PANTHEON

Community-Based Smart City Digital Twin Platform for Optimised DRM operations and Enhanced Community Disaster Resilience

D1.3

PERIODIC REPORT ON DRS STAKEHOLDERS' INPUTS

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TASK ABSTRACT

Effective stakeholder involvement means bringing together representatives from key stakeholders and users with different viewpoints. This provides an opportunity to explain objectives and concerns, question different viewpoints and eventually to resolve some of the perceived conflicts through better mutual understanding. The Users' Advisory Board (UAB) will be formed by CBDRM and policy advisors, NGOs and SSH experts from national or regional institutions. The UAB will be formed as planned in section 3.2 Management structure and procedures, under ISEMI supervision. Key objectives of this task: 1) to constitute a collaborative transdisciplinary and stakeholder / end user dialogue group 2) to understand opportunities and challenges as well as stakeholders' claims or points of view and their underlying reasons, 3) to identify shared purposes among relevant stakeholders, 4) to guide the participatory design and monitoring.

[1] **Please indicate the type of the deliverable using one of the following codes**:
R = Document, report
DEM = Demonstrator, pilot, prototype, plan designs
DEC = Websites, patents filing, press & media actions, videos
DATA = data sets, microdata
DMP = Data Management Plan
ETHICS: Deliverables related to ethics issues.
OTHER: Software, technical diagram, algorithms, models, etc.

[2] **Please indicate the dissemination level using one of the following codes**:
PU = Public
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EXECUTIVE SUMMARY

The PANTHEON project joins the fight against both natural and man-made disasters by modernizing existing disaster resilience models and developing tools to build a community-based digital ecosystem for disaster resilience.

The project is following a user driven approach placing the end-users and related experts at the core of the development process. Related subjects are already represented in project consortium itself, but in addition to this, mechanisms have been established to generate Disaster Resilient Societies (DRS) stakeholders' input. These mechanisms comprise the Users' Advisory Board (UAB) and the PANTHEON Stakeholder Group (PSG). The main goal is to involve as many experts as possible covering different viewpoints into the selected activities, to collect their feedback about technologies in development, to discuss with them gaps and needs and to support effective dissemination and exploitation of the project results through active stakeholder engagement. While the UAB serves as a curated dialogue group of interdisciplinary experts in related fields of Community-Based Disaster Risk Management (CBDRM), the PSG supports the PANTHEON project through a social network of DRS stakeholder members on the online platform CMINE.eu. These two pillars (UAB and PSG) ensure the sustained involvement of DRS stakeholders throughout the whole duration of the PANTHEON project.

Right from the beginning of the project DRS stakeholders' input was collected as part of the work for *WP2: PANTHEON Approach For Building Disaster-Resilient Communities* and *WP3: Requirements, Participatory Design Process and Pilot Use-Cases Specifications.* This procedure was continued through the following WPs. For this, a total number of 41 participatory actions were conducted, including surveys, interviews and workshops. A total of 188 DRS stakeholders participated in these activities and provided input to the PANTHEON project covering different viewpoints of key stakeholders and end users.

1 INTRODUCTION

The PANTHEON project aims to develop a community-based Smart City Digital Twin (SCDT) platform for optimised Disaster Risk Management (DRM) operations and enhanced community disaster resilience. To achieve this, the involvement of experts, stakeholders and end-users in different fields is crucial. Maximizing such contributions creates the conditions to strengthen the validity and applicability of the project results. This report covers the mechanisms established to ensure sustained involvement of DRS stakeholders and presents the input and insights provided by these stakeholders so far.

Chapter 2 provides the overall framework of how the continuous involvement of relevant stakeholder groups is ensured throughout the whole duration of the project. With the Users' Advisory Board (UAB) and the PANTHEON Stakeholder Group (PSG), two complimentary mechanisms are presented that support the collection of stakeholder input from different perspectives.

Chapter 3 draws a detailed picture of how the UAB aims to support the PANTHEON project and how the formation process of the board is going so far. Section 3.1 shortly describes the recruitment process and defines roles and responsibilities as part of the UAB's processes. In section 3.2, all expert participants of the UAB are listed together with information about their background. Section 3.3 then covers the kind of content to be discussed during UAB meetings and the expected benefit generated through these actions. In section 3.4, the specific content discussed within the UAB meetings is presented.

Chapter 4 focuses on presenting the idea behind the PSG and its current status. First, section 4.1 describes the online-platform CMINE and discusses the benefits of using it as a foundation to engage with comprehensive networks of DRS stakeholders in the PANTHEON project framework. Then, section 4.2 provides information on the PSG itself, what has been done to establish the group up to this point and how the next steps will look like.

Finally, chapter 5 will give an overview of the extensive DRS stakeholders' input collected and utilized during the first 24 months of the PANTHEON project. For this, section 5.1 describes all participatory activities involving end-users and stakeholders during the work for *WP2: Approach For Building Disaster-Resilient Communities* and section 5.2 does the same for *WP3 – PANTHEON Requirements, participatory design process and pilot Use-Cases specifications.* In section 5.3 and 5.4, DRS stakeholders' input to WP6 and WP8 is described briefly. The overall numbers of involved DRS stakeholders are presented in Table 5.

This report is then complemented by conclusions in chapter 6 and referenced documents in the appendix.

2. CONCEPT FOR DRS STAKEHOLDERS' INPUT IN PANTHEON

The PANTHEON project uses the input of Disaster Resilient Societies (DRS) stakeholders from the beginning of the project through all stages of development. Several different modes of DRS stakeholders' engagement are being pursued for the PANTHEON project that will be discussed in detail in this report. As an overall requirement for comprehensive and purposeful input, the involved stakeholders have been and will be selected not only for their knowledge and experience in relevant fields, but also with the goal of covering a broad interdisciplinary spectrum within the PANTHEON area of application.

The target groups identified as relevant DRS stakeholder to support PANTHEON's development with their input were identified as follows:

- Community representatives:
  - Administrative personnel and policy advisors
  - Representatives of NGOs (Non-governmental organisations) and the civil society
  - Responsible for critical infrastructures
  - Representatives of vulnerable groups
- End-users in Community-Based Disaster Risk Management (CBDRM):
  - Civil protection officers
  - Firefighters
  - Paramedics
  - Police officers
- Academic and SSH (Social sciences and humanities) experts
  - Experts in the field of disaster management
  - Experts on natural or man-made disasters
  - Experts in community engagement, capacity building and social vulnerability

Some of the stakeholders mentioned above are already represented in the consortium and therefore contribute to the development of the project, moreover they are also available to other partner organisations in the PANTHEON project for needed support and technical input. Even though not exclusively, this report will focus on the input generated by DRS stakeholders who are not directly part of the consortium.

In the early phases of the project, all consortium partners utilized their networks to provide suitable contacts for the work in *WP2: PANTHEON Approach For Building Disaster-Resilient Communities* and *WP3: Requirements, Participatory Design Process and Pilot Use-Cases Specifications.* A specific outline of measures taken and input generated by the time of this reports' submission (M24) is presented in section 4. PANTHEON Stakeholder Group (PSG)

This group is focused not only on end-users/practitioners, but also different community representatives, as communities play an important role in the PANTHEON project. At the same time, it is open for any other stakeholders, such as academia, research & development, industry, private and third sector, critical infrastructure operators, etc. – with no limitation in the number of members.

During the initial phase of the project, the decision on the suitable working environment for such a group was taken, considering the advantages of already existing platform within the topic area. CMINE.eu was selected as the most effective tool and a private group dedicated to the PANTHEON project was created.

4.1 THE CRISIS MANAGEMENT INNOVATION NETWORK EUROPE (CMINE.EU)

The Crisis Management Innovation Network Europe (CMINE) is an open, cooperative and inclusive information network for sharing information, experiences, best practice and lessons learned among individuals, crisis management organizations, researcher entities, industry and policy makers throughout Europe and beyond.

CMINE provides a superb window to participate in and observe discussions on innovation and thereby establish an unprecedented sharing of knowledge across all fields of Crisis Management and Disaster Risk Reduction.

CMINE also links stakeholders from existing projects, networks and initiatives to reduce repetition and fragmentation whilst encouraging new ideas, and identifying innovative solutions to improve European resilience.

4.1.1 BENEFITS OF CMINE.EU FOR PANTHEON PROJECT

CMINE provides connections to other projects, entities and initiatives with a similar interest or profession as is intended for the PSG. Crisis Management can be viewed as a process of planning, collaboration and mutual support. CMINE, as the basis of the PSG, provides a platform and communication tool to make that a reality by connecting the PANTHEON project with an international network of likeminded individuals and organizations with a range of complimentary skill and experiences.

The network provides opportunities to engage with established groups and project teams, organizations and response teams, international players and policy setters as well as event organizers and trainers.

Extended support is also available to take advantage of the comprehensive suite of facilities such as Group hosting, surveying, confidential communication and event management.

4.2 PANTHEON STAKEHOLDER GROUP ON CMINE.EU

As described above, CMINE allows PANTHEON to create a specific group within the platform. This is known as the PANTHEON Stakeholder Group (PSG). It was created during the initial phase of the project and is supervised by International Security and Emergency Management Institute, n.p.o. (ISEMI), partner of the PANTHEON project.

The group is set up as PRIVATE which means, that its content is not visible for every CMINE.eu user and membership is subject to coordinators approval. Due to this procedure, it is possible to easily ensure and control the sensitivity of the group's content.

4.2.1 MEMBERSHIP

Interested users are requested to create their own profile on the CMINE.eu platform through an agreed registrations process. This allows them to make use of the different features and functionalities of this platform whether interested in the PSG or not.

Once the registration is confirmed and the user is logged-in, it is possible to browse the page and use the features of the platform. One of them is to search for the groups of personal interest such as the PSG. Currently it is possible to find it in categories “Crisis management”, “Private groups” as well as “Projects”. If there are more specific groups in a particular section, they can be viewed by clicking “load more”. Once the

user has a registered account, the PSG can be accessed on https://www.cmine.eu/topics/37356. The group cannot be found without logging in to the platform itself.

Registered users can interact with all the users, projects, organizations and other entities on the platform.

