xR4DRAMA

Extended Reality For DisasteR management And Media planning

H2020-952133

Evaluation of the 1st prototype and updated user requirements

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Abstract

This deliverable describes the methodology, process, and results of the evaluation of the first prototype and the use cases implementation. It also includes a refined set of user requirements where needed, based on the outcome of the evaluation of the first prototype.

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History

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v0.1	10.05.2022	Providing a preliminary ToC	Martina Monego
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Executive Summary

This deliverable describes the evaluation results of the 1st XR4DRAMA prototype from the end users' perspective based on the outcomes of two pilots (media planning PUC in Corfu, 3-4 May and disaster management PUC in Vicenza, 17-18 May 2022). During those occasions, the main stakeholders of the two developed use cases (media production planning and disaster management) tested the xR4DRAMA platform in the context of their scenarios, providing feedback focused on effectiveness, efficiency, and user satisfaction.

Describing more in detail the contents of this document, the first section of the deliverable provides a short summary of the functionalities of each XR4DRAMA tool developed for the 1st prototype and tested during the pilots.

Then, the deliverable starts to describe the pilots' structure, their context and organization, focusing on the evaluation of the 1st prototype from the perspective of the end users who participated in the pilots as active players. Feedback from the users was collected both during the pilots and after, thanks to questionnaires. These data had been analysed with the procedure described in the final part of this deliverable, which provides also the results emerged from the evaluation.

The outcomes of the 1st prototype evaluation presented in this document will be the reference point to address the technical development of the platform towards the final prototype and to improve the organisation of the final pilots and their evaluation procedures.

Abbreviations and Acronyms

AR   **Augmented Reality**

is an immersive technology superimposing layers of digital content into the physical world to enhance the user's real-world experience

DoA   **Description of Action**

DP   **Disaster Preparedness**

measures taken to prepare for and reduce the effects of disasters. That is, to predict and, where possible, prevent disasters, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences

DRR   **Disaster Risk Reduction**

aims to reduce the damage caused by natural hazards like earthquakes, floods, droughts and cyclones, through an ethic of prevention

MR   **Mixed reality**

is a hybrid definition combining both AR and VR

NLProc   Natural language processing

PTC   Piece To Camera

PUC   Pilot Use Case

SA   Situation Awareness

VR   Virtual Reality

XR   **Extended Reality**

also known as cross-reality and hyper-reality, is an umbrella term that encompasses human-machine interactions generated by computer technology with devices or wearables to create real and virtual environments which include VR and AR

6DoF   Six Degrees of Freedom

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1   INTRODUCTION

This deliverable describes the implementation of the evaluation of the xR4DRAMA first prototype and the consequent refinement process to tune the user requirement for the final version of the platform. In addition, the deliverable provides, in the first part, an overview of the prototype describing the modules and tools developed and tested in the field, while in the second part the concerns about the implementation of the two exercises, one for PUC1 in Vicenza and the other one in Corfu. The platform, in fact, had to be tested in real life conditions, which had been demonstrated through the two-xR4DRAMA pilots and evaluated based on the interaction with the technology. This allowed the consortium to gather precise feedback and indications from the end user's prospective, in order to incorporate them into the design modifications.

Last part of this deliverable describes the results of the survey and carried out in order to acquire feedbacks from stakeholders and update of user requirements.

Based on the results of this evaluation, the technological development of xR4DRAMA will be carried on until the final system, which will be tested during the final evaluation cycle.

2   XR4DRAMA 1ST PROTOTYPE

2.1 Data acquisition from Web and Social Media

The data acquisition module is a fully-fledged solution that is capable of collecting multimedia from multiple heterogeneous Web and social media resources. It uses several different techniques to extract textual and high-quality audio-visual content that is freely available on the Internet and provide it to the xR4DRAMA platform.

In the first prototype version, the architecture of the module was designed and various methodologies were implemented for the discovery and extraction of online content (crawling, scraping, search, wrappers upon APIs that expose data from open repositories). Additionally, a unified data model (an extension of SIMMO) was applied to represent and store the different multimedia types. The main data collection activities were focused on the Youtube video-sharing platform and the Twitter social networking site. In that version, the data are obtained beforehand and are searched whenever a new project is initiated in the xR4DRAMA authoring tool. The retrieved results were served to the analysis components of the platform. More details about the implemented methodologies of the module can be found in "*D2.2: Archival media dataset creation, web crawling and social media sensing v1*".

In the second development cycle we aim to significantly extend the Web and social media data repository. More resources will be gathered by applying the functionalities supported in the first prototype, as well as by developing additional wrappers that connect to different websites and social media. Example online sources that will be integrated are Reddit posts, information from the Foursquare platform, Flickr images and Wikipedia articles. Furthermore, the integration mechanism with the rest components of the platform will be streamlined in order to facilitate the discovery of updated online data on creation of a new project.

2.2 Satellite Service component

The Space sensing is a service capable of acquiring the relevant satellite data and pre-process them for 3D modelling from satellite images. It also stores and handles the drone images provided by the users.

2.3 Physiological and environmental data acquisition module

The **physiological data acquisition** module uses a wearable system (smart vest) for monitoring physiological parameters and integrates the data in the XR4DRAMA platform. The smart vests have been tested in the disaster management scenario, in order to monitor the stress levels of users involved.

Functionalities implemented and tested in PUC1

As described in the D2.1, the wearable system includes:

- a smart vest in which textile sensors able to acquire ECG (electrocardiogram) and the breath signal are integrated;
- a data logger that embeds an inertial platform and it is able to acquire, record and transmit physiological signals, movements of the trunk and posture.

The wearable sensing platform was tested during PUC1 on the Vicenza flooding use case in order to evaluate the acceptability of the system from the end users, and to validate its features in term of physiological data collection and transmission through the xR4DRAMA Platform.

Functionalities to be implemented in the final version

For the final version, the smart vest will be improved in term of wearability making minor modification of the design and using a new, more breathable, lighter and extra-comfortable fabric to allow for greater freedom of movements.

The **environmental data acquisition** module considers two different equipment: a device to record the sound locally during the data collection phase carried out by the location scouts (Media Production Planning) and a device to evaluate the correlation between stability of people/stress and flood by detecting the hydrostatic pressure (Disaster Management).

Functionalities related to PUC1

A proof-of-concept device able to acquire hydrostatic pressure was designed and developed for the PUC1. The new device as a proof of concept needs a dedicated validation and calibration session and its functionalities will be tested in the final version of xR4DRAMA platform.

Functionalities related to PUC2

The Zoom H3-VR audio recorder was selected among commercial product as its characteristics fit with a Virtual Reality platform integration. It's a compact audio recorder that embed four unidirectional condenser microphone capsules (Ambisonics mic array) offering flexible 360° audio capture. Results from the Corfu pilot will be used to assess the usability of the audio recorder device.

2.4 Sensor Data Analysis

This component is responsible for the process and analysis of physiological data derived from the smart vest, with the aim of predicting stress. After acquiring real-time physiological data from the smart vest, the sensor data analysis module is responsible for the data processing. This processing includes i) signal pre-processing, where signal transformation and filtering are performed and ii) feature extraction, where the pre-processed signals are further analysed to extract useful features. The final prediction of stress levels has been done using machine learning techniques. A regression model has been trained in order to predict a continuous value of stress level.

For the second prototype, the ongoing work for the sensor data analysis module will mainly be the evaluation of the model based on data collected during the pilots. Based on the evaluation results, necessary changes will be made to the entire sensor data analysis process.

2.5 Audio based stress level detection component

The audio based stress level detection component produces an estimation of a person's level of stress based on the recorded audio of their voice. It can be applied to First Responders in the field (based on radio communication or other audio recordings) or to incoming phone calls (or voice messages) from citizens to the emergency service's phone lines.

For prototype 1 an initial version of the audio-based stress detection module was integrated in the platform, receiving audio recordings and passing its output to the stress fusion component to produce a stress level estimation combining audio and sensor base detection. A second improved detection model was trained and is currently being tested (and integrated with the fusion component).

In the future, the module will be further improved (by training better statistical prediction models) and potentially adapted to other situations, such as the analysis of phone calls.

2.6 Visual analysis component

The xR4DRAMA visual analysis component exploits modern computer vision and deep learning techniques in order to *a)* extract useful information from images and videos and *b)* filter and pre-process videos before their input to 3D reconstruction.

The visual analysis version of the 1st prototype receives input from different sources (xR4DRAMA's crawled data, citizen mobile app and authoring tool) and is made up of several modules, each of which extracts different types of information. The Scene Recognition (SR) module characterizes the type of scenes represented in analysed images or videos from a variety of scene categories selected to meet the needs of the xR4DRAMA's use cases. The Emergency Classification (EmC) module aims to determine if there is any emergency situation (flood, fire) or not. The Building and Object Localisation module (BOL) localizes objects and elements of interest, as well as people and vehicles that could be in danger when an emergency (e.g., flood) is detected. Moreover, in order to get more accurate results from the BOL module, a Photorealistic Style Transfer (PST) algorithm is used as a pre-

processing step before the analysis of images and videos from the BOL module. In the case of video analysis, a Shot Boundary Detection technique is used to break videos into the numerous scenes they include and then analyse each video shot. The information extracted from the visual analysis component, forwarded to the xR4DRAMA's Knowledge Base. In addition, visual analysis filters and pre-processes videos before the 3D reconstruction. More precisely, indoor video scenes and blurry frames filtered out, while moving objects (e.g., vehicles) and people faces blurred in order to assist the task of 3D reconstruction from videos. A detailed description of each visual analysis module in the context of the xR4DRAMA's 1st prototype can be found in "*D3.2: Outdoors localization algorithms & tools v1*".

