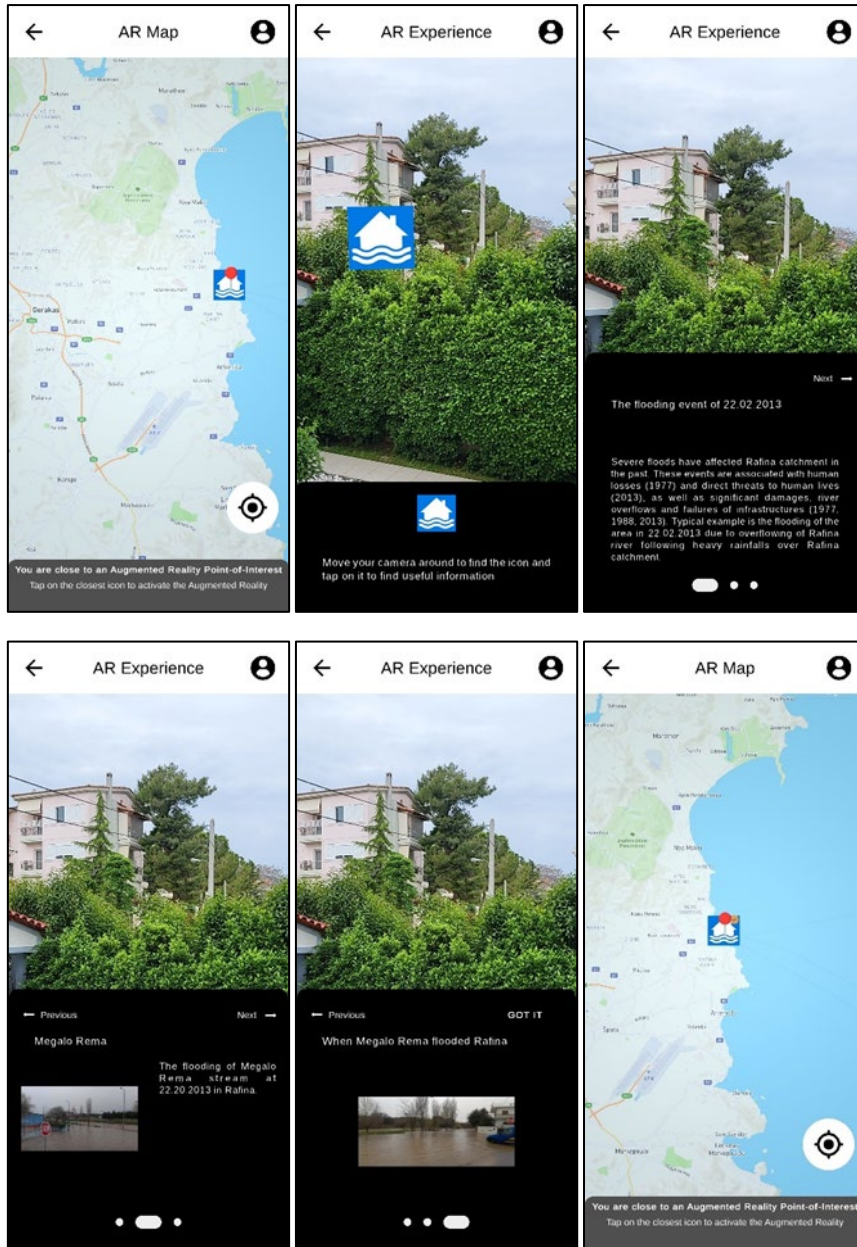


FIGURE 3.18 DIFFERENT STEPS OF AN AR CAMPAIGN

3.2.4.3 Good to know

Here, the user may retrieve additional informative material (e.g., guidelines, links, per training session on the disaster and/or the country of interest).