The body of the home page consists of latest information / main options:

- ✓ write a post
- ✓ share information
- ✓ see recently active users as well as all the members and also latest new joiners
- ✓ see upcoming events as well as all the events
- ✓ see the posts
- ✓ all these inputs can be commented, liked, shared, reported …

On the top of the page, there is main menu, where it is possible to work with:

- ➢ news feeds (search, filter, display, comment, look for details, etc.)
- ➢ discussions (search by keyword, start new one, reports on existing ones, etc.)
- ➢ groups and forums (search – by name, keyword, but also location and to proceed to particular group)
- ➢ events (search a proceed to details)
- ➢ solutions (search a proceed to details)
- ➢ partners (create, search a proceed to details)
- ➢ resources (search a proceed to details)
- ➢ members (search – by name, keyword, but also location and to proceed to particular profile. It is possible to send a direct message to the selected user. Users are displayed on the map also.)
- ➢ CMINE updates (home page)
- ➢ CERIS DRS (CERIS DRS Cluster Arrangements).

There are also shortcuts/icons for search and for sharing different information (post, trip, event, location, reference), for sharing location, for notifications, for messaging and for own profile.

To be able to fully participate on the group, it is necessary to join the group by clicking the yellow button “Request to join”. A subsequent simple procedure of approval needs to be done by the group coordinator(s). Once this is done, the new user will receive notification and everything is ready. The coordinator can manage membership.

4.2.2 FEATURES FOR ENGAGEMENT AND STAKEHOLDERS' MANAGEMENT

Members of the group can see details of each other and can interact with each other to contribute.

Layout and options are similar to those described above for whole platform. It is possible to write a post, see a basic description of the group, there is contact data of the group coordinator as well as additional information, latest posts and a group tailored menu with shortcuts and icons. Also, there is information about latest joiners, links to social media and a media centre, where different documents / files can be stored and be available for the members.

It is important to highlight, that information shared on the group is visible only for the group members.

4.2.3 CURRENT STATUS OF THE PSG

The PSG had 35 members in M24 (Dec 2024). These cover both project consortium members and external stakeholders and includes experts and practitioners from different sectors.

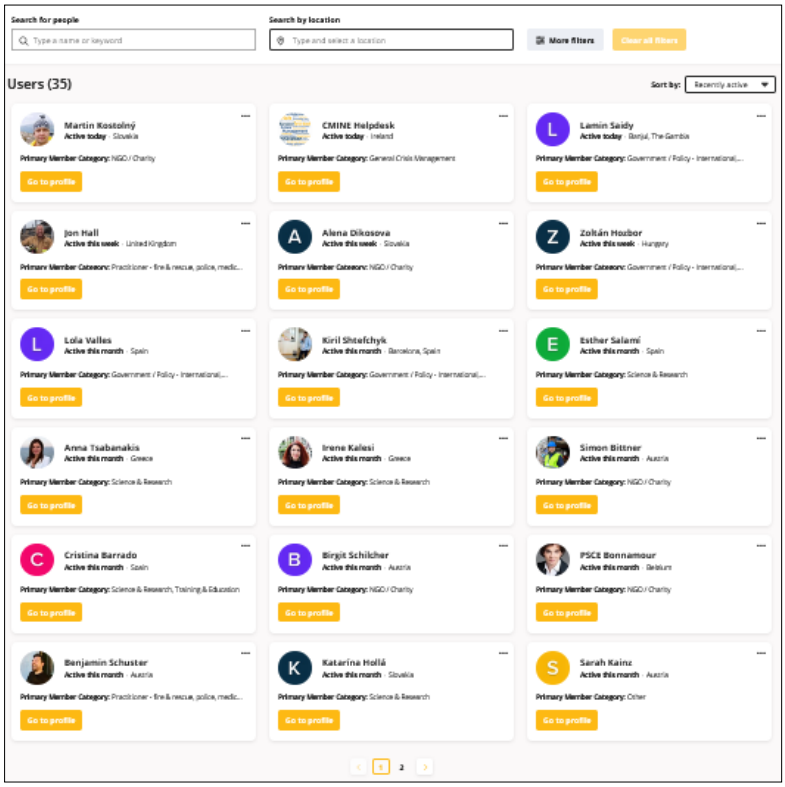

Figure 5: Members of the PSG

4.2.4 COMPOSITION OF GROUP MEMBERS BASED ON THE CLUSTERS OF THEIR ORIGIN:

- 16 – “Science & Research in area”,
- 6 – “NGO/Charity - Practitioners”,
- 6 – “Government & General Crisis Management”,
- 4 – “Industry/Consultancy & Other”,
- 3 – “Practitioner – fire & rescue, police, medical, etc.”.

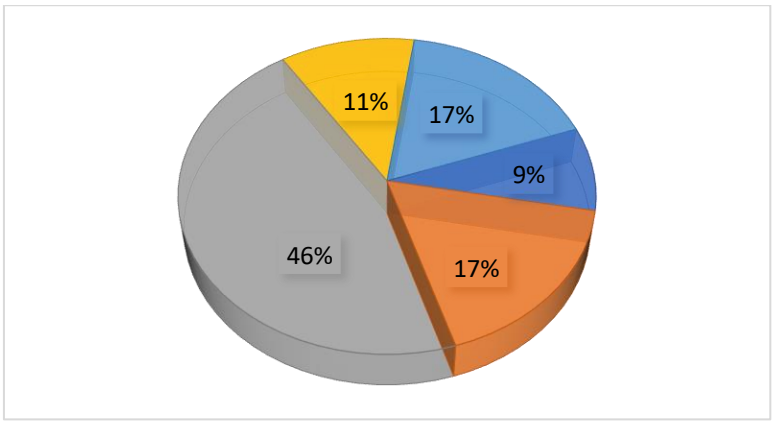

Figure 6: Composition of the PSG members - categories

From the perspective of geographical coverage, they represent 8 EU countries and 4 non-EU countries:

Table 3: Geographical coverage of the PSG members

Country	Number of members
Austria	6
Belgium	2
Greece	11
Hungary	1
Malta	1
Slovakia	4
Spain	5
Armenia	1
Ireland	1
Gambia	1
Uganda	1
United Kingdom	1

4.2.5 NEXT STEPS

The framework of the PSG is established and the processes are set. Next activities will continue on main aspects:

- Content – uploading and sharing of inputs coming from another project tasks and WPs.
  - Posting of ideas, findings, experiences, but also questioning
  - Launching "communications"
  - Adding "news"
  - Uploading relevant files into "Media centre"
- Users – involving of new ones and management of relations of existing ones.
- Engagement management - Assessment of the possibility for the members to participate in project activities, not only remotely, but also directly, especially in pilots or other suitable events

These activities require support from all project partners. Last, but not least, functionality of the entire platform will be secured as well as necessary support will be provided based on the users' need or the needs coming from the project.

As the final phase of the project is approaching, this is an opportunity to increase activity within the PSG as well. The content will focus on presenting demonstrations from both a technical and organisational perspective.

5. DRS stakeholders' input.

To continuously support the PANTHEON project with diverse perspectives from the identified target groups, the concept for DRS stakeholders' input relies on two pillars, the Users' Advisory Board (UAB) and the PANTHEON Stakeholder Group (PSG), that serve as two different but complimentary approaches to stakeholder involvement. Table 1 gives an overview of the composition, purpose and modes of engagement of the UAB and the PSG, the two participatory mechanisms established to support PANTHEON's development

process. For more details, see sections: 3. Users' Advisory Board (UAB) and Community engagement in disaster risk management
There are rather few examples of social knowledge being effectively incorporated into risk management strategies (specifically in regards to technology-based strategies like digital twins). Recommendations have included applying epidemiological and criminal models to bring in social factors.

- **Current technologies in use**
  The integration of technology in disaster risk management varies. Attica region for example lacks a unified early warning system. Some areas rely on specialized scientific institutions for risk management. While many regions aim to develop comprehensive technological frameworks, these efforts are still in early stages.
- **Civil protection operations**
  Civil protection efforts in some regions (for example Attica) focus on identifying vulnerabilities in areas with dense populations and critical infrastructure. They collaborate with academic institutions to inform planning and conduct disaster response exercises. Training effectiveness is measured through surveys and evacuation data.
- **Data sources and legal constraints**
  The availability of data is a significant challenge, with discussions focused on the need to balance useful simulations with the legal restrictions on data retention. Ideally, comprehensive datasets would be available, but they are hindered by serious legal and ethical limitations.
- **Response time and impact**
  The time it takes to respond is influenced by available resources and population density. For example, the Vienna Fire Brigade achieves consistent urban response times within 10 minutes. However, there is a lack of expert analysis in Europe regarding the relationship between response time, investment, and the reduction in casualties or damage.
- **Efficient adoption of new technologies**
  To be effective, technologies like AI and drones have to address the needs of practitioners in disaster scenarios. Instances where equipment remains unused shed light on a lack of proper planning for implementation. Real-world value is essential for the adoption of new technologies.
- **Vulnerable groups in disaster planning**
  Current disaster planning models often fail to account for vulnerable groups due to difficulties in collecting detailed data, such as household-level vulnerability information. While broader data is available, it does not provide the necessary precision for targeted civil protection actions.

3.4.2 SECOND UAB MEETING

- **Participation in field trials**
  Organizations that are not first responders should be included based on their needs and gaps. Inclusivity may be achieved through stakeholder mapping and ensuring representative involvement of those identified. Field trials should address accessibility for vulnerable groups, ensuring that cultural specifics and languages are considered.
- **Data exchange**
  There were no proposed solutions for overcoming barriers to data sharing regarding non-sensitive information, highlighting a gap in strategies to improve anonymized data exchange.
- **Drone utilization**
  Participants lacked personal experience with drone fleets for disaster response but suggested referring to external projects (e.g. COLARIS) for useful insights.