In the second development cycle, we aim to deploy an algorithm for water level estimation from video analysis (e.g., from static surveillance cameras installed next to the river) and make existing algorithms more robust in terms of accuracy and execution time.

2.7 Audio and textual analysis

The audio and textual analysis component serves to extract and structure relevant information from audio-based (speech) and written textual content.

For prototype 1, automatic speech recognition was integrated in English and Italian, providing transcripts of audio messages sent through the Citizen App. It was successfully tested during the disaster management pilot in Vicenza.

The output from the speech recognition module, as well as other written messages is then passed to the text analysis module, which extracts relevant information from the text and provides a structured representation of its content. This feature has been applied during the pilot test to the messages from the Citizen App as well as to the tweets previously collected by the crawler. The aim of this is to detect and tag emergency-related situations (such as people in danger, blocked or flooded roads, etc.).

In the future, the audio and textual analysis component will also be applied to phone calls to emergency services (initial tests have already been performed), as well as other information sources relevant to the media production use case (extracting information focused on the needs of that use case).

2.8 Space modelling component

This component exploits visual data from UAVs, digital archives and web resources, and satellite remote sensing to generate 3D models of urban and country areas

2.9 Decision Support System

This component is responsible for the inference techniques that will be developed for decision support framework in the domains of media production planning and disaster management, and semantic content annotation and integration. The main issues will be addressed in this component are two: a) Dealing with probabilistic information coming from the various modalities and content retrieved from search. b) Being able to reason efficiently

upon a large knowledge base. In the first prototype, for the Decision Support System (DSS) component we have: i) identified the fields and data that will be needed for decision support, ii) defined a list of competency questions regarding the collected data to be used in the ruleset, and iii) formulated the first version of the semantic reasoning ruleset (I.e., risk aggregation, citizens-to-protect, and other). Moreover, for the DSS component we have constructed an information retrieval mechanism, which when given a project id, and two timestamps can retrieve information that can help the textual generation mechanism and the backend end API.

The ongoing work for the second prototype of the DSS is based on the creation of Points Of Interest (POIs). More specifically, when a POI will be created or updated, some information from the POI will be sent to the DSS component, such as the number of affected objects or persons, the type of destruction, and the coordinates. Next, the DSS component will compute a severity score, based on the aforementioned information, in order to add the severity score to the POIs, which have been considered related to the message by textual or visual analysis.

2.10 Text generation module

The text generation module converts structured information from the various analysis components (textual, visual, stress, etc.) into human-readable reports or messages. It can be used to prepare aggregated documentation as well as status or situation updates or messages.

For the first prototype, a preliminary version of the text generation module was implemented in the context of disaster management domain. Given a project id and two timestamps, the module receives the information selected by the DSS component and provides a verbal summary in English or Italian of the emergency situations that occurred in that timeframe. The generation is performed using the UPF grammar-based generator FORGe (Mille et al. 2019)[1], which allows for multilingual generation of more or less complex structured data. A detailed description of the implementation can be found in *"D3.6: Multilingual information generation techniques v1"*.

For the second prototype, regarding the disaster management use case, we are currently working on improving the quality of the status/situation summaries and also to implement the generation of a title and small description for the POIs created from text and visual analysis information. As previously mentioned, this will be implemented using UPF's FORGe rule-based generator. Regarding the use case of media production, the module will generate a report by organising in a coherent and cohesive way the relevant information coming from the data acquisition and language analysis modules. Therefore, the report will contain information such as visa requirements, shooting permits, recommendations based on the region's political or sanitary situation, usual weather, infrastructure availability, etc. And the

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[1] Mille, S., Dasiopoulou, S. and Wanner, L., 2019. "A portable grammar-based NLG system for verbalization of structured data". In *Proceedings of the 34th ACM/SIGAPP Symposium on Applied Computing*, pp. 1054-1056

implementation in this case can also include machine translation and/or text simplification as well as the grammar-based generator.

2.11 Semantic Integration

The main functionality of the Semantic Integration component is the generation of the mappings responsible for directly linking heterogeneous digital evidence including audio, video, text, and sensor analysis. In the first prototype, for the semantic integration mechanism it was possible to integrate the messages from the other components (i.e., visual, textual, and stress level analysis), both for PUC1 and PUC2 requirements. In addition, the knowledge graph scheme has been updated to represent all the knowledge needed for PUC1-PUC2. Moreover, the semantic integration mechanism has been enriched with an information retrieval mechanism, which when given a project id and two timestamps can retrieve information that can help the textual generation mechanism and the backend end API.

The ongoing work for the second prototype of the semantic integration mechanism is mainly about creating or updating a POI. More specifically, when a message is received from the textual or the visual analysis component, the integration will search for similar POIs, based on location, category and sub-category labels (for now), and if one is found it will update the information in the similar POIs. Otherwise, the integration mechanism will create a new POI.

2.12 GIS Services

The GIS Service functions as a support to the AR app and, at the next phase, the Authoring and the VR frontend tools, by providing a geospatial database with content of different modalities (2D and 3D visual content, audio files and generic data such as PDF files). The provided content is aggregated to a common reference coordinate system and serves as the underlying localization platform that will allow all relevant data to be suitably projected in 3D space. Simultaneously, the GIS Service offers the ability to execute geospatial queries that provide the user with the ability to navigate between two physical points given a set of rules, the ability to retrieve the closest points of interest (POIs) relevant to the user's GPS location, the ability to reason on overlapping areas, as well as the ability to reason on spatial coherence. All information can be organised, reformed, and served to the client apps in multiple suitable formats. At the same time, the GIS Service is assisting the AR app navigation in the real world's physical space.

2.13 End user tools

2.14 VR Authoring tool

The VR Authoring tool is a windows application built using Unity3D. The authoring tool provides an entrance to the xR4DRAMA tools and acts as a central point for the data and actions that a user of xR4DRAMA would like to use. In the 1st prototype of the tool we implemented the major functionalities, which included creation of projects, creation and editing of users. The tools furthermore can gather data from open street maps and connect

with the backend services to get and visualise data gathered by various services. The Authoring tool allows navigation in the location decided for the project, add new points of interests and comments. This helps in creating a fully standalone tool as well which can help in situational awareness.

Functionalities implemented in the first version:

- User Creation: When starting the application, the user can create a user account on the platform for themselves. Currently, a username and password is required, in the upcoming versions, a user verification will also be done for security reason.

- Project Creation: Once the user is logged into the platform, the tool allows the user to create a project, to do so a project name and location is needed. Project information and dates of the projects are optional functionalities that the user can add.

- Adding users to projects: User has the functionality to add other users to the project to be able to collaborate on the project.

- Choosing a location on a map: Once a project is created, user can choose the exact location of the project, based on the previous location provided. The tool uses OpenStreetMap[2] to get the map data as well location of interests in the desired area.

- Add/View and Edit various media/text data on specific locations on the map: Users have the ability to add text/images/videos at a specific location in the map. This will allow other users to view and edit them. This will allow users of other tools to also see the media.

- Connect to the VR Collaborative Tool: The tool has the ability to start the Collaborative VR tool.

The next version of tool will expand on the already implemented functionalities, address bugs found during testing and add new functionalities based on the feedback from the users.

2.15 VR collaborative tool

The VR Collaborative tool puts multiple users in the middle of the location of the project, where in VR or desktop they can gain situational awareness, collaborate with actors and discuss media production or disaster management. The current version of the tool supports the following functionalities:

- Currently, for the first prototype the following functionalities are developed:
- 3D Map view: The tool is able to create a 3D Map view of the chosen location along with basic heights of the surrounding buildings

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[2] https://www.openstreetmap.org/

- 2D Map view: The users can also view a small 2D Map on their HUDs
- Multiple people in the same environment: Multiple VR/Desktop users can share the same VR Environment by just logging into the same project and using the VR session ID shown when a session is started in the Collaborative tool
- Talk to people in VR: During a VR Session, all users can talk to each other
- View User generated content: The users can view images etc, generated by other users and put on a specific location

In the next version of the tool, we will expand on functionalities, add new features based on user requirements and feedback from the testing of the 1st prototype

2.16 AR App

The AR app is the interaction interface provided to the users in the field, either they are 1st responders in the Disaster Management scenario (PUC1), or they are the location scouters and journalists of the Media Planning scenario (PUC2). The AR app is being developed as a mobile phone application with features that follow the user requirements. The AR app communicates bilaterally with the platform so the users get the latest information from the platform and at the same time the control room receives updates from the field. In this way, both actors in-situ and away have improved situation awareness. This deliverable supplies demos for using this 1st version, as well as basic implementation details. It also supplies a brief state-of-the-art, including the most common augmented and mixed reality devices. Furthermore, a complete list of the user requirements fulfilled by the AR app is given. Also, the progress and the next steps of the AR app development are documented. This 1st version of the AR app is dedicated not only to resolving most of the connectivity and integration issues with the backend and the GIS Service, but also to concretizing and exemplifing the user requirements to specific features and processes of the app. As a result, most of the 2D screens needed and the 2D map view of the app have been prepared with fully operating features, such as receiving points of interest (POIs) from the GIS, editing, updating, uploading multimedia at POIs, and getting navigation routes that consider danger zones. Furthermore, the first features related to POIs have been ported to the augmented reality view, as the outdoor navigation issues have been partially resolved. The accuracy of the outdoor navigation and the pose estimation of the user will improve in the next version based on the work that is done on visual SLAM and the scene recognition algorithms.