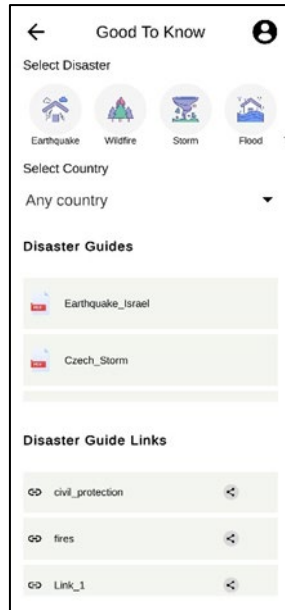


FIGURE 3.19 GOOD TO KNOW FOOTAGE TAB

### 3.2.5 NOTIFICATIONS

A notification pops up in the application in the four following cases:

1. When a new hazard event is added by a CPA (and the new hazard event is displayed on the map),
2. When the status of a report changes (e.g. from ongoing to closed),
3. When the priority of an event is modified (e.g. from high priority to moderate priority) and
4. When a new training session is added by a CPA (*Disaster training, AR Campaign or Good to know*).

Each notification is dismissed when the user has seen it.

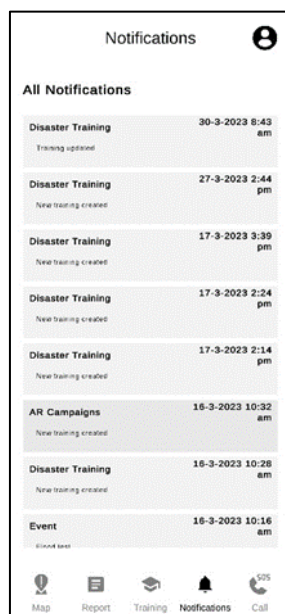


FIGURE 3.20 NOTIFICATIONS TAB



### 3.2.6 EMERGENCY CALL

Upon selection of this tab, the user is prompted to select among different options to make a direct call to 112. This call can be either a phone call or a call via one of the applications installed beforehand in the mobile device (e.g. GoToMeeting, skype, viber).

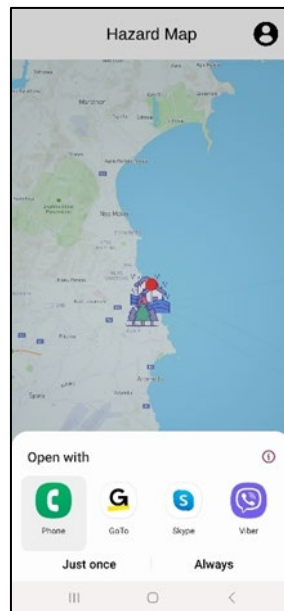


FIGURE 3.21 EMERGENCY CALL TAB

## 3.3 Possible future improvements

During the course of the project, the TRL of Aeolian AR app has evolved. More specifically, prior to the T3.3 workshops ICCS Aeolian app was in TRL 2 and after these workshops and prior to the T3.4 workshops it reached TRL 4. After the first round of T3.4 workshops ICCS solution reached TRL 5 and eventually after the second round of T3.4 workshops it moved to TRL 6 and beyond. Some further aspects that could be addressed in potential future improvements of the Aeolian AR app are presented in the following.

In order to ensure the highest availability of crucial services during times of disaster, it is important to conduct exhaustive stress testing. This includes testing the reporting, chatting, and alerting functionalities to make sure they can handle the expected volume of users and traffic.

Furthermore, in order for communication to be effective, it is important that the communication services support a wide range of languages and alphabets to ensure that information can be seamlessly transmitted to the relevant authorities. Additionally, the ability to enhance communication through photos or videos, upon request, can be invaluable in certain situations.

For new users, it can be helpful to provide onboarding and tutorials that explain the application's features and how to use them. Additionally, users with relevant

qualifications, such as first responders, medics, or USAR, should be able to enhance their profile with this information.

Users need to be able to receive clear feedback on the success or failure of their actions in the application. Providing prompt and clear feedback when an action is completed or when there is an error can reduce frustration and improve the user experience.

Lastly, it is important to optimize the application for slower internet speeds, which are common in many areas affected by natural hazards. This can be achieved by minimizing the size of images and other media on the platform and by prioritizing text-based content. By doing so, the system can be more accessible to a wider range of users, especially those in remote or rural areas where internet connectivity may be limited.