- **Digital twin training**
  To evaluate training with Digital Twin systems, literature on decision support systems could be utilized to establish evaluation criteria. End-user feedback is crucial for assessing the quality of decision-making, focusing on clarity and practical relevance.
- **System integration and commercialization**
  Challenges in integrating solutions like PANTHEON include limited resources and compatibility with existing legacy systems, particularly in the public sector. Successful adoption requires practical demonstrations and alignment with regional standards.
- **Community data and disaster plans**
  Community input for Smart City Digital Twins should focus on creating simple, useful tools while ensuring data is validated. National disaster plans should be integrated with caution, ensuring no conflicts with existing protocols or liability concerns.
- **Expectations for simulations**
  For wildfire simulations, Digital Twin systems should help with evacuation planning by incorporating data on vulnerabilities, population distribution, and building materials. In heatwaves, they should facilitate coordination between health and meteorological services, while earthquake simulations should predict casualties, displacement, and the necessary resources for shelter and fatalities.

3.4.3 THIRD UAB MEETING

- **Data sharing and the feasibility to work with Public Data only:**
  Public access to data remains difficult, limited and inconsistent in most countries, although hazard categorization in certain areas was done well. Participants discussed challenges and potential collaboration to improve data-sharing practices. Additionally, the option to use the PANTHEON platform only with publicly available data and have a human decision maker working with both PANTHEON and internal organizational data was discussed.
- **Artificial Intelligence (AI) in decision support:**
  AI is being seen as a powerful tool for decision-making but requires careful integration with human oversight due to legal and ethical concerns. It was agreed that AI should be used in specific scenarios based on data availability and that the exact implementation of human oversight has to be decided on individually for each type of operation.
- **KPIs for PANTHEON pilots:**
  Establishing both technical and non-technical KPIs is essential to evaluate the system's effectiveness in scenarios like disaster preparedness. However, external experts did not specify exact KPIs to apply to the PANTHEON pilots.
- **Expectations for digital twins in disaster management:**
  Scalability, adaptability, and thorough data integration were discussed as critical features. While flooding scenarios were seen as less relevant for the PANTHEON focus regions, future expansions of the system should address a variety of hazards – including flooding, which is highly relevant throughout most parts of Europe.
- **Public participation in PANTHEON pilots**
  Public feedback mechanisms were discussed but are not part of the project's primary focus, as it targets organizational end-users. However, there is interest in exploring public involvement at later stages, particularly for evaluation. For this however, there needs to be a product that can be understood by the public and does not require in-depth training to be applied.
- **Preparation of a mock-up**
  The PANTHEON project would benefit from the creation of a mock-up version that visually

represents the system's goals. This would foster more effective discussions and provide a tangible basis for assessment and guidance.

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Table 1: Mechanisms for DRS stakeholders' input

	Users' Advisory Board (UAB)	PANTHEON Stakeholder Group (PSG)
Responsible partner	JOAFG	ISEMI
No. of members	Max. 10	Unlimited
Background of members	• Interdisciplinary expertise with focus on CBDRM experts. • Majority from focus regions (min. 66%). • English-speakers. • Even gender distribution is aimed for.	• Representatives of all stakeholder groups. • No demographic limitations or quotas. • English-speakers.
Mode of operation	• Regular online meetings. • On-demand advice for partners via email. • Optional: Attendance at physical meetings and pilots.	• Utilization of the online-platform CMINE (Crisis Management Innovation Network Europe). • Online forum discussion on posts. • Dissemination of project events.
Objectives	• Give feedback and advise on project developments. • Provide participatory input on design and monitoring. • Enable the understanding of opportunities and challenges. • Accelerate the dissemination of project results.	• Enabling the inclusion of many different perspectives. • Network that may be approached regarding interview, workshop and questionnaire participation. • Target group for dissemination and events.

3. USERS' ADVISORY BOARD (UAB)

The Users' Advisory Board (UAB) is a closed group of external experts that accompanies the PANTHEON project from the point of its formation (M13) to the end of the project. Consisting of stakeholders, end-users and SSH-experts from different relevant fields, the UAB forms a dialogue group that discusses all matters of the project development from an interdisciplinary perspective. Further, the members agree to be available for enquiries by project partners by email.

3.1 APPROACH & GOVERNANCE OF THE UAB

As part of the recruitment of UAB members, all consortium members were asked to contact suitable experts from their network (according to predefined backgrounds and objectives as described in Table 1: Mechanisms for DRS stakeholders' input). If those experts agreed, their contacts were provided to the task leaders of JOAFG. Together with all expert contacts from participatory research as part of WP2 & WP3 a suitable composition of UAB members was approached step by step. At the moment of this report's submission (M24), the UAB formation is finalised with ten members taking part in UAB activities.

A first introductory board meeting was held on 15.01.2024, where all board members had the chance to introduce themselves and received both a presentation and onboarding discussion to get to know PANTHEON's aims and objectives as well as an introduction to the work done throughout the first project year. On 25.01.2024 the first regular UAB meeting was held as online meeting on the platform Zoom and as part of the PANTHEON General Assembly. After this, regular online meetings were held at an interval of 6 months: 03.06.2024 & 02.12.2024. The timeline for UAB meeting schedule and related activities is presented in Figure 1.

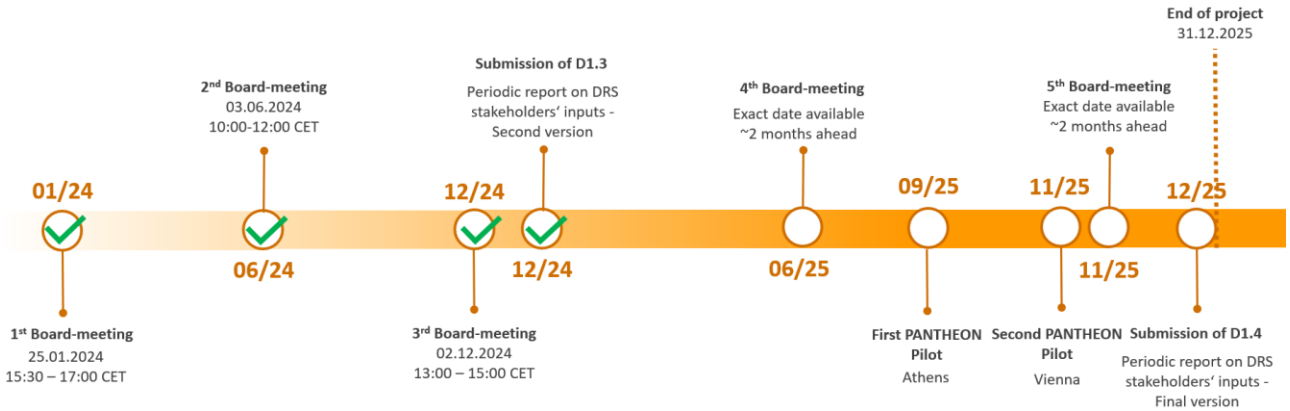

Figure 1: UAB meeting timeline

The UAB meetings are scheduled for 2 hours each and are being moderated by JOAFG, while the content for discussion is presented/provided by representatives of all active WPs. The sessions are being recorded, transcribed and analysed by JOAFG. The results covering all expert advice collected during the UAB meetings are disseminated within the project consortium as soon as consolidated. Further, the summaries of UAB meeting's results are reported on as part of D1.3 Periodic Report on DRS Stakeholders' inputs (second version) (see 3.4) & D1.4 Periodic Report on DRS Stakeholders' inputs (third version), each covering all meetings that have been held until submission date.

As a formal act of joining the UAB, all members signed a Non-Disclosure Agreement (NDA), stating their confidentiality regarding all project developments (Appendix A: Non-Disclosure Agreement).

3.2 UAB MEMBERS

By the time this report was submitted (M24), ten members have joined the PANTHEON Users' Advisory Board. The members, as well as their professional background and current occupation are presented in Table 2.

Table 2: Members of the Users' Advisory Board (by M24)

Name	Country	Current occupation	Professional background
Michel Bour	FR	FIRE-IN European Project Manager at SAFECLUSTER; Crisis management trainer Teacher at Upper-Rhine University	Michel Bour is the Fire chief, senior fire officer responsible for the French side, of the monitoring of the implementation of cross-border disaster relief with the German and Swiss Rescue Services. From 2011 to 2019, he was elected as General Secretary from the CTIF, International Association of Fire and Rescue Services. From 2014 to 2016, he carried out missions in China, in the context of an EU-China cooperation.
Sergi Alegre	ES	Director General of Airport Regions Council	Dr. Sergi Alegre is the former vice-mayor of the city of El Prat de Llobregat and member of the Metropolitan Government of Barcelona, where he held office for 27 years. In this function he was in charge of urban development and collected expertise in community participation; He is a former fireman (total of 15 months) and had the chance to get to know disaster management as an end user. Today, Dr. Alegre works as the Director General of Airport Regions Council and represents numerous regions in this function.
Jelena Mazaj	IT	Coordinator, Higher Education and Research Unit (HE&R), CESIE	With over 15 years of professional experience, she has combined research, training, administrative work, and consultancies in capacity building and knowledge management for higher education institutions, responsible research and innovation, and non-formal education. Her expertise in the sector encompasses various roles such as lecturer, international relations officer, project coordinator, and local expert for research and innovation (R&I) and mobility projects. Currently, she holds the position of HE&R Coordinator at one of the largest NGOs in Italy - CESIE, where she oversees research in areas such as sustainability, rural development, resilience, digital learning, internationalization, STEM (Science, Technology, Engineering, Mathematics), and others. Her recent research focuses on analysing networks for sustainable innovations and the impact of exogenous factors on organizational performance. Dr. Mazaj is the author or co-author of more than 10 scientific publications and has contributed to over 15 project deliverables.