2.17 Citizen Mobile App

The Citizen Awareness App is a mobile situation awareness application that aims to support the general public during a crisis event. The app is able to gather context for each user based on different variables such as location, time and proximity to the incident area and informs them about the current state of situation, possible threats or alerts and provides instructions. Furthermore, users provide data (text, audio, images and video reports) via the mobile app which are fed to the xR4DRAMA platform where they are processed by the corresponding visual, text and audio components and the results are integrated in the platform in order to update the current situation.

The Citizen Awareness App has a secondary mode, intended for first responders, with main purpose of collecting physiological signal data from the smart vest (physiological acquisition module) worn by first responders. These data are sent to the xR4DRAMA platform where they are processed by the stress detection component and the results are displayed on the front-end tools (AR app/authoring tool). More information about the implemented technologies supported by the prototype version of the Citizen Awareness App can be found in D5.3 – 'Prototypes and mobile development v1'.

Functionalities implemented and tested in PUC1

The prototype version of the Citizen Awareness App was used during PUC1 on the use case of Vicenza flood and supported the following functionalities:

- Text, audio and image emergency report options for the citizens (Figure 1);
- Text notification system, allowing the professionals in the control room to inform the citizens about the status of the disastrous event (Figure 1);
- Upload of the physiological data of the first responders to the xR4DRAMA platform (Figure 1);
- Multilingual support (English - Italian);
- Notification centre for message archiving.
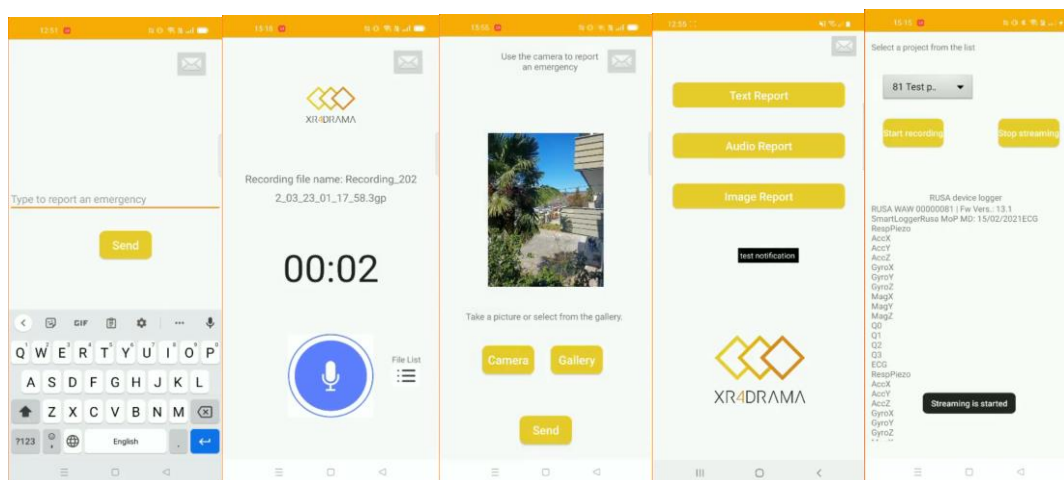
Figure 1 From left to right: Citizen text report, Citizen audio report, Citizen image report, Text notification received, Physiological signals streaming.

Functionalities to be implemented in the final version

The final version of the Citizen Awareness App will support the functionalities listed in the prototype version as will modify them to suit the needs of the end users based on the feedback received on the conclusion of the PUC1. Some notable functionalities that are planned to be supported in the following and final version are:

- Added video emergency report option for citizens;
- Map aware notification system (showing user location on map, proximity to safe/danger areas, etc.).

3   GENERAL APPROACHES

This chapter discusses the general approaches followed for the setting up and the evaluation phase of the project an end-user perspective. These approaches were shared and discussed with all the Consortium partners.

3.1 Disaster Management

3.1.1 Approach for the pilot

The pilot to test and evaluate the 1st xR4DRAMA prototype was organized on the basis of the following steps, with the active involvement of the Stakeholders in each of them:

- General test of the xR4DRAMA pilot (16th of May 2022): this activity was intended as pre-test for who used the technologies during the pilot;

- Training of the end users to the xR4DRAMA technologies (17th of May 2022);

- Pilot execution on the 17th and 18th of May 2022: performed by the end-users and stakeholders of the flood scenario;

- Debriefing of the pilot for its evaluation (17th of May 2022 in the afternoon);

During the phases of the pilot, the following roles had been assigned:

- Control room operators: they used the Authoring tool to receive forecasts, real time monitoring of the outcome of the crisis, to send global alerts to the citizen and to establish a bidirectional communication to/from the first responders (equipped with the AR app). During the pilot, the participants who played these roles remained in the control room. This role was performed by members from the Municipality of Vicenza and AAWA;

- Civil protection volunteer teams: the leader of each of these teams used the xR4DRAMA AR app to communicate with the control room, providing incident reports (text and/or video, photos) and receiving tasks from the control room to perform; during the pilot there were two teams of first responders, positioned in different locations according to the storyline. This role was performed by AAWA;

- Citizens: they used the xR4DRAMA awareness mobile app to send incident reports (text and/or video, photos) and to receive notifications from the first responders. During the pilot, the participants who played the role of 'Citizen' were located in specific areas of the city, according to the storyline. This role was performed by AAWA.

3.1.2 Approach for the evaluation

The evaluation of the 1st prototype was based on the flood pilot results, following the criteria explained in the D6.2. More in detail, the main pillars for this process are:

- Observation sheets: these sheets collected the feedback and notes taken by the actors in each of the three sessions. Each actor was assigned a specific type of role

with the aim of taking note of each performed task, its timing and occurred problems. The actors were also advised to write down any helpful comments about interacting with the xR4DRAMA technology.

- Questionnaires: created according to the criteria expressed in the D6.2 and provided to all the 'actors' after the pilot. Each questionnaire contained a series of questions on how the 'actors' assessed the organization and structure of the pilot, the ease of performing specific tasks with the xR4DRAMA technology; there were also questions about the evaluation of specific system functionalities and their feeling of satisfaction with the use of the developed tools.

- Feedbacks collected in the debriefing: the debriefing session took place immediately after the pilot, where the participants share opinions and provided useful feedback on their experience with the xR4DRAMA technology, regarding their roles, on what they liked, on the difficulties, suggestions for the future improvements etc. All contributions from end-users were translated by AAWA staff in the presence of the xR4DRAMA Consortium.

3.2 Media Production Planning

3.2.1 Approach for the pilot

Similar to AAWA approach DW tested the pilot in Corfu in the 3rd and 4th of May 2022 following the steps listed below:

- Location scouting on site (incl. taking photos for 3D model by phone, 360° photos, sound);
- Data input of photos for 3D model;
- Location Scouting at Spianada and Kremasti;
- Control Room checks Level 3 Situation Awareness.

During the data acquisition in the field, the whole consortium participated in the activities to see and provide feedbacks on the implemented functionalities.

3.2.2 Approach for the evaluation

Regarding the evaluation criteria, DW chose to combine a checklist approach ('What has been implemented?' – s. detailed list in section 5.4.4) with a catalogue of carefully selected qualitative questions that are reflected in the walkthroughs and summarized user interviews.

The three key questions (and sub questions) we went back to over and over again:

- How much situation awareness does the system provide?
- Will an (enhanced) xR4DRAMA model give you a decent impression of the designated media production area?
- What about UX, UI, usability?
- To which extent is the user able to fulfil their task and achieve their goals? (effectiveness)

- How much effort does the user need to invest to come up with accurate and complete results? (efficiency)
- How satisfied is the user with the system? (satisfaction)
- How stable and mature is the system?

4   DISASTER MANAGEMENT PILOT IN VICENZA

4.1 Description of the Site

The pilot involved different areas of the city of Vicenza:

- Control Room (or COC Room): where the COC is established in case of a crisis that involves the Municipality. In this room, for the entire duration of the pilot, the Decision maker was settled, together with the COC delegates, the control room operators and the relative observers.
- Vicenza City center: First responders and Citizens were divided in teams deployed in the most critical points (in terms of flood risk) along the Bacchiglione River, in order to test the mobile apps. Some of the chosen points are the location where the Municipal Civil Protection plan defines some preventive actions that must be taken by Civil Protection Volunteers when the water level in the Bacchiglione River exceeds the alert thresholds.
- The S. Agostino - Park Retrone district: suburban-rural area is in the southern of the Municipality of Vicenza, crossed by the Retrone river.

a) Vicenza historical center   b) S. Agostino – Park Retrone District

Figure 2 City areas involved in the pilot

Control Room

The Vicenza COC (Municipal operative command center) is in "Sala Chiesa" at Palazzo Trissino, Corso Andrea Palladio 98, Vicenza.

Figure 3 Control room at Palazzo Trissino, Vicenza

In the COC room the xR4DRAMA system was installed to support all three sessions of the pilot. The PC and the projector in the control room were used for connecting to the Authoring Tool and the VR collaborative tool to monitor the situation during the simulated flood emergency.

Vicenza city center

During the pilot, in the city center the teams of first responders and citizens were assigned to different areas, in which they performed tasks in specific locations according to the assignment by the control room or they sent specific flood incident reports.

The main areas were:

- Blue zone: both sides of the Bacchiglione river between Pusterla bridge and Matteotti Square;
- Green zone: the area around Park Fogazzaro and Pusterla bridge;
- Red zone: the area around Querini Park.