## 4 CONCLUSIONS

In this chapter, we present the conclusions drawn from the development and implementation of the HERMES platform and the Aeolian AR mobile app within the RiskPACC project. These innovative tools aimed to enhance disaster risk prevention, management, and response – more specifically: to narrow down the Risk Perception Action Gap (RPAG) – by leveraging technology and fostering collaboration among stakeholders, including Civil Protection Authorities CPAs, citizens, and volunteers. Throughout the project, extensive interactions and feedback sessions were conducted to shape the functionalities of both HERMES and the AR App according to user needs and requirements.

The development and deployment of the HERMES platform, developed by STAM, have demonstrated its effectiveness as a comprehensive solution for sharing information, facilitating communication, and promoting community engagement in disaster risk management. The platform's functionalities, including user registration and login, profile setup, emergency reporting, knowledge repository, and messaging system, have empowered CPAs and citizens to actively participate in disaster preparedness and response activities. The success of HERMES can be attributed to its user-friendly interface, the integration of community-specific guidelines, and the ability to adapt to varying local contexts. Similarly, the AR mobile app, developed by the ICCS team, has showcased the potential of augmented reality technology in enhancing situational awareness and decision-making during disasters. Through the app's intuitive interface, users can access real-time information, visualize hazards and risk scenarios, and receive relevant alerts and notifications. The app's functionality has been refined through iterative interactions with CPAs, citizens, and volunteers, ensuring that it meets their specific needs and aligns with the overall project objectives.

Looking ahead, the HERMES platform and the AR mobile app have immense potential for further enhancements and future applications in the field of disaster risk management. Building upon the lessons learned and the feedback received, several recommendations can be put forth to guide their future development and utilization. For HERMES, efforts should focus on sustainable funding models to ensure the longevity of the platform beyond the project's lifespan. This includes exploring partnerships with relevant stakeholders, such as local governments, to secure financial support and promote the continued growth and maintenance of the platform. Additionally, ongoing user engagement initiatives should be implemented to encourage active participation and the sharing of up-to-date best practices within the repository. Regarding the AR App, continuous refinement and optimization are essential to improve performance. This includes stress testing to ensure that the app can handle the expected volume of users and traffic during times of disaster, as well as providing clear and prompt feedback to users on the success or failure of their actions in the application.

In conclusion, the HERMES tool and the AR App both provide valuable contributions to disaster risk reduction efforts and to narrow down the RPAG. It is important to continue refining and optimizing these tools to improve their performance and effectiveness in disaster risk reduction efforts. Additionally, it is essential to ensure

that these tools are accessible and usable by a wide range of users, including those in remote or rural areas where internet connectivity may be limited. By leveraging the capabilities of these tools and continuously improving them, disaster risk reduction efforts can be strengthened and more effective in mitigating the impact of disasters on communities and societies.

Moving forward in the RiskPACC project, the next steps will build upon the activities outlined in WP6 and WP7 to further enhance the project's impact and refine the RiskPACC platform.

Under WP6, the focus will be on leveraging the findings and insights gained from the project to generate wider impact. This will involve the implementation of a peer-learning module, facilitating knowledge exchange between the project and external cities and regions to close the RPAG. By engaging with diverse stakeholders and sharing best practices, the project will benefit from valuable external perspectives and experiences. The feedback and recommendations received from these exchanges will contribute to the continuous improvement and optimization of the RiskPACC solutions.

In parallel, the solutions developed in WP5 are entered into the integration process of WP7. The RiskPACC Platform will provide the end-user a single access point thanks to which all the information can be accessed and reached. WP7 will focus on the design and integration aspects, ensuring that the platform meets the technical requirements and delivers a user-centric experience.

Overall, although the development activities in WP5 finished, these next steps will enable the RiskPACC project to leverage external knowledge, refine the platform's design, and ensure seamless integration with existing systems. By incorporating the insights gained and implementing iterative improvements, the RiskPACC platform will continue to evolve as an effective tool for enhancing disaster risk prevention, management, and response efforts.