Nikos Passas	GR	Head of the Independent Department for Civil Protection of the Region of Attica	Dr Nikos Passas holds a First Degree on Earth Sciences from the University of Athens (Greece), a Masters (M.Sc.) and Ph.D. degree in Engineering Geology both from Imperial College, London (UK). He has extended experience in soil/rock mechanics, environmental management, crisis management, decision making tools related to environmental impact/climate change/natural disasters acquired from authoring 35 scientific publications, managing/participating in 15 research contracts (EC, PHARE/TACIS, ASIA ITC, WORLD BANK) and more than 100 environmental studies. His present position as Head of the Independent Department for Civil Protection of the Region of Attica, Greece has yielded already two awards for excellent performance: the SILVER Best City Award and the Gold IoT (Interest of Things) Award.
Ioannis Kapris	GR	Independent Department for Civil Protection of the Region of Attica (Design Department for Civil Protection)	Ioannis Kapris holds a Bachelor's degree in Earth Sciences from the University of Athens (Greece) and a Master's degree (M.Sc.) in Environmental and Disaster Management, both from the University of Athens (Greece). With extensive experience in environmental management, crisis management, and research related to environmental impact, climate change, and natural disasters, he has authored 15 scientific publications. In his current role, which he has held since February 2021, as a member of the Independent Directorate of Civil Protection of the Attica Region. Ioannis Kapris is member of the Design Department for Civil Protection in the Region of Attica, Greece. His contributions have already been recognized with two prestigious awards: the SILVER Best City Award and the Gold IoT (Internet of Things) Award.
Areti Plessa	GR	Independent Civil Protection Directorate, Region of Attica (Department of Planning)	Areti Plessa was awarded a BSc degree in Geology in 1996, a MSc degree in Seismology-Geophysics in 2001 and a second MSc degree in Disasters and Crises Management Strategies in 2019, all degrees from the University of Athens. She has been employed at the Institute of Geodynamics, National Observatory of Athens (1997-2019) holding a permanent position in earthquake and tsunami data analysis and network monitoring. She has been involved in supporting research in several EU and national funded projects, mainly in the field of earthquake and tsunami risk. She has served as co-chair in Working Group 4 on “Public Awareness, Preparedness and Mitigation of tsunami risk”, at the Intergovernmental Coordination Group of the North-Eastern Atlantic and Mediterranean Tsunami Warning System of UNESCO (2016-2021). She currently holds a position at the Independent Civil Protection

			Directorate, Region of Attica (Department of Planning) and her main responsibilities are focused on disaster planning and preparedness, such as developing Special Plans for dealing with disasters at regional level, aligned with the National Civil Protection Plans and conducting civil protection exercises (2019-now).
Maria Papathoma-Köhle	AT	Senior Postdoctoral Researcher, Institute for Mountain Risk Engineering, University of Natural Resources and Life Sciences Vienna (BOKU)	Maria Papathoma-Köhle finished her degree in Geology at the University of Athens (GR) in 1997 and holds a MSc in Environmental Management from the University of Durham (UK) from 1998. She finalized her PhD on 'Tsunami vulnerability assessment using GIS with special reference to Greece' at the Coventry University (UK) in 2003. As an expert for vulnerability assessments of buildings based on indicators or vulnerability curves for tsunamis, floods, debris flows and wildfires as well as institutional vulnerability and physical resilience, she has been working for different academic institutes in Vienna since 2005. She is also the recipient of a number of Awards, including the Elise Richter Postdoctoral fellowship, works as a reviewer for numerous scientific journals and frequently publishes journal articles.
David Reinberger	AT	City of Vienna, Chief Executive Office - Organisation and Security Group for Crisis Management and Security	David Reinberger finished his degree in Theoretical Physics at the University of Vienna. He worked for the Austrian Academy of Science within the DELPHI-Experiment at CERN before he joined the City of Vienna. For 16 years, he held the position of the appointee for Nuclear Issues situated at the Vienna Ombuds-office for environmental protection where he was also responsible for technical questions of environmental protection. Since 2022, he works for the Chief Executive Office - Organisation and Security Group for Crisis Management and Security where he is responsible for CBRN and the Psycho-social emergency care of the City of Vienna. Further, he deals with questions of climate change.
Anna Scolobig	CH	Senior researcher and lecturer - International Institute for Applied Systems Analysis (Vienna, Austria) & University of Geneva (Switzerland)	Dr. Anna Scolobig has a background in social sciences. She is senior research scholar at the International Institute for Applied Systems Analysis (Vienna, Austria) and at the University of Geneva (Switzerland). In her work, she examines the social, political and institutional aspects of disaster risk management, and the effectiveness of practices and policies to reduce risk. For example, her research compares options for disaster risk reduction, pulling together technical aspects with issues of societal concerns and economic feasibility. She works closely with colleagues from other disciplines and with stakeholders, especially at the local level to co-design e.g. adaptation strategies, risk mitigation plans or early warning systems. Her work spans several countries in Europe, Asia, Andes, and Caucasus.

Zoltán Hozbor	HU	Duty Officer at National Directorate General for Disaster Management	Zoltán Hozbor has been acting as a Fire Officer at the National Command and Control Centre of the Hungarian Directorate General for Disaster Management for the last 10 years. He gained experience in the field of Control Room operations concerning Fire & Rescue, Civil Protection/Defence and Industry Safety, early warning systems and the authority work (prevention and preparedness) at national operational levels. He also spent almost 10 years at Budapest International Airport state operated Fire & Rescue Service in a number of areas starting from operational to emergency planning, local and international trainings, quality assurance, public relations and compliance. During this period, he was member of the Airport Commission of CTIF. He was involved in several EU funded projects starting from 2008 and SEE DPPI and UCPM trainings. He has been a national delegate to the Federation of European Fire Officers (FEU) since 2012.

3.3 CONTENT FOR UAB DISCUSSIONS

During UAB meetings, the members discuss current developments of the PANTHEON project to provide input from their diverse stakeholder perspectives. These discussions have a focus on the following aspects:

- providing valuable input at the beginning of the project's development work with regards to specific user requirements,
- discussing opportunities, challenges and their underlying reasons, helping to identify shared purposes among relevant stakeholders,
- advising on changes in societal, regulatory and stakeholder priorities that may have an impact on the project and its objectives,
- accelerating and amplifying the dissemination of project results to the disaster resilience community.

In order to give an accurate picture of said project developments, all WP leaders of running WPs are asked to prepare and present the work done, results generated and issues faced during the work on tasks within their WP. These presentations may also be delegated to task leaders, if assessed as useful by WP leaders. Special attention should be given to difficulties and issues that concern the UAB members' expertise may be of benefit.

3.4 UAB MEETING INPUT

This chapter presents a summary of the topics discussed during each UAB meeting held until the submission of this report (M24).

3.4.1 FIRST UAB MEETING

- **Community engagement in disaster risk management**
  There are rather few examples of social knowledge being effectively incorporated into risk management strategies (specifically in regards to technology-based strategies like digital twins). Recommendations have included applying epidemiological and criminal models to bring in social factors.
- **Current technologies in use**
  The integration of technology in disaster risk management varies. Attica region for example lacks a unified early warning system. Some areas rely on specialized scientific institutions for risk management. While many regions aim to develop comprehensive technological frameworks, these efforts are still in early stages.
- **Civil protection operations**
  Civil protection efforts in some regions (for example Attica) focus on identifying vulnerabilities in areas with dense populations and critical infrastructure. They collaborate with academic institutions to inform planning and conduct disaster response exercises. Training effectiveness is measured through surveys and evacuation data.
- **Data sources and legal constraints**
  The availability of data is a significant challenge, with discussions focused on the need to balance useful simulations with the legal restrictions on data retention. Ideally, comprehensive datasets would be available, but they are hindered by serious legal and ethical limitations.
- **Response time and impact**
  The time it takes to respond is influenced by available resources and population density. For example, the Vienna Fire Brigade achieves consistent urban response times within 10 minutes. However, there is a lack of expert analysis in Europe regarding the relationship between response time, investment, and the reduction in casualties or damage.
- **Efficient adoption of new technologies**
  To be effective, technologies like AI and drones have to address the needs of practitioners in disaster scenarios. Instances where equipment remains unused shed light on a lack of proper planning for implementation. Real-world value is essential for the adoption of new technologies.
- **Vulnerable groups in disaster planning**
  Current disaster planning models often fail to account for vulnerable groups due to difficulties in collecting detailed data, such as household-level vulnerability information. While broader data is available, it does not provide the necessary precision for targeted civil protection actions.

3.4.2 SECOND UAB MEETING

- **Participation in field trials**
  Organizations that are not first responders should be included based on their needs and gaps. Inclusivity may be achieved through stakeholder mapping and ensuring representative involvement of those identified. Field trials should address accessibility for vulnerable groups, ensuring that cultural specifics and languages are considered.
- **Data exchange**
  There were no proposed solutions for overcoming barriers to data sharing regarding non-sensitive information, highlighting a gap in strategies to improve anonymized data exchange.
- **Drone utilization**
  Participants lacked personal experience with drone fleets for disaster response but suggested referring to external projects (e.g. COLARIS) for useful insights.

- **Digital twin training**
  To evaluate training with Digital Twin systems, literature on decision support systems could be utilized to establish evaluation criteria. End-user feedback is crucial for assessing the quality of decision-making, focusing on clarity and practical relevance.
- **System integration and commercialization**
  Challenges in integrating solutions like PANTHEON include limited resources and compatibility with existing legacy systems, particularly in the public sector. Successful adoption requires practical demonstrations and alignment with regional standards.
- **Community data and disaster plans**
  Community input for Smart City Digital Twins should focus on creating simple, useful tools while ensuring data is validated. National disaster plans should be integrated with caution, ensuring no conflicts with existing protocols or liability concerns.
- **Expectations for simulations**
  For wildfire simulations, Digital Twin systems should help with evacuation planning by incorporating data on vulnerabilities, population distribution, and building materials. In heatwaves, they should facilitate coordination between health and meteorological services, while earthquake simulations should predict casualties, displacement, and the necessary resources for shelter and fatalities.