In these areas some of the most flood-related critical points are present, where the Civil Protection teams perform their tasks:

1: Ponte degli Angeli; 2: Querini Park; 3: Piazza Matteotti; 4: Ponte Pusterla; 5: Park Fogazzaro; 6: Contrà dei Torretti; 7: Palazzo Chericati; 8: via S.Domenico; 9: Contrada Porta S. Lucia; 10: Hospital Park; 11: Viale Rumor; 12: Contrà delle Chioare; 13: Contrà Pedemuro-San Biagio; 14: Piazza Araceli.

The figures below summarize the above-mentioned points and areas.

Figure 4 Blue zone

Figure 5 Red and green zones

4.2 Agenda of Activities

In the following table is provided the official agenda of the disaster management pilot and of the related activities.

Day 1

Start	End	Subject	Presenter	Duration
9:30	9:40	Welcome – Introductions	AAWA	0:10
9:40	10:10	Introduction to xR4DRAMA	CERTH	0:30
10:10	10:40	Introduction to the Pilots objectives and scenario	DW/AAWA	0:30
10:40	11:10	Explanation of the Pilot organization (roles)	AAWA	0:30
11:30	12:30	Components presentation (Each technical partner presents to the users the component implemented)	ALL	1:00
12:30	13:30	Training of the participants - part 1 (Each technical partner trains the users about the Front-end tool implemented) VR Collaborative/Authoring tool AR app	ALL	1:00
14:30	15:20	Training of the participants - part 2 (Each technical partner trains the users about the Front-end tool implemented) Citizen app Smart vest + RUSA device, Water pressure sensor	ALL	0:50
15:50	17:20	Trial Session - Phase 1 (UC_1) - pre emergency	ALL	1:30
17:20	17:30	Wrap up of the day and presentation of following day	AAWA	0:10

Table 1 Agenda of the disaster management pilot related activities

Day 2

Start	End	Subject	Presenter	Duration
9:30	9:40	Pilot Briefing	AAWA	0:10
9:40	11:10	Trial Session - Phase 2 (UC_2) - during crisis, information by citizens • incl. Transportation (location: Vicenza center)	ALL	1:30
11:10	12:40	Trial Session - Phase 2 (UC_2) - during crisis, information update by first responders (location: Vicenza center)	ALL	1:30
12:40	13:00	Wrap up of Phase 2	ALL	0:20
14:00	16:00	Trial Session - Phase 3 (UC_3) - during crisis, emergency management (locations: Vicenza center + Park Retrone)	ALL	2:00
16:30	17:00	Debriefing, Conclusions	AAWA	0:30

Table 2 Agenda of the second day

4.3 Storyline

The story line for the disaster management pilot is divided into three sessions to cover all the flood Use Cases:

- o Session 1 - pre-emergency phase
- o Session 2 - emergency phase: information update by First Responders
- o Session 3 - emergency phase: emergency management on the basis of Situation Awareness

The first session was the pre-emergency phase, before the occurrence of the flood, which focuses on forecasting models. More in detail, the storyline starts with the reception of an official warning message by the municipality of Vicenza, dealing with the worsening of safety conditions along the Bacchiglione river (prediction through early warning system of exceeding pre-established alert thresholds for river levels in sections of interest). After that the mayor activates the structure for the emergency management.

The mayor of the City is the primary civil protection authority within his/her municipality and thus responsible for planning operations and coordinating the Municipal Operational Center (COC- Control room). The operations are coordinated by the Civil Protection Department that uses officials and volunteers. The xR4DRAMA platform needs to provide the Decision Maker all the information related to the forecasted flood in order to manage the situation according to the Municipal Civil Protection Plan.

After this point **the second session** started, when the situation was constantly monitored by the operators in the control room by the mean of the Authoring tool, focusing now on the real-time evolution of the flood event and its consequences in Vicenza. At this stage it is essential to collect data from the territory, both thanks to the help of first responders in the field and thanks to citizens who can report flooding emergencies and critical situations in the territory, elements that must be considered in planning intervention actions.

Moreover, specific public alerts can be communicated to the citizens.

Citizens and first responders send incident reports to signal to the authorities that there were floodings in various areas of the city centre. The control room operators can assign to the first responders' tasks that are not pre-defined but depending on the ongoing situation (e.g., to verify information coming from the citizen's flood reports).

The operators in the Control Room are also constantly updated by the first responders' teams in the field about the status of their assigned tasks.

In this phase, the system collected a large amount of information such as: incident reports, video from fixed video cameras, images and videos taken by the mobile apps, Tweets etc. Regardless of the various sources and their format, the incoming data were analysed by the proper tool of the xR4DRAMA platform. The outcomes of the analysis are presented in an efficient and meaningful manner in the Authoring tool/VR collaborative tool assisting the Decision Maker to consider useful information concerning the incident, such as its location, its level of risk etc.

In the third session, during the emergency, decision makers and first responders face a stressful scenario. It is important for the control room to monitor the status of first responders, in order to better assign tasks. The Civil Protection has a set of pre-defined tasks to assign to the first responders' teams: more in detail, the exceeding of different thresholds at "degli Angeli" bridge triggered a set of pre-defined tasks in the Civil Protection plan in critical points in the city.

The control room needs to assign tasks, check the performed action (by physiological-physical parameters – stress detection), and monitor their execution in real time, guiding the first responder to optimise the performance of his/her action (efficiency and effectiveness, duration) and ensure safety conditions. The first responders in the field are equipped with smart vests to record their physiological parameters and the xR4DRAMA system guides them in the field providing them their stress level and navigates them in the city avoiding dangerous areas.

4.4 User Requirements tested during the pilot

The final list of Disaster Management (PUC1) user requirements, defined in D6.2 is reported in the table below. It should be noticed that, since the flood pilot tested the 1st prototype of the xR4DRAMA platform, not all the URs mentioned in D6.2, have been fully implemented during the first version of the system and thus tested during the flood pilot. More specifically, the URs fully implemented in the 1st prototype of the platform are in green box in the table below, while the URs which were not tested during the pilot are highlighted in orange.

Info-ID	Category	Name	Description	Possible source of information or data
PUC1-01	Geography, Surroundings	Rivers, Embankments	indication of rivers, water courses, riverbanks	information via GIS data;
PUC1-02	Geography, Surroundings	Manholes, electrical and gas pipes	indication of manholes, electrical and gas pipes	information via GIS data;
PUC1-03	General information	Areas of attention, safe waiting places, shelters	Information on the presence of areas of attention, safe waiting/parking places, shelters, sand-bag distribution areas	information via GIS data/ website of local authorities;
PUC1-04	Flood risk management	Flood maps	Raster data of flow velocity and water depth in flood scenarios	information via Raster data;
PUC1-05	Flood risk management	Risk maps	Information on flood risk level in the territory	information via GIS data;
PUC1-06	Flood risk management	Flood reports	Information about flood reports localized by audio analysis and categorized according to the problem issue	products from audio and text analysis sent from mobile app for citizens;
PUC1-07	Flood risk management	Flooded elements	Information on flooded elements (e.g. cars and people inside the river)	detected/counted from video, images and audio messages sent from mobile app for citizens, social media;
PUC1-08	Flood risk management	River embankment's overtopping and/or breaking	Information related river embankments overtopping or breaking	products from audio/video analysis and modelling results;

Info-ID	Category	Name	Description	Possible source of information or data
PUC1-09	Flood risk management	Elements at risk	Information on the presence of elements at risk and the degree of emergency	detected/counted from video, images and audio messages sent from mobile app for citizens, social media;
PUC1-10	Environmental factors	Sensor measures	Information on environmental variables: water level, rain, temperature, humidity	information from AAWA database or environmental agencies' websites
PUC1-15	Geography, Surroundings	Land use change, past flood events' extent	Information derived by satellite images analysis	Information from COPERNICUS satellites
PUC1-16	Flood risk management	Population potentially in danger	Information on the potential presence of people in areas at risk	information from AAWA database
PUC1-17	Flood risk management	Cultural heritage/natural sites potentially in danger	Information on the potential presence of cultural heritage/natural sites	information from AAWA database
PUC1-18	Flood risk management	Civil Protection Plan procedures	Information on the localization, type of action, activation threshold of the Vicenza Risk Management Plan procedures	information via website of local authorities/ AAWA database

Info-ID	Category	Name	Description	Possible source of information or data
PUC1-12	Human factors	Physiological parameters	Physiological parameters of first responders in the field	data by location scout
PUC1-13	Human factors	Stress level	detect by stress analysis the stress level in first responders affected by flooding/involved in rescue operations	sensors for stress analysis
PUC1-14	Accessibility	Best routes	Possibility to define the best possible escape routes or the fastest way to reach an intervention area	simulation in system

Table 3 Flood Pilot User Requirements

4.5 Training activities

Training sessions were organized for the end users, differentiating them according to the roles established during the pilot.
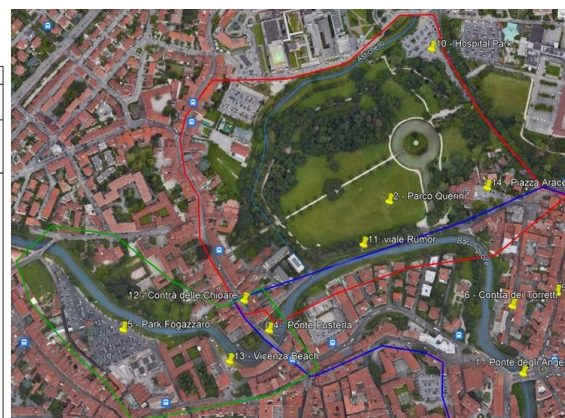
Figure 6 Training sessions.

The aim of this activity was to provide to the users involved in the pilot a general overview of the xR4DRAMA platform, to train them on the main features of the XR4DRAM apps required for the pilot and to explain their role in the pilot itself.