3.4.3 THIRD UAB MEETING

- **Data sharing and the feasibility to work with Public Data only:**
  Public access to data remains difficult, limited and inconsistent in most countries, although hazard categorization in certain areas was done well. Participants discussed challenges and potential collaboration to improve data-sharing practices. Additionally, the option to use the PANTHEON platform only with publicly available data and have a human decision maker working with both PANTHEON and internal organizational data was discussed.
- **Artificial Intelligence (AI) in decision support:**
  AI is being seen as a powerful tool for decision-making but requires careful integration with human oversight due to legal and ethical concerns. It was agreed that AI should be used in specific scenarios based on data availability and that the exact implementation of human oversight has to be decided on individually for each type of operation.
- **KPIs for PANTHEON pilots:**
  Establishing both technical and non-technical KPIs is essential to evaluate the system's effectiveness in scenarios like disaster preparedness. However, external experts did not specify exact KPIs to apply to the PANTHEON pilots.
- **Expectations for digital twins in disaster management:**
  Scalability, adaptability, and thorough data integration were discussed as critical features. While flooding scenarios were seen as less relevant for the PANTHEON focus regions, future expansions of the system should address a variety of hazards – including flooding, which is highly relevant throughout most parts of Europe.
- **Public participation in PANTHEON pilots**
  Public feedback mechanisms were discussed but are not part of the project's primary focus, as it targets organizational end-users. However, there is interest in exploring public involvement at later stages, particularly for evaluation. For this however, there needs to be a product that can be understood by the public and does not require in-depth training to be applied.
- **Preparation of a mock-up**
  The PANTHEON project would benefit from the creation of a mock-up version that visually

represents the system's goals. This would foster more effective discussions and provide a tangible basis for assessment and guidance.

4. PANTHEON STAKEHOLDER GROUP (PSG)

This group is focused not only on end-users/practitioners, but also different community representatives, as communities play an important role in the PANTHEON project. At the same time, it is open for any other stakeholders, such as academia, research & development, industry, private and third sector, critical infrastructure operators, etc. – with no limitation in the number of members.

During the initial phase of the project, the decision on the suitable working environment for such a group was taken, considering the advantages of already existing platform within the topic area. CMINE.eu was selected as the most effective tool and a private group dedicated to the PANTHEON project was created.

4.1 THE CRISIS MANAGEMENT INNOVATION NETWORK EUROPE (CMINE.EU)

The Crisis Management Innovation Network Europe (CMINE) is an open, cooperative and inclusive information network for sharing information, experiences, best practice and lessons learned among individuals, crisis management organizations, researcher entities, industry and policy makers throughout Europe and beyond.

CMINE provides a superb window to participate in and observe discussions on innovation and thereby establish an unprecedented sharing of knowledge across all fields of Crisis Management and Disaster Risk Reduction.

Figure 2: CMINE logo

CMINE also links stakeholders from existing projects, networks and initiatives to reduce repetition and fragmentation whilst encouraging new ideas, and identifying innovative solutions to improve European resilience.

4.1.1 BENEFITS OF CMINE.EU FOR PANTHEON PROJECT

CMINE provides connections to other projects, entities and initiatives with a similar interest or profession as is intended for the PSG. Crisis Management can be viewed as a process of planning, collaboration and mutual support. CMINE, as the basis of the PSG, provides a platform and communication tool to make that a reality by connecting the PANTHEON project with an international network of likeminded individuals and organizations with a range of complimentary skill and experiences.

The network provides opportunities to engage with established groups and project teams, organizations and response teams, international players and policy setters as well as event organizers and trainers.

Extended support is also available to take advantage of the comprehensive suite of facilities such as Group hosting, surveying, confidential communication and event management.

4.2 PANTHEON STAKEHOLDER GROUP ON CMINE.EU

As described above, CMINE allows PANTHEON to create a specific group within the platform. This is known as the PANTHEON Stakeholder Group (PSG). It was created during the initial phase of the project and is supervised by International Security and Emergency Management Institute, n.p.o. (ISEMI), partner of the PANTHEON project.

The group is set up as PRIVATE which means, that its content is not visible for every CMINE.eu user and membership is subject to coordinators approval. Due to this procedure, it is possible to easily ensure and control the sensitivity of the group's content.

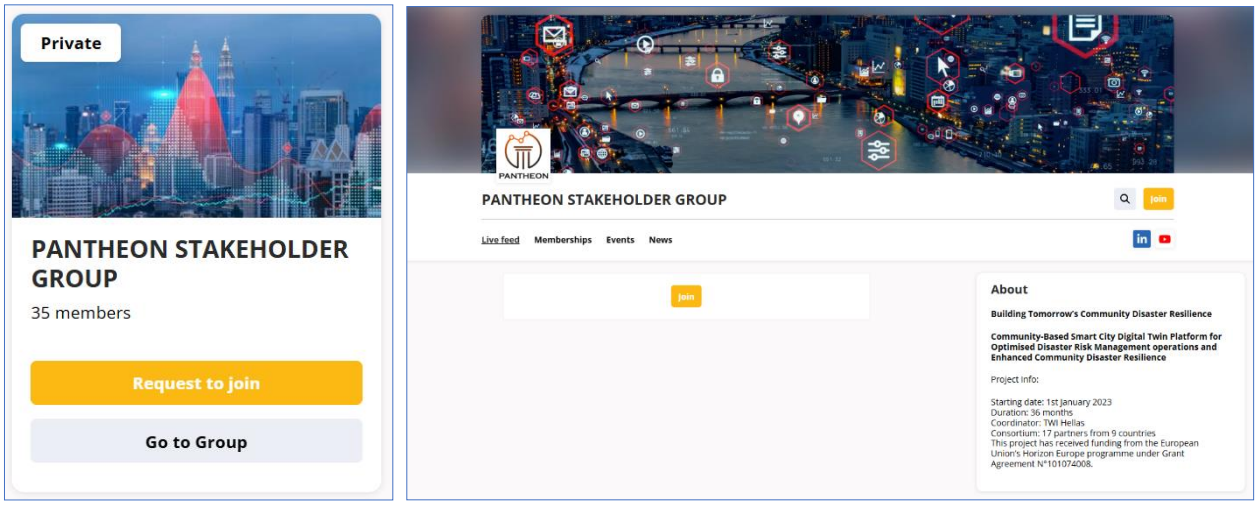

Figure 3: PSG overlay for non-members

4.2.1 MEMBERSHIP

Interested users are requested to create their own profile on the CMINE.eu platform through an agreed registrations process. This allows them to make use of the different features and functionalities of this platform whether interested in the PSG or not.

Once the registration is confirmed and the user is logged-in, it is possible to browse the page and use the features of the platform. One of them is to search for the groups of personal interest such as the PSG. Currently it is possible to find it in categories “Crisis management”, “Private groups” as well as “Projects”. If there are more specific groups in a particular section, they can be viewed by clicking “load more”. Once the user has a registered account, the PSG can be accessed on https://www.cmine.eu/topics/37356. The group cannot be found without logging in to the platform itself.

Registered users can interact with all the users, projects, organizations and other entities on the platform.

The body of the home page consists of latest information / main options:

- ✓ write a post
- ✓ share information
- ✓ see recently active users as well as all the members and also latest new joiners
- ✓ see upcoming events as well as all the events
- ✓ see the posts
- ✓ all these inputs can be commented, liked, shared, reported …

On the top of the page, there is main menu, where it is possible to work with:

- ➢ news feeds (search, filter, display, comment, look for details, etc.)
- ➢ discussions (search by keyword, start new one, reports on existing ones, etc.)
- ➢ groups and forums (search – by name, keyword, but also location and to proceed to particular group)
- ➢ events (search a proceed to details)

- solutions (search a proceed to details)
- partners (create, search a proceed to details)
- resources (search a proceed to details)
- members (search – by name, keyword, but also location and to proceed to particular profile. It is possible to send a direct message to the selected user. Users are displayed on the map also.)
- CMINE updates (home page)
- CERIS DRS (CERIS DRS Cluster Arrangements).

There are also shortcuts/icons for search and for sharing different information (post, trip, event, location, reference), for sharing location, for notifications, for messaging and for own profile.

To be able to fully participate on the group, it is necessary to join the group by clicking the yellow button "Request to join". A subsequent simple procedure of approval needs to be done by the group coordinator(s). Once this is done, the new user will receive notification and everything is ready. The coordinator can manage membership.

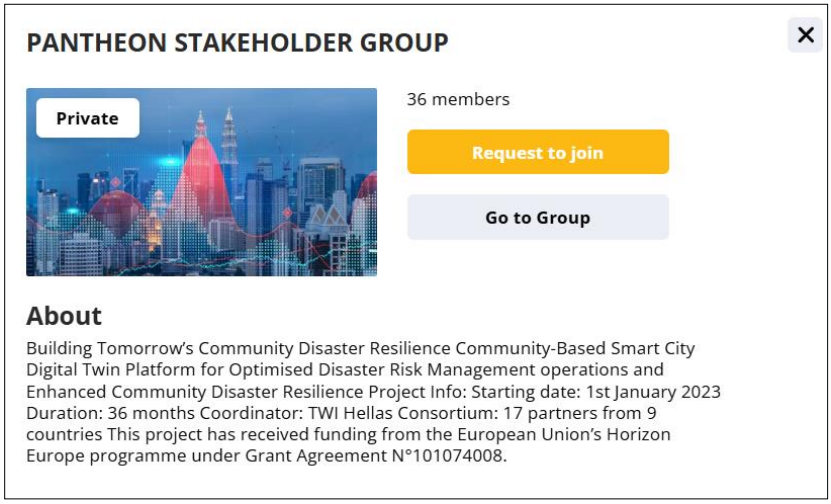

Figure 4: Request to join the PSG

4.2.2 FEATURES FOR ENGAGEMENT AND STAKEHOLDERS' MANAGEMENT

Members of the group can see details of each other and can interact with each other to contribute.

Layout and options are similar to those described above for whole platform. It is possible to write a post, see a basic description of the group, there is contact data of the group coordinator as well as additional information, latest posts and a group tailored menu with shortcuts and icons. Also, there is information about latest joiners, links to social media and a media centre, where different documents / files can be stored and be available for the members.

It is important to highlight, that information shared on the group is visible only for the group members.

4.2.3 CURRENT STATUS OF THE PSG

The PSG had 35 members in M24 (Dec 2024). These cover both project consortium members and external stakeholders and includes experts and practitioners from different sectors.

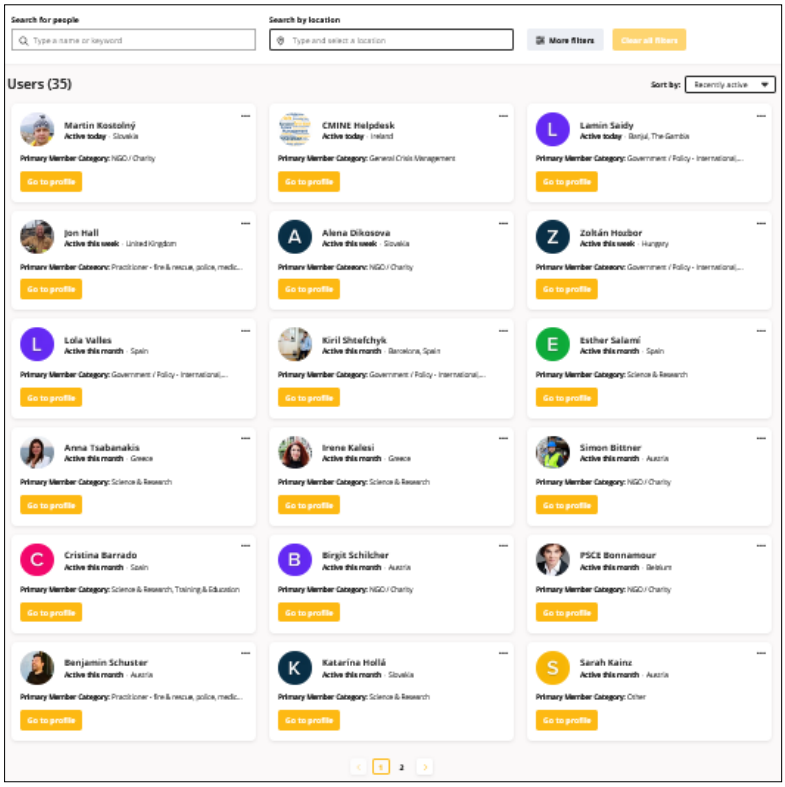

Figure 5: Members of the PSG

4.2.4 COMPOSITION OF GROUP MEMBERS BASED ON THE CLUSTERS OF THEIR ORIGIN:

- 16 – “Science & Research in area”,
- 6 – “NGO/Charity - Practitioners”,
- 6 – “Government & General Crisis Management”,
- 4 – “Industry/Consultancy & Other”,
- 3 – “Practitioner – fire & rescue, police, medical, etc.”.

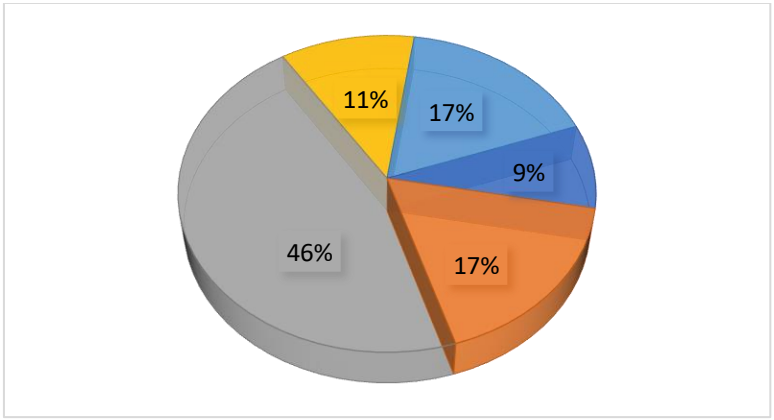

Figure 6: Composition of the PSG members - categories

From the perspective of geographical coverage, they represent 8 EU countries and 4 non-EU countries:

Table 3: Geographical coverage of the PSG members

Country	Number of members
Austria	6
Belgium	2
Greece	11
Hungary	1
Malta	1
Slovakia	4
Spain	5
Armenia	1
Ireland	1
Gambia	1
Uganda	1
United Kingdom	1

4.2.5 NEXT STEPS

The framework of the PSG is established and the processes are set. Next activities will continue on main aspects:

- Content – uploading and sharing of inputs coming from another project tasks and WPs.
  - Posting of ideas, findings, experiences, but also questioning
  - Launching "communications"
  - Adding "news"
  - Uploading relevant files into "Media centre"
- Users – involving of new ones and management of relations of existing ones.
- Engagement management - Assessment of the possibility for the members to participate in project activities, not only remotely, but also directly, especially in pilots or other suitable events

These activities require support from all project partners. Last, but not least, functionality of the entire platform will be secured as well as necessary support will be provided based on the users' need or the needs coming from the project.

As the final phase of the project is approaching, this is an opportunity to increase activity within the PSG as well. The content will focus on presenting demonstrations from both a technical and organisational perspective.

5. DRS STAKEHOLDERS' INPUT

In addition to the input received as part of the UAB and the PSG (see above), extensive involvement of DRS stakeholders was performed during the work for *WP2 Approach For Building Disaster-Resilient Communities, WP3 PANTHEON Requirements, Participatory Design Process and Pilot Use-Cases Specifications* and *WP8 Training & Pilots Set up-Execution-Evaluation.* While the methodology applied during this work and the findings derived from collected stakeholder inputs is reported on within the respective Deliverables (D2.1, D2.2, D2.3, D2.5, D3.2, D3.6 and D8.1) as well as future reports, a short overview of participatory actions applied up to this point is presented in the following sections. Table 4 presents all DRS stakeholders' input received as part of activities on the different WPs from M11 to M24. *Stakeholder participants* here mean individual people, although it might be the case that individuals were counted more than once, if they participated in different activities (e.g. filled in the survey and participated in a workshop). While most of the reported participants are from external organisations, the counting also includes participants from end user organisations within the consortium (this concerns WP6 and WP8 activities).

Table 4: DRS stakeholder' input received from M11 to M24

WP	Title of input	Type of input	Number of executions	Stakeholder participants	Timeframe
2	WP2 Questionnaire (for Vienna)	Survey	1	32	Oct.-Nov. 2023
2	WP2 Interview (for Vienna)	Interview	4	4	Oct.-Nov. 2023
3	Workshop on the definition use cases	Workshop	3	10	Nov 23 - Jan 24
6	Meetings on drone scenarios	Meeting participation	5	6	Nov 23 - Nov 24
8	Stakeholder input for resource planning	Workshop	1	6	18.09.2024
8	End-user scenario coordination	Workshop	1	12	07.11.2024
8	PANTHEON training scenario detailing	Workshop	1	3	18.11.2024
8	Technical implementation for pilot scenarios	Workshop	1	12	21.11.2024
1	User Advisory Board meetings	Meeting participation	3	10	Jan.-Dec. 2024

Table 5 summarizes the total number of executed methods and DRS stakeholders involved in PANTHEON's development from project start to M24.

Table 5: Number of DRS stakeholders involved in PANTHEON by M24

Method	Number of executions	Number of DRS stakeholder participants
Surveys	3	76
Interviews	18	18
Workshops	12	78
UAB meetings	3	10
Other meetings	5	6
Total	**41**	**188**

In compliance with the General Data and Protection Regulation (GDPR) of the EU, all stakeholders who gave their input as part of interviews, workshops or surveys signed an informed consent form. These forms were adapted for discussed content and method applied (for an example see Appendix B: Informed Consent Form (Example from WP3 Workshops)).

5.1 WP2 – APPROACH FOR BUILDING DISASTER-RESILIENT COMMUNITIES

As part of the work conducted for *WP2: Approach For Building Disaster-Resilient Communities,* several actions were implemented in order to capture the views and opinion of DRS stakeholders. In addition to task-specific interviews and workshops that will be described in the following sections, an online questionnaire covering several WP2 tasks (T2.1, T2.2, T2.3) was developed. This questionnaire was distributed among 140 DRS stakeholders, who were identified through partner networks and proactive online research, and filled out by a total of 39 of these DRS stakeholders. The contacted questionnaire participants had expertise in the following fields:

- First responders
- Civil protection organisations/ Governmental and policy making authorities
- Schools
- Disability associations (mental and physical)
- Hospitals
- Organizations supporting/working with women
- Charitable institutions
- Nursing homes
- Organizations working with migrant groups/refugees
- Public authorities/NGOs performing community work/educational work on disaster management
- Technology, energy, network providers

In an effort to update the data of these WP2 tasks to address the new focus area Vienna, additional 32 responses of Viennese stakeholders were received for the final versions of WP2 Deliverables, submitted in January 2024 (M13).

A detailed description of the methodological approach as well as recruiting and conduction can be found in *D2.3 Community Vulnerability and Capacity Assessments (VCAs) report*.

5.1.1 TASK 2.2 REGIONAL MULTI-HAZARD/RISK DATA ASSESSMENT

As part of the work for *Task 2.2. Regional Multi-Hazard/risk data assessment,* the desk-based research was integrated with information from seven interviews with representatives of Civil Protection Authorities (CPAs) at national, sub-national and regional level from the focus regions Paris/France and Athens/Greece and with various backgrounds. The interviews aimed to obtain insights from the status quo of national hazard, risk assessment and disaster management tools used in the two countries, as well as from the potential approaches for improvements and recommendations for community outreach. Further, the interview findings helped identifying gaps and challenges to be considered during risk assessment and planning processes in order to enhance civil protection and emergency management capabilities.

5.1.2 TASK 2.3 COMMUNITY VULNERABILITY AND CAPACITY ASSESSMENTS

For Task *2.3 Community vulnerability and capacity assessments,* a total of seven semi-structured stakeholder interviews were conducted. Due to time constraints of approached stakeholders, three of those interviews had to be conducted in written form via email. Four of the interviewees were active in France and three in Greece. They had a diverse set of backgrounds: an international fire brigade, earthquake planning and protection, an engineering school with expertise in disaster management, a risk expert, information technology (IT) administration in a psychiatric hospital, safety advisement in an NGO, and a schoolteacher in a Community and Citizens stakeholder organisation. The collected data from T2.3 interviews was used to further contextualize the findings of the survey presented before, in chapter 5.1 WP2 – Approach For Building Disaster-Resilient Communities.

5.1.3 TASK 2.5 PARTICIPATORY GOVERNANCE MODEL

For *Task 2.5 Participatory Governance Model,* two stakeholder workshops were conducted with seven participants from different European countries (including France and Greece) covering a broad range of expertise. This included policy and CBDRM advisors, first responders and SSH experts in the engagement of volunteers as well as vulnerable groups as part of disaster management. Additionally, an open-ended exploratory survey was distributed to civil protection agencies and experts in natural and man-made disaster management. A total of 12 DRS stakeholders gave input for the development *D2.5 Participatory governance model and recommendations* and therefore complemented the extensive literature research in the definition of recommendation on how to best involve, engage and mobilize communities in all phases of disaster management.