This activity has been specifically addressed to the people who participated in the pilot as First responders and citizens.

Figure 7 Example of activity sheet provided for the citizen's role

The milestones of the training sessions were:

-        provide a general overview of the xR4DRAMA platform and of the goal of the Pilot;

-        explain the features of the xR4DRAMA mobile apps;

-        install the xR$DRAMA mobile applications in each device;

-        basic settings of the mobile applications;

- explain to the users with role of citizen how to send incident reports and attach multimedia like photos and audio files.

Figure 8 Example of activity sheet provided for the first responder's role

- explain to the users with role of first responders more advanced features of the dedicated mobile apps, including the login as first responder, the features for receiving or refusing tasks and for updating their status; how to connect the app to the RUSA device to record their physiological parameters.

4.6 Pilot Process and Outcomes

4.6.1 SESSION 1: UC_1 Pre-emergency management

The xR4DRAMA carried out an initial automated query on the expected flooding scenario in Vicenza, by indexing information about Vicenza and flooding related situations from openly available web- and cloud-sources as well as from a predefined set of proprietary repositories. The results of this query have been analysed, organized and presented in the Authoring tool to create a Level 1 situation awareness.

- **Front-end tools involved**:
  - VR Authoring tool;
  - VR Collaborative tool.
- **Back-end modules involved**:
  - GIS;
  - 3D reconstruction;
  - Satellite images;

- o Web data collection;
- o Text analysis;
- o Visual analysis;
- o Text/natural language report generation.
- o
- **Users involved**:
    - o staff in the control room.

Figure 9 Control room operator's role in the pre-emergency phase

During this phase most of the tools functioned correctly as reported in the observation sheet; there were some missing important layers that did not allow the operator to perform all actions, those layers are basically the ones generated by the field reports of citizens. The Observation sheets report also some suggestions to make the platform more suitable for users, mainly concerning the quality of the 3D reconstruction and the usability of some tools in the VR environment.

All those suggestions were discussed with technical partners in order to improve the products.

4.6.2 SESSION 2: UC_2 Emergency: Information update by First Responders

The xR4DRAMA provided the control room to access a more complex level of situation awareness, updating the informative layers already available with information from the field.

- **Front-end tools involved**:
    - o VR Authoring tool;
    - o VR Collaborative tool;
    - o AR app;
    - o Citizen mobile app.
- **Back-end modules involved**:

- o GIS;
- o 3D reconstruction;
- o Satellite images;
- o Text analysis;
- o Visual analysis;
- o Text/natural language report generation.
- **Users involved**:
  - o staff in the control room;
  - o first responders;
  - o citizens.

Figure 10 Control room operator's role and citizen' role in the emergency phase

This phase, due to the absence of some specific connections between the modules, provided less functions available for the Authoring tool; the Citizen app and the AR app provided basically all the foreseen functionalities

The absence of the POIs based on the reports generated by citizens and first responders led to some issues because the decision maker was not able to have a complete picture of the emergency. Also, the stress level of first responders was not present in the Authoring tool. Other issues linked with additional functionalities were reported to the technical partners in order to improve the platform.

As already mentioned, the citizen app and the AR app provided many of the functionalities requested. For those applications there are many suggestions in order to improve their functions as reported in the following chapters.

4.6.3 SESSION 3: UC_3 Emergency management on the basis of Situation awareness

The xR4DRAMA system provided first responders with important information and reproduced in real time the actual event inside the control room to allow for well-informed and efficient decision making and mitigation actions planning. The xR4DRAMA system showed first responders how to act safe and efficiently during an emergency, based on the available information.

A VR environment has been developed along with AR technologies to visualize the state of the area and to guide the first responders. Physiological sensors on first responders allow

the staff in the control room to assign tasks to a person based on their updated personal physical status in the stressful situation.

- **Front-end tools involved**:
  - o VR Authoring tool;
  - o VR Collaborative tool;
  - o AR app;
  - o Citizen mobile app (first responder mode, for sensor-tracking only)+ RUSA device and Smart vest
- **Back-end modules involved**:
  - o GIS
  - o 3D reconstruction
  - o Satellite images
  - o Text analysis
  - o Visual analysis
  - o Text/natural language report generation
  - o Stress levels (audio & sensor-based)
- **Users involved**:
  - o staff in the control room;
  - o first responders.

Figure 11 Control room operator's role and first responder's role in the emergency phase

From this phase emerged mainly the request to improve the 3D reconstruction in the Authoring tool and the lack of information from the field.

The Observation forms reported also the lack of visualization of stress level in some AR app probably due to a connection problem with RUSA devices and the AR app. The stress level indicator was absent in the Authoring tool not allowing the operators in the control room to assign tasks based on the current personal physical status of the first responders in the field.

4.7 Evaluation criteria for the disaster management pilot

The evaluation of the pilot was planned using a specific approach, dividing the technical performance or implementations from the expectations of end users. The Observation sheets are in fact a schematic way to collect technical feedback with specific evaluation in terms of performance indicators of the system, bug reports, functionalities and technical

feedbacks. The Questionnaires aim to acquire more subjective feedback, very useful for the improvement and exploitation of the project; unlike the Observation sheets, the questions asked to participants in those documents provide an overview of the background of the users involved and their feelings and suggestions about the system.

4.7.1 Observation sheets

Observation sheets are structured as a document that should be compiled directly in the field during the demonstration by the observers or by other users not directly involved in the project.

Those instruments are developed for each phase of the emergency to verify in a real situation the entire workflow of xR4DRAMA platform. The forms of those documents report a series of specific actions that should be performed by the operator in each phase of the pilot, chronologically ordered to let the observer follow totally the storyline of the pilot. The second column describes the place where the action is supposed to be deployed, while the following three columns contain the checks about the status of the action (done, done with some limitations, issues etc. and not done). The sixth column contains the tool responsible for the action in order to permit to technical partners to acquire specific feedbacks on each tool. The last two columns contain the timing for the action useful to test the performance of the system and the notes by end users.

4.7.2 Questionnaires

Questionnaires are structured to acquire feedbacks on each tool developed including the smart vests for stress level detection by Smartex. Each questionnaire should firstly acquire a general overview of the user, his/her background and knowledge and some general data as the age and gender in order to ensure that who evaluate the platform belong to a balanced group, representative of all potential users. After the general part each questionnaire provides specific questions about each tool used in the exercise based on the role selected. This part is particularly useful in order to acquire feedback on the usability of the system, on the alignment between expectations and real products and in order to acquire any other need or idea for the final system. Questionnaires are also useful for technical partners to validate some choices, as for example the improvement of Smartex vest and the consequent usability and comfort or the new sensors developed.

4.8 Results of the evaluation for the disaster management pilot

4.8.1 Results of the observation sheets

Observation sheets report some suggestions to make the platform more suitable for users listed and synthetized in the table below:

Tool	Action	Performed
Authoring tool	login	Y
	creation of a project selecting an area and entering all information	Y
	add collaborators	Y

	view all GIS layers	P
	create a task	Y
	lunch VR of the area	Y
	explore the VR environment	P
	display information by citizens from visual analysis	P
	display information by citizens from text and audio analysis	P
	display information sent by first responders	P
	check the stress level	N
	check the status of tasks	P
	check the situation in real time	P
	check the situation in real time in VR mode	P
	send task	P
	display information from first responders	P
AR app	login as first responder	Y
	select categories of interest to visualize	Y
	inset a POI with a picture	Y
	inset a POI with a video	Y
	inset a POI with an audio file	Y
	insert an Area of interest	Y
	editing a POI	Y
	accept, perform and complete a task	Y
	visualize stress level	P
	verify a report and sent a report of an area	Y
	use the navigation tool	Y
	acquire a video for 3D reconstruction	Y
Citizen app	open the app	Y
	report a critical situation sending texts	Y
	report a critical situation sending audio records	Y
	report a critical situation sending photos	Y
	receiving notifications	Y
	first responder mode login	Y
	activate and connect the RUSA device	P

Table 4 Results of the Observation sheets, action performed and results

Table 4 reports about the action performed in the exercise and the results of any action marked as Y (yes, performed correctly), N (no, not performed) and P (partially performed). Most of the actions foreseen in the test were performed correctly and this is a good starting point for the development of the final product. For the partially performed actions information, bug reports and suggestions are reported, as displayed in table 4, in order to provide to the technical partners a complete view of any issues emerged from the point of view of the external observers.

Phase 1 (UC_1) - pre emergency	
Tool	**Improvement**
Authoring Tool (VR tool)	The watch with the command menu was partially hidden by the glove in the VR tool
Authoring Tool (VR tool)	The current resolution of the 3D model is not such as to give a good level of situation awareness in the control room. It would be useful to be able to take advantage of a view from above, with a higher level of definition
Authoring Tool	The POIs are now all selected by default and the user must deselect them one by one: it is better to expect the opposite
Authoring Tool	The ground level perceived by the user is not consistent with that of the 3D model and the POIs appear elevated compared to the reconstructed model
Authoring Tool (VR tool)	Due to the aforementioned ground level problem, when objects (e.g. drone and remote controller) appear they can end up below the ground level and are no longer reachable by the user
Phase 2 (UC_2) - during crisis, information by citizens and first responders	
Tool	**Improvement**
Authoring Tool	Since the correct categories were missing in the authoring tool, the results appeared as POIs in other categories (eg landmark). It was therefore not clear what were the new POIs created and the related information was not displayed clearly (e.g. no image

	attached)
Authoring Tool	For the same reasons mentioned above, the POIs appeared only at the end of the trial and in other categories, making their visualization unclear. The quality of the report needs to be improved and currently the text generation project does not differentiate between the sources examined (e.g. tweets or reports from citizens)
Authoring Tool	some POIs are "hidden" from the 3D model and cannot be selected and Information displayed; it is not currently possible to view the video reports sent by the first responders (they are not visible as attachments in the POI and from the page of files loaded in the project it is not possible to view them)
Authoring Tool	Stress level not present, should be integrated
Authoring Tool	The "completed" tasks category is not currently available and therefore it is not possible to have a complete picture of the situation. - The task completion report (text + audio file) sent with the AR app is not displayed in any way in the authoring tool. It should be added in the "completed" tasks view.
AR app	The filters selected on the categories of layers and POIs are lost every time you close the app or simply switch screens in the app: it should be able to keep the chosen configuration
AR app	in the preview of the uploaded media

	files it is not possible to view the images. Once a file associated with a POI has been uploaded, it is no longer possible to delete or replace it (for the user who created it)
AR app	once a file associated with a POI has been uploaded, it is no longer possible to delete or replace it (for the user who created it)
Citizen app	there is no summary screen of the reports sent (e.g. with report type sending time) the position of the citizen could be displayed on a map to be sure of being correctly geolocated before sending the Report for any type of notifications
Citizen app	there is no alert for the presence of unread notifications
Phase 3 (UC_3) - emergency management	
Tool	**Improvement**
Authoring Tool	Important categories and stress level are missing and 3D reconstruction to be improved as in the phase 1
Authoring Tool	No videos available from citizens; No completed tasks' reports
Citizen app	the transmission of physiological parameters was interrupted several times during the trial (in many cases the data has not been transmitted to the system and/or has not been saved in the RUSA device)
AR app	sometimes the GPS location was not accurate
Authoring tool	Videos were made for the 3D reconstruction of points of interest (eg Basilica Palladiana). the result of the reconstruction has not yet been viewed

Table 5 Results of the Observation sheets, improvements and suggestions

Table 5 reports a series of suggestions and information important for the fine tuning of user requirements, the precise description of any issues is fundamental. As reported no one of these issues was able to block the test and this is also a good result reached during the test.

All information reported in the table were also discussed with technical partner; in order to organize the bug fixing and the future development, all those requests will be inserted in the dedicated online report platform.

4.8.2 Results of the questionnaires

This chapter report about the answers provided by users to questionnaire attached to this deliverable (in appendix A.4).

The results of the questionnaires acquired from the participants are reported below; questions are divided per tool/area.

First questions for the users deal with general questions to provide an overview of the participant's background; most of them are technicians but during the exercise there were also other people with different professionality in order to cover all aspect of the emergency including first responders and decision makers. One of the most important aspects was to guarantee the gender balance in all trials; in this project we manage to acquire answers from both male and female with ages variables between 20 to 50 years in order to enlarge as much as possible the public for any future exploitation.

In order to test all functionalities with a consistent number of people we asked to participants to cover during the exercise as much roles as possible to acquire feedback on the whole platform.

The user interface of the authoring tool requires for most people some effort or trainings to be used; no one select that is difficult to be used. Most of the users found useful the tool both from the operational and decisional point of view. Users also suggest the necessity to integrate the system with the visualization of flood maps and to improve the 3D reconstruction in terms of details.

The general overview of the Authoring tool in terms of clearness and general impression was very good feedback on it, users found the tool clear and useful.

Most of the people involved in the test are already familiar with VR and this allow to acquire a proper judge about the tool; they found the interface clear, not so intuitive but good to be used after training; also, from the decisional and operational point of view this tool was highly appreciated. The need for data is adequately satisfied. Most of the requests of improvements are linked, as in the Authoring tool, to the improvement of the 3D reconstruction and the insertion of specific layers as the flood maps. A specific request that comes during the exercise is to develop two modes to explore the VR environment: a "fly" mode and a "ground" mode to allow decision makers to explore the whole map and stop on some specific points.

Also the AR app provides a clear interface, useful for operations on the field, users provides also reports about the completeness and clearness of information present in the AR app. The improvement requests are about the possibility to visualize more data, as for example flood

maps and about the possibility to improve the task's report part as better described in the following chapters.

The general impression of AR app is also good; and the app is also considered as a useful tool.

The Citizen app includes a mode that allows users to connect to the RUSA device and acquire all physiological parameters for the stress level detection; for this part of the app the feedback was good relating to the interface, defined as clear and useful; but from an operational point of view, users reported some issues with the connection between the device and the app. Technical problems that did not allow them to record correctly their physiological parameters along the whole trial.

An important target reached during the pilot was to test different sizes of the smart-vests and to report on them. The overall comfort was acceptable or comfortable; the vests are sufficiently breathable, and the position of the device and the bands was sufficiently stable.

Also for the smart vest the judgement was good enough.

The Citizen app was one of the most complete tools in xR4DRAMA prototype; the interface was clear with a good general impression. The part that requests some improvement is the presence of notifications because is quite difficult to find them inside the app.

Finally the general impression of the trial session was good, and this is an important evaluation since the scope of this session was to test the platform and tools in a real scenario.

4.8.3 Summary of the evaluation results

The outcome of the evaluation of the first prototype of xR4DRAMA system was positive, however, a few requirements should be adjusted or improved in the final system. The presence of some people from the municipality of Vicenza, in charge of the management of the emergency, provided an unexpected plus in the evaluation. The feedback from them was a good feeling about the platform and technologies. There are also some tools and improvements to be done for the final system; the most important is the integration of flood forecasts and maps from AAWA servers and the integration of specific layers generated by the video analysis, text analysis and audio analysis. Other important improvements should be prepared to integrate the stress level of teams in the Authoring tool and to provide a stable connection with RUSA devices. During the evaluation emerged also some bugs promptly corrected by technical partners, in particular with android 12 OS. Another important improvement that should be developed is the possibility to add an IOS version of the mobile applications to allow also IOS users to test and use the platform.

5 MEDIA PRODUCTION PLANNING IN CORFU

5.1 User Story

Natascha is a documentary film maker for DW. She has been assigned to make a documentary on the island of Corfu – i.e. the TV program envisioned and described in D 6.2. A quick look at her budget tells Natascha the production needs to be rather economical;

specifically costs for background research and location scouting should be kept at a minimum. At the same time, DW is looking to produce an informative program that meets journalistic standards. Natascha is also quite ambitious. She wants to be well prepared, collect a lot of information, and set up everything the right way without spending too much money. Enter xR4DRAMA, the extended reality and multimodal data situation awareness platform that also caters to media production planners – and will tell Natasha (and her team) what designated shooting sites on Corfu look like, plus what's going on there at a specific time.

Natasha is, of course, a fictitious person and simply introduced here for the purpose of a short, concise user story. In the real world, members of DW Innovation and xR4DRAMA partners took on Natascha's role and that of her team members.

5.2 Description of the Site(s)

The island of Corfu (and its relevance) has already been described in D 6.2. As for the concrete sites of media pilot, xR4DRAMA was tested in a hotel conference room in Kanoni (technical preparations, authoring tool, collaboration tool, consortium debates, development) as well as several places in Corfu City (location scouting, mobile app, media recording, data verification). For reasons of clarity and comprehensibility, the team put a focus on Spianada Square (including the von der Schulenburg statue), the Venetian Well of Kremasti plus the backstreets surrounding it, and the Old Venetian Fortress.

Figure 12 Corfu's Old Venetian Fortress plays a prominent role in the xR4DRAMA media pilot.

5.3 Agenda of Activities

The agenda for the Corfu pilot can be summarized as follows:

- technical setup (laptops, XR gear, video projectors, gadgets);

- download and initial startup of the latest project software (Windows applications, Windows framework, Android application);

- preparation of docs and spreadsheets (requirements, expected performance, notes, talking points);

- 'dry run' of the platform and the project in the conference room;

- scouting, media recording, data verification on site on the island / in Corfu City;

- more system test runs and documentation;

- evaluation and technical debates.

Please note that a number of interviews with friendly users were also conducted in Bremen and Berlin – shortly before and after the Corfu test run, but with the same hardware and similar project files.

5.4 Pilot Process and Outcomes

The following section summarizes the preliminary planning and setup work done for the Corfu pilot, the situation awareness concepts taken into account, the evaluation criteria for the platform, the actual prototype status (in comparison to what has been described in D 6.2), as well as the walkthroughs and interviews conducted with a selected group of external users.

5.4.1 Preliminary planning and project setup

In order to successfully perform the media pilot test session, team DW made the following preparations:

Hardware

- set up of three Windows 'gaming' PCs (to run the xR4DRAMA desktop tools);

- set up of three Meta Quest 2 headsets (with connection to the PCs to run the xR4DRAMA tools in immersive mode);

- set up of three laptops for note taking, file sharing, and video conferences;

- set up of three Android smartphones (to test the xR4DRAMA 'location scouting' mobile (AR) app).

Software

- installation of the latest version of the xR4DRAMA desktop software (authoring tool, collaboration tool, .NET framework);

- installation of the latest version of the xR4DRAMA 'location scouting' mobile (AR) app;

- installation of a number of mobile apps for photo/video recording and file sharing.

Organizational

- set up of a number of cloud documents, spreadsheets, and repositories to document the test run;

- set up of a task list for location scouts / media producers.

Figure 13 Preparations for the media pilot test run at the hotel in Kanoni.

5.4.2 Situation Awareness in the test run

As discussed in D6.1 (and a number of project blog posts), the media production pilot is mainly about figuring out how much situation awareness the xR4DRAMA platform is able to generate and provide for its users. We basically distinguish between three levels: Simple Mode, Advanced Mode, and Immersive Mode. The following sections feature quick descriptions of the different modes and how they were 'activated' in the course of the test run.

5.4.3 Initial Mode (Situation Awareness Level 1)

This is the default mode of the platform. It is automatically activated by starting the authoring tool, creating a project, selecting an area of production (in this case: Corfu City) and waiting for the xR4DRAMA services running in the background to do their job (i.e. aggregate as much information as possible on the selected area).

Over the course of the Corfu test run, the initial mode worked basically fine. Production areas could (eventually) be defined in an easy and accurate fashion, the tool retrieved a lot of POIs and generated simple 3D models.

There was, however, no general information and/or useful, web-scraped context data yet. More details are discussed in the required features list and summarization of user interviews.

5.4.4 Enhanced Mode (Situation Awareness Level 2)

This is the more sophisticated mode of the platform. It is activated by updating the initial map based on new information, data points, and media gathered by a location scout sent into the field.

Over the course of the Corfu test run, the enhanced mode worked basically fine. Tasks regarding research and AV documentation could be created, edited, sent, and fulfilled by the field agents who were equipped with smartphones running the xR4DRAMA mobile AR app, and additional devices such as 360° cameras and audio recorders.

There were, however, a couple of issues with the updating process. Projects would not refresh the user view automatically, continuously, or seamlessly. More details are discussed in the required features list and summarization of user interviews.

Figure 14 Team xR4DRAMA taking 360° photos in the center of Corfu City

5.4.5 Immersive Mode (Situation Awareness Level 3)

This is the platform's premium, 6DoF mode.

It is activated by switching to xR4DRAMA's VR mode (which will exit the authoring tool and bring up the immersive collaboration tool). This mode actually works right from the start (for now) – but it only makes sense to use it after the initial model has been updated/refined, e.g. with more pictures, videos, sound recordings, or 3D models based on drone footage or photogrammetry.

Over the course of the Corfu test run, the immersive mode worked basically fine. However, a couple of necessary features were not available then, like the possibility to freely pick any desired vantage point or to 'step into' an uploaded 360° photo.

More details are discussed in the required features list and summarization of user interviews.
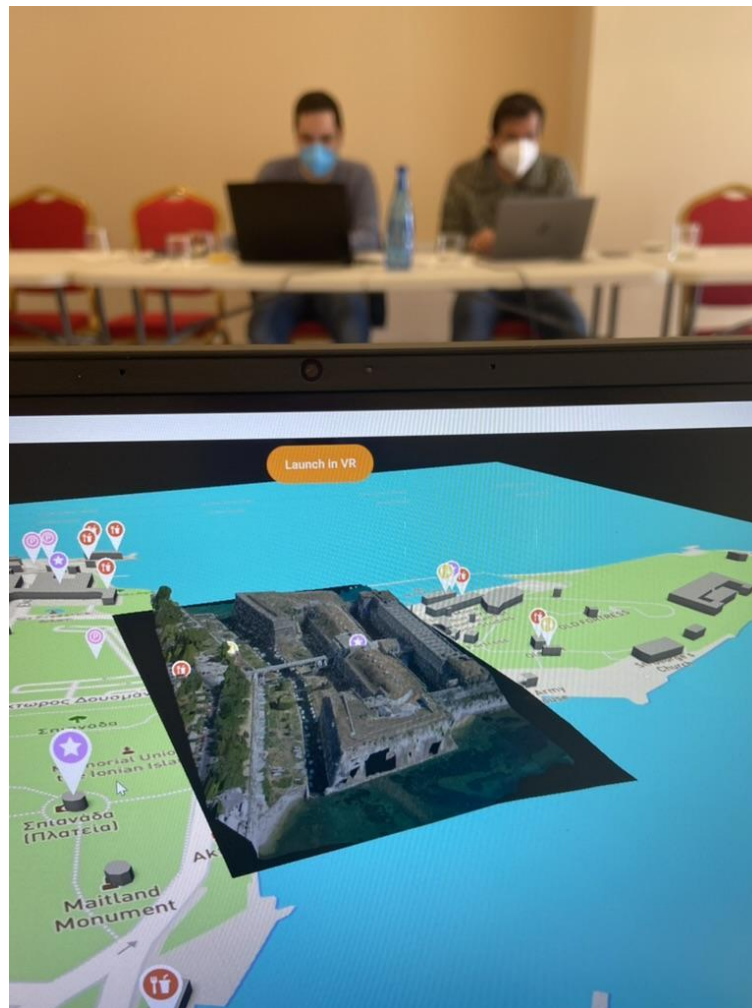
Figure 15 The xR4DRAMA authoring tool prototype on a laptop computer, shortly before switching to fully immersive mode

5.5 Prototype status

The following is an overview of the requirements (defined in D 6.2.) and their implementation status at the time of the Corfu pilot. Please note that some names and descriptions have been slightly changed/updated for better structure and readability – and due to new insights regarding workflows and situation awareness levels. More fine-grained requirements and a long list of minor technical glitches and bugs have been documented as well, but are not included here, as the consortium deems them irrelevant for the platform's basic architecture, functionality, usability. Needless to say, all of them will be addressed in good time.

5.6 User walkthroughs and interviews

This section provides a summary of the extensive xR4DRAMA demo sessions and conversations DW had with a number of selected 'friendly users' (s. D 6.2) before, during, and shortly after the Corfu test run. All sessions used very similar data sets and very similar iterations of the xR4DRAMA software and are thus comparable.

Please note that large scale quantitative testing would not have made sense here due to the complexity of the use case and the need to understand

a) media productions/journalism

b) immersive technology

c) the xR4DRAMA software application kit (desktop and mobile)

The four people instructed and interviewed represent almost all stakeholders in the 'media bubble': DW talked to an XR/media scholar, a production planning specialist/3D model artist, a video/immersive journalist, an XR/3D/gaming expert – and also added observations from internal test runs, which represent the perspective of innovation managers, journalists, and interface designers.

Figure 16 First xR4DRAMA 'test drive' with an external user

5.6.1 V. (XR scholar)

V., who has an academic background in media aesthetics, body theory, and immersive concepts, said that she really liked the xR4DRAMA approach and the general setup of the prototype, but that there is certainly room for improvement.

"At this stage, if I'm honest, a combination of Google Maps/Earth/Street View/Photos, Wikipedia, and a couple of other services might give me more accurate information and better orientation regarding a specific location, and it would not take much longer." She said that we should try and build what she called a "proper 3D notebook/planner".

She added: "The more smartly integrated features and services, the better the situation awareness."

In that context she also highlighted that "orientation is always a challenge", and that "underdeveloped or poor immersion can actually cause alienation or confusion" – and thus does not help at all.

With regard to the authoring and VR tool, she highlighted the need for a clearly visible, big enough map that is always accessible in an easy way. Furthermore, V. explained that "most of us are very much used to the stationary use of tech". Therefore, "immersion and ways to interact in VR really need to be learned" which means the platform may need some sort of tutorial, possibly even scaffolding concepts.

V. absolutely loved and applauded the integrated VR meeting tool, as it is really helpful and interesting to discuss things 'on location'.

5.6.2 T. (production planning and 3D model specialist)

T., who knows a lot about 3D models and works as a supervisory technician and production planner, called xR4DRAMA "an innovative tool" that would be "really helpful" in his line of work.

He was particularly impressed by the 3D of the fortress on Corfu and the smooth location scouting app, which could be improved by introducing "a number of standard AR setups" for specific productions (PTC, simple interview setup, panel discussion etc.).

T. pointed out that all in all "precise, reliable data will be crucial" for the project.

He also assumes that every now and then, location scouts may have to visit a site for a second time (to correct/update missing data).

In a quite fundamental remark T. highlighted that a basic requirement for xR4DRAMA's official use at a European broadcaster would be the option to locally store all data on local devices (data privacy) and establish clear rules/labels for sharing data with others.

Furthermore, T. came up with a long list of smaller issues the consortium should attend to, e.g.

Authoring Tool

The project date needs different/better formatting that complies with (inter)national standards the authoring tool should offer a function to redefine/revise project areas after working on a project has started situation awareness suffers when the default mode does not provide photos a POI favourites list would be a good idea the task list needs an editing function there should be a progress bar telling users how long they have to wait until a project is loaded re-loading of projects should be improved in terms of performance (local data storage?) the function to adjust time (morning/noon/night) would be even better if there was a virtual sun on the edge of the screen to see where the light is actually coming from:

VR Mode

- navigation should be improved, teleportation distances increased;

- the size of the map should be scalable (zoom in, zoom out);

- there should be a way to create POIs in VR as well;

- virtual drone flying would only make sense with a) bigger screens on the remote and b) adjustable camera angles/tilts (to get an overview of bigger sites);

- it would be very helpful to have a reference to (e.g. a virtual person?) to estimate sizes and distances in VR.

Mobile AR App

- an exact scale for AR mode needs to be guaranteed ("does this really fit here?"); objects should not be scalable in the app, but rather displayed in a pre-defined distance.

5.6.3 D. (video and immersive journalist)

D., who is a journalist and video reporter with a strong interest in VR/immersive, also enjoyed testing the xR4DRAMA prototype, stated that parts of it already look really good – and even came up with concrete project ideas/use cases at her media organization. In terms of general remarks, she also suggested the introduction of "different POI fav lists for different jobs", i.e. different clusters for editors, grips, or lighting technicians.

As for design and user experience issues, D.'s comments were quite similar to that of T., but she also raised some new questions. During and after the test run she stated that:

Authoring Tool

- xR4DRAMA needs a feature that allows for the re-definition of production area after creating a project;

- the task list needs editing function;

- the map could use some sort of scroll bar.

VR Mode

- there should be a tutorial of sorts; like in many other XR experiences, users could start in a room where the learn to navigate/interact;

- there is no real feeling/understanding of the scale of a site yet (in VR mode); in this context, it would also be nice to have some information (signs?) on walking distances at defined points;

- users should be able to fly themselves (bird mode);

- photos in VR mode (regular or immersive 360°) are a must;

- the 3D models are currently distracting/irritating (they look better from far away); maybe it's better to go with simple, gray blocks?;

- there is the "somewhat unfulfilled expectation" of being able to explain a realistic looking site in 6DoF.

Mobile AR App

- the tasklist overview could use design overhaul;

- uploading of files in POI info editing mode doesn't seem to work;
- there are a few missing UI elements, e.g. tapping on the paper plane icon is mandatory when sending a comment, but not when uploading visual content.

5.6.4 F. (XR Expert)

Our final tester was F., a 3D artist and game/VR developer with expertise in VR interactions and photogrammetry. He liked the general concept, was specifically "impressed by the high quality 3D reconstructions" as well as the "really nice day/night feature" and mostly commented on flawed UX/UI, with a focus on tool mechanics and navigation. Among other things, he suggested to:

Authoring Tool

- introduce the (standard) function of dragging the map by holding down the right mouse button;
- improve the process of POI creation and editing;
- improve the media file browser (thumbnails, filters, items count);
- fix a couple of design issues (display 360° files in 360°, create better audio file thumbnails).

VR Mode

- change the 'launch in VR' wording to something else, as the VR does not start immediately, and the model can also be explored in desktop mode;
- redesign the initial setup window (too many options, too much text, random room IDs);
- make sure all POI categories are displayed in VR;
- make sure 3D models are less frayed and placed more accurately on the map;
- improve movement/locomotion (introduce flying mode; increase teleport threshold);
- get rid of obstacles (more or less invisible blocks/buildings with intact colliders);
- introduce a 'sticky' map;
- improve wristwatch menu design mechanics (colour palette overlaps, random opening/closing);
- improve virtual drone flights (remote spawns in random position, virtual rotor blades are visible on remote screen, drone crashes when user drops remote, drone positions are not stored, no option to switch from one drone cam to the next).
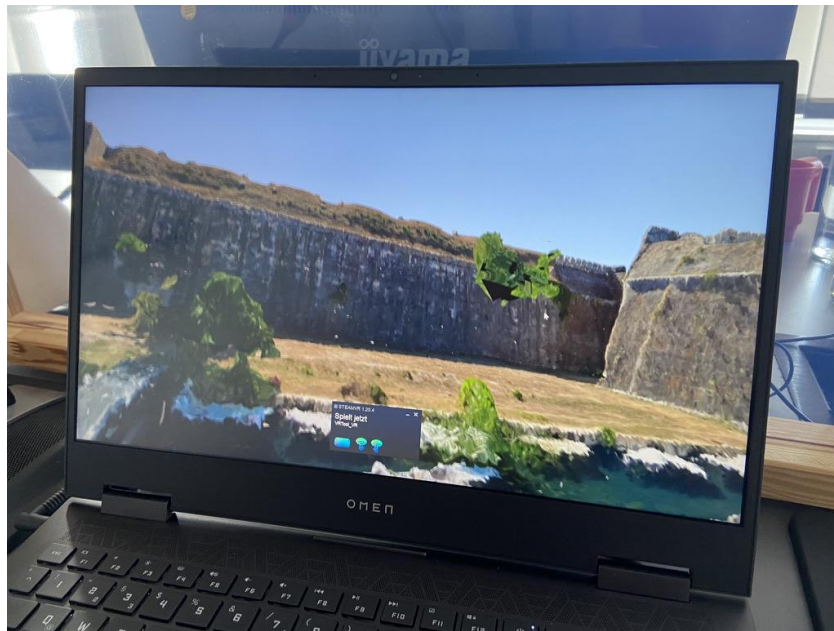
Figure 17 VR Mode

5.6.5 DW xR4DRAMA team

This section documents additional observations and comments by DW's xR4DRAMA core team, which currently consists of three media professionals. Between them, they cover the domains of innovation management, (video) journalism, and interface design. DW's xR4DRAMA team concurs with all remarks made by the external experts, and likes to add the following:

Authoring Tool

- at some point, xR4DRAMA needs proper user management (roles, permissions);

- the core tool should also feature a global search – e.g. to find specific POIs in a cluttered;

- an OCR function for uploaded images would come in handy as well;

- a 'fav list' of POIs (ideally: multiple lists with custom names) seems to be mandatory at some point to cater to production needs;

- a fully rendered dummy avatar that can be placed anywhere in the 3D model as a reference of scale.

VR Mode

- locomotion should be improved: joystick/controller movement, better teleportation, climbing on 3D structures, flying;

- probs/setups places in AR mode (app) should also be visible in the VR environment.

Mobile AR App

- some sort of virtual measuring tape (that optionally sticks) would help with production setups.

5.7 General assessment

The test run on Corfu (and the user sessions based on the Corfu data/tech) showed that roughly 1.5 years into the project, the consortium has managed to create a very solid prototype for the media use case. xR4DRAMA can already be used 'in the wild', and it is on the verge of becoming a feature-rich XR production planning platform. However, it is also clear that there is quite some room for improvement and refinement.

Regarding SA, the platform suffers from somewhat incomplete data and content collections (or the representations thereof). This is especially true for text material and general assessments of a place and its 'vibes', i.e. the NLProc pipeline. At the same time, increasing SA with the help of location scouts (who can use an advanced Android app) and by diving into a scene (thanks to a number of 6DoF VR features) works surprisingly well already, even though a (much needed) feature to display 360° photos still has not been implemented. Over the next couple of months, a development focus should perhaps be on very basic, automated processes that contribute to better L1SA results.

UX, UI, and usability are also quite solid – with the entire process headed in the right direction, as basically all design/interaction issues have been painstakingly documented/analysed and there is a commitment to ironing them out in upcoming iterations of the xR4DRAMA tools.

Next to fixing several smaller irregularities and adding features to improve production planning efficiency, a major challenge will lie in giving users better orientation on the map (especially in immersive mode), better navigation options, and possibly some sort of intro/tutorial. As for bugs, errors, and overall performance, the xR4DRAMA tools already work relatively well and also seem to be quite stable. Nevertheless, when putting the authoring tool to its paces (unforeseen updates of meta and in-project data, switching between modes, lots of movement on the model etc.), a substantial number of glitches and even some dead ends come out in the open. All of them should be known and documented by now. The Android location scouting app seems to be more performant than the authoring tool at the moment.

All in all, the current version of the platform meets a lot of system requirements (frontend features/functions), but relatively few information requirements (connected services running in the background). This imbalance is already being fixed, though.

Figure 18 The xR4DRAMA 6DoF VR collaboration mode – experienced in a VR headset and broadcast onto a screen.

6   REFINED USER REQUIREMENTS

Following the implementation of both prototype the PUC leaders with technical partners started to revise the user requirements to improve the final product. The first milestone of this work was the agreement on the categories and layers for the Authoring tool and the AR app; in order to implement this task AAWA and DW worked on a Miro Board generated by technical partners to finalize categories and layers that should be presented in the last version of the Authoring tool and AR app.
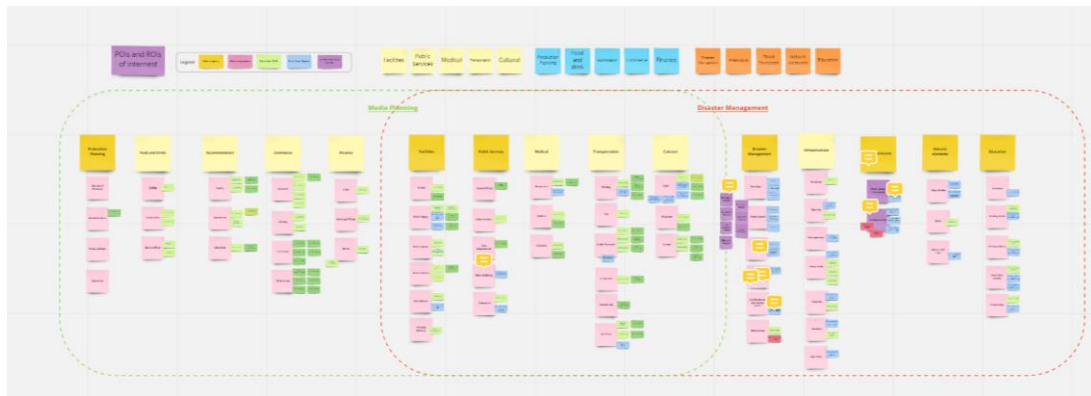
Figure 19 image of the Miro Board

Regarding the requirements, the following tables reports about the status of each requirement with some comment after the evaluation to fine tune all of them.

6.1 System requirements

Req Id	Name	Description	Implementation status/Comments
SYS-1	System dashboard and admin interface	An application interface that allows for high-level operators to access the xR4DRAMA system from the control room	Implemented, some features still missing
SYS-2	End-user interface	An HCI that allows end-users to easily communicate with the system	Fully implemented
SYS-3	Location ingest	Possibility to define a specific location	Fully implemented
SYS-4	Location-query	A functionality of the system that allows end-users to initiate a query regarding a specific location in web- and cloud services	Partially implemented, focus on OSM (other web data still missing)
SYS-5	Aggregation of query status and results	The capacity of