5.2 WP3 – PANTHEON REQUIREMENTS, PARTICIPATORY DESIGN PROCESS AND PILOT USE-CASES SPECIFICATIONS

Within the work conducted for *WP3: PANTHEON Requirements, Participatory Design Process and Pilot Use-Cases Specifications,* some activities were implemented related to the stakeholder inputs. *Task 3.2 Participatory Design Process* aimed at defining design criteria and decision support for the technical development of PANTHEON, based on stakeholder feedback with a focus on end-users. After identifying the potential end-users in each region (by this time the pilot change to Vienna was already internally decided), they were approached and invited to *Participatory Design Workshops.*

Three *Participatory Design Workshops* were conducted with a total of 28 participants from Vienna/Austria and Athens/Greece. Participants included representatives from:

- Ministries involved in disaster management
- Civil protection authorities
- Regional disaster management officials
- Ambulance services, fire brigades and police

From the outcomes generated through the workshops, five potential Use Cases for an implementation of the developed system were identified. In each of these Use Cases, the participating end-users estimated that the proposed system would provide added value. Further, an extensive recommendation catalogue was developed which presents end-user-based design criteria that are allocated to each of the Use Cases.

As part of *Task 3.6 Project use case specification and scenarios* several workshops with end users were conducted to refine the PANTHEON use cases, guiding both technical development and pilot planning.

5.3 WP6 - PANTHEON REMOTE SENSING FOR MULTI-HAZARDS AND DATA DELIVERY SCHEME IMPLEMENTATION

For WP6, a series of meetings was held to define and refine the end user objectives for the drone swarm. These meetings brought together the technical partners in charge of designing the drone swarm algorithms and the end users expected to use these swarms during the pilots. The technical partners put forward various proposals for using the drones, and these were validated/modified by the end users. Note that this is still work in progress; and that the end users have very different needs to answer (police force and ambulance/medical assistance services), so a challenge is to accommodate all the end user requests. Additionally, the technical partners in charge of the drone swarms held meetings with the Graphical User Interface (GUI) partners to define and refine the exchange of inputs and outputs between the Swarm algorithms and the GUI. these exchanges must of course be based on the end user needs defined previously, so this is also still work in progress.

5.4 WP8 – TRAINING & PILOTS SET UP-EXECUTION-EVALUATION

Over the course of 2024 four workshops were conducted as part of WP8 to gauge the needs of stakeholders regarding usage of the PANTHEON platform as a planning and training tool. The aim of the workshops was to sensibly augment current workflows and offer decision support for areas that currently realistically can be supported by the deployment of a simulation platform. Most workshops resulted in, sometimes extensive, lists of possible decision support application fields. Finding the right usage scenario for this kind of tool was ultimately achieved by going back and forth with the stakeholders through presentations of possible systems' capabilities and needs assessments. The presentation of the PANTHEON system during the project's pilot phase will incorporate the end results of said workshops as showcases during the pilot scenarios.

6. CONCLUSIONS

The PANTHEON project is accompanied by extensive involvement of DRS stakeholders to collect their input for a purposeful development process and to utilize their expertise as well as dissemination networks. This involvement is backed by the implementation of a complimentary two-pillar approach.

The Users' Advisory Board (UAB) serves as a dialogue group of curated experts from different fields that give their multi-perspective input on current project developments on a regular basis through online board meetings. The PANTHEON Stakeholder Group (PSG) is a private online forum on the social network platform CMINE that focuses on crisis management stakeholders. The PSG is being utilized to discuss findings and outcomes with a wide stakeholder audience and to facilitate a target-oriented dissemination of project events and results.

During the first 24 months of the PANTHEON project, a total of 188 DRS stakeholders were involved in the developments. Their input was collected by the means of interviews, surveys, workshops and specific activities as part of T1.2 (UAB & PSG). They supported the consortium during the multi-hazard and risk assessment, the community vulnerability and capacity assessments, the development of a participatory governance model, use case definition, pilot conceptualisation and through regular project development advise. Further, they provided crucial insights into the needs and requirements of disaster managers and first responders, leading to the definition of end-user-based design criteria for the system in development.

7. LIST OF ABBREVIATIONS

Abbreviation	Meaning
CBDRM	Community-Based Disaster Risk Management
CBRN	Chemical, Biological, Radiological, Nuclear
CERIS	Community of European Research and Innovation for Security
CMINE	Crisis Management Innovation Network Europe
CPA	Civil Protection Authority
CTIF	Comité Technique International de Prévention et d'Extinction du Feu
D	Deliverable
DRM	Disaster Risk Management
DRS	Disaster Resilient Societies
EU	European Union
GPDR	General Data Protection Regulation
GUI	Graphical User Interface
HE&R	Higher Education and Research
IoT	Internet of Things
IT	Information Technology
M	(Project-) Month
NDA	Non-Disclosure Agreement
NGO	Non-Governmental Organisation
PSG	PANTHEON Stakeholder Group
RAN	Resilience Advisors Network
REA	Research Executive Agency

R&I	Research and Innovation
SCDT	Smart City Digital Twin
STEM	Science, Technology, Engineering, Mathematics
SSH	Social Sciences and Humanities
UAB	Users' Advisory Board
UNESCO	United Nations Educational, Scientific and Cultural Organization
VCA	Vulnerability and Capacity Assessment
WP	Work Package

8. REFERENCES

Crisis Management Innovation Network Europe (CMINE): www.cmine.eu (last visit on 10.10.2023; 09:32)

9. APPENDIX

APPENDIX A: NON-DISCLOSURE AGREEMENT

NON-DISCLOSURE AGREEMENT

This Agreement is made effective as of the (insert date) by and between

TWI HELLAS ASTIKI MI-KERDOSKOPIKI ETAIREIA in the capacity of the Coordinator for the PANTHEON project (Project number: 101074008) as per the GA signed with the EC, representing the beneficiaries of the said project

Hereinafter "Disclosing Party"

and

(insert name and address of External Expert),

Hereinafter "Recipient"

to assure the protection and preservation of the confidential and/or proprietary nature of Confidential Information (as defined below) disclosed, to be disclosed or made available by Disclosing Party to Recipient in connection and for the purpose of the performance of the PANTHEON project ("Purpose").

Whereas the Disclosing part and the Recipient have an interest in participating in discussions wherein either Party might share information with the other that the disclosing Party considers to be proprietary and confidential to itself ("Confidential Information"); and

Whereas the Parties agree that Confidential Information of a Party might include, but not be limited to that Party's: (1) business plans, methods, and practices; (2) personnel, clients, and suppliers; (3) inventions, processes, methods, and other proprietary rights; or (4) specifications, drawings, models, samples, tools, programs, or other related information;

Now, therefore, the Parties wish to formalise the disclosure conditions of confidential information to be exchanged within these discussions and agree as follows:

1. All information in whatever form or mode of communication, which is disclosed by a Party (the "Disclosing Party") to any other Party (the "Recipient") in connection with the Project during its implementation and which has been explicitly marked as "confidential" at the time of disclosure, or when disclosed orally, has been identified as confidential at the time of disclosure and has been confirmed and designated in writing within 15 calendar days from oral disclosure at the latest as confidential information by the Disclosing Party, is "Confidential Information".

2. The term "Confidential Information" shall not be deemed to include information which:

(a) the Recipient rightfully possessed before it received such information from the Disclosing Party as evidenced by written documentation;

(b) was independently developed by or on behalf of Recipient without use of or access to the Confidential Information of the Disclosing Party;

(c) subsequently becomes publicly available through no fault of the Recipient;

(d) is subsequently furnished rightfully to the Recipient by a third party without restrictions on use or disclosure;

(e) is required to be disclosed by law, provided that the Recipient will exercise reasonable efforts to notify the Disclosing Party prior to disclosure; or

(f) is the subject of a written permission to disclose provided by the Disclosing Party.

3. Recipient shall maintain all Confidential Information in trust and confidence and shall not disclose to any third party or use any Confidential Information for any unauthorized purpose. Each party may use such Confidential Information only to the extent required under the Purpose. Confidential Information shall not be used for own purposes or the purposes of any third party, like for research, development, regulatory affairs or production, or any purpose or in any manner that would constitute a violation of any laws or regulations, including without limitation the export control laws. If one party is suspected to breach this Agreement, the suspected party has to prove that the matter of suspected violation is information in compliance with Paragraph 2.

4. If a Recipient becomes legally required to disclose any Confidential Information, the Recipient shall, to the extent legally permissible, provide the Disclosing Party with prompt notice so that a protective order, preliminary injunction, or other appropriate remedy may be sought. If such protective order, preliminary injunction, or other remedy is not or not fully obtained, the Recipient shall disclose only that portion of the Confidential Information that is legally required to be submitted in the opinion of the Recipient's legal counsel, and confidential treatment shall be requested. Compulsory disclosures pursuant to this Section will not alter the confidential designation of the Confidential Information, and the Recipient's obligations of confidentiality shall continue with respect to non-compelled disclosures.

5. The Confidential Information shall not be reproduced in any form nor to any extent except as required to accomplish the intent of this Agreement. The Recipient shall further not reverse engineer, disassemble or decompile any software or other tangible objects that embody Disclosing Party's Confidential Information.

6. Recipient under this Agreement shall advise its/her employees who might have access to the Confidential Information of the confidential and proprietary nature thereof and agrees that its employees shall be bound by the terms of this Agreement. No Confidential Information shall be disclosed to any employee who does not have a need for such Confidential Information. The Recipient shall not disclose any Confidential Information to any third party without the express written consent of the Disclosing Party.

7. All Confidential Information (including all copies thereof) shall remain the sole and exclusive property of the Disclosing Party and shall be returned to the Disclosing Party or destroyed upon request of the Disclosing Party, and in any event upon completion or termination of this Agreement. However, Recipient may retain one copy of the Confidential Information with its legal department to monitor compliance with this Agreement.

8. No rights, title, interest or licenses to trademarks, inventions, copyrights or patents are implied or granted under this Agreement. The Recipient is not eligible to apply for intellectual property rights related to the information of the Disclosing Party, e.g. patents, trademarks, utility models etc.

Nothing in this Agreement shall be construed as establishing any other business relationship or as representing any commitment by either party to enter into further agreements and/or to disclose any of its respective Confidential Information by implication or otherwise.

The parties do not warrant the accuracy or completeness of the Confidential Information disclosed.

No warranties or representations are given for Confidential Information. Recipient should rely on Confidential Information at its own risk. Confidential Information is provided “as is”. Any warranty or liability due to incorrect, incomplete or otherwise faulty Confidential Information shall be assumed exclusively on the basis of any provisions in any agreement on technical cooperation or licensing which might follow this agreement in terms of time. Samples produced by the disclosing party do not contain any assurance as to the industrial-technical or economic usability of the Confidential Information embodied in the samples.

9. This Agreement shall continue in full force and effect for so long as the parties continue to exchange Confidential Information. This Agreement may be terminated by any party to this Agreement at any time upon thirty (30) calendar days written notice to the other party. The termination of this Agreement shall not relieve any party of this Agreement of the obligations imposed by this Agreement with respect to Confidential Information disclosed prior to the effective date of such termination and the provisions of those Paragraphs shall survive the termination of this Agreement for a period of five (5) years from the date of such termination.

10. This Agreement may not be changed, modified, amended or supplemented except by a written document signed by both parties including the written form requirement itself.

11. Each party hereby acknowledges and agrees that in the event of any breach of this Agreement by the Recipient, including, without limitation, the actual or threatened disclosure or unauthorized use of a Disclosing Party's Confidential Information without the prior express written consent of the Disclosing Party, the Disclosing Party will suffer an irreparable injury, such that no remedy at law will afford it adequate protection against, or appropriate compensation for, such injury. Accordingly, the parties agree that the Disclosing Party shall be entitled to temporary and permanent injunctive relief against the Recipient, its officers or employees and any such other rights and remedies to which the Disclosing Party may be entitled to at law, in equity or under this Agreement for any breach or threatened breach of this Agreement by the Recipient. The provisions of this Section 11 shall survive the expiration or termination of this Agreement for any reason. Upon breach or default of this Agreement, the non-breaching or non-defaulting party shall be entitled to recover all reasonable costs of enforcement hereof, including reasonable attorney’s fees, expert witness fees and depositions’ costs.

12. The parties' rights and obligations under this Agreement will bind and inure to the benefit of their respective successors, heirs, executors and administrators and permitted assigns. Neither party shall assign or delegate his/its obligations under this Agreement either in whole or in part without the prior written consent of the other party.

13. Should any provision of this Agreement be or become legally invalid or unenforceable, the validity of the remainder of the Agreement shall not be affected thereby. Invalid provisions shall be replaced with provisions which come as close as possible to the intended result of the invalid or unenforceable provision. In the case of a contractual gap, such provision shall be in force which comes as close as possible to the intended result of the agreement, if the matter had been considered in advance by the parties.

14. Any notices required or permitted hereunder shall be given to the appropriate party at the address specified below or at such other address as the party shall specify in writing.

15. This Agreement shall be governed by the laws of Greece, excluding its conflicts of laws principles. Place of jurisdiction is Athens, Greece.

Agreed To

Recipient / External Expert:	Disclosing Party:
Date, Signature Name/ Position / Address	Date, Signature **Dr. Panagiotis Chatzakos** PANTHEON Beneficiary Coordinator TWI Hellas, Leoforos Kifisias 280, 15232 Halandri, Greece

APPENDIX B: INFORMED CONSENT FORM (EXAMPLE FROM WP3 WORKSHOPS)

Informed Consent for participation

Project: PANTHEON Community-Based Smart City Digital Twin Platform for Optimised DRM operations and Enhanced Community Disaster Resilience

Topic: Participatory design process to build community disaster resilience

Participation: Workshop/Interview

Participant consent form

Before we start with the study, we would like to inform you about the data processing and ask for your consent. You need not worry about privacy as we will not share the information we have gathered from this study other than statistical and non-identifiable personal information in the report. Please tick the following:

- ☐ I am aware of the main aspects of the participation for the above PANTHEON project.
- ☐ I confirm that I have had the opportunity to ask questions.
- ☐ I understand that my participation is voluntary.
- ☐ I understand that my answers to any questionnaire will remain anonymous.
- ☐ I understand that if I don't wish to answer any particular questions, I am free to decline.
- ☐ I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified of identifiable in the outputs that result from the research without my agreement.
- ☐ I agree to take part in the above-mentioned activity, the sole purpose of which is research.
- ☐ I give my consent to audio footage
- ☐ I give my consent for my contact details to be shared with the members of the research team for the purpose of receiving information and communications relating to the PANTHEON project.
- ☐ I understand, that I can revoke my consent at any time with effect for the future, whereby the lawfulness of the processing carried out on the basis of the consent until revocation is not affected. A revocation has the consequence that my data will no longer be processed for the above-mentioned purposes from that point on.

- ☐ I hereby confirm that I have read and understood this declaration of consent and that my questions were addressed properly.

Location and date:

……

Name of the participant:

……

Signature participant:

……

This form should be signed and dated. A copy should be saved by the participant and one for the project documentation.

Project information

The EU-funded project PANTHEON will design and develop a Community based Digital Ecosystem for Disaster Resilience. In more detail, the aim is to improve risk assessment, reduce vulnerability, and strengthen community disaster resilience. Part of this is the enhancement of operational capabilities of Community Based Disaster Resilient Management (CBDRM) teams. To this end, it will use Smart City Digital Twin (SCDT) technology and leverage new and emerging technologies and innovations. For the specific developments in the project, our research focuses on Greece (Athens) and France (Paris) as pilot regions. Input from other areas will also be welcome to broaden the scope.

To achieve our goal of strengthening community-based disaster risk management, we are currently working on developing design criteria and decision support for technical developers to help make the PANTHEON tool useful and meaningful to disaster management agencies and end-user organisations. This includes:

- Survey and analysis of typical problems faced by stakeholders and end-users in the context of disaster management.
- Survey and analysis of stakeholder and end-user requirements for a system that would assist in disaster response planning.
- Develop design criteria for a disaster resilience system through a participatory design approach.

Methods: Conduct a workshop to identify typical problems faced by end-users and stakeholders that PANTHEON could help solve. The workshop will discuss the wishes and requirements of stakeholders and end-users for a system that would help them in disaster response planning. The recorded workshop will be transcribed and analysed by content analysis to answer the research questions.

Project Partners:

1 TWI ELLAS ASTIKI MI KERDOSKOPIKI ETAIREIA (Greece)
2 AIRBUS DEFENCE AND SPACE SAS (France)
3 M3 SYSTEMS BELGIUM (Belgium)
4 SOFTWARE IMAGINATION & VISION SRL (Romania)
5 Mobility Ion Technologies SL (Spain)
6 FUTURE INTELLIGENCE EREVNA TILEPIKINONIAKON KE PLIROFORIAKON SYSTIMATON EPE (Greece)
7 ECOLE NATIONALE DE L AVIATION CIVILE (France)
8 UNIVERSITAT POLITECNICA DE CATALUNYA (Spain)
9 PRACTIN IKE (Greece)
10 ISEM-INSTITUT PRE MEDZINARODNU BEZPECNOST A KRIZOVE RIADENIE, NO (Slovakia)
11 INTEROPTICS S.A. (Greece)
12 JOHANNITER OSTERREICH AUSBILDUNG UND FORSCHUNG GEMEINNUTZIGE GMBH (Austria)
13 EPSILON MALTA LIMITED (Malta)
14 INSTITUT DE SEGURETAT PUBLICA DE CATALUNYA (Spain)
15 HELLENIC POLICE (Greece)
16 KENTRO MELETON ASFALEIAS (Greece)
17 Crisis Management State Academy (Armenia)

Information about generated data

Processing of data and data protection

All data collected in the course of the survey will be treated confidentially and will only be viewed or processed by the project-involved employees of *project partner, who stores the collected data material* (in the role of data processor according to GDPR) and *project partners, who works with the data material* (in the role of data controller according to GDPR). Information that could lead to an identification of the person will be changed (anonymisation / pseudonymisation) or removed. In scientific publications, the data is post-processed accordingly, so that the resulting overall context of events cannot lead to an identification of the person by third parties. The results will be further processed in the form of a report and possibly further scientific publications.

The data will be processed on the basis of your consent for the purpose of carrying out the above-mentioned research project (collection, evaluation, generation of results, publications). The legal basis for this is the EU General Data Protection Regulation (GDPR), namely in particular Art 6(1)(a) (consent) in conjunction with the Austrian Research Organization Act (FOG). Your personal data (name, contact, age, gender, duration in working area, role in disaster management, allocation of organisation and information about the disaster management plan). The collected questionnaire ("raw data") will be kept for 10 years from the date of publication of the results of the project to demonstrate compliance with good scientific practice and then destroyed. Data required for the assertion, exercise and defence of legal claims will be stored for up to 30 years and subsequently deleted. You have the right to information, correction, deletion, restriction of processing, data portability, objection, and a right of appeal to the data protection authority at any time in accordance with legal provisions (in particular Art 15 to 22 DSGVO with the restrictions in § 2d paragraph 6 FOG).

Voluntary nature of participation

Participation in this survey is voluntary. Participants may withdraw at any time without giving reasons and without incurring any disadvantages. For this purpose, please keep this document with the contact: dpo@pantheon.eu

Confidentiality and anonymity

Your information will be used solely by researchers for research purposes in the context of the above research project. Personal information will not be shared with anyone outside the research team of this project. The published research results (publications, research reports) have no personal reference and therefore do not allow any conclusions to be drawn about your identity.

Right of withdrawal

In order to be able to fulfil your right of withdrawal and to enable assignment of the correct record for this purpose, we urgently recommend to save this informed consent with the following contact address, to be able to contact us: Cristina Barrado dpo@pantheon.eu or Anna Tsabanakis info@pantheon.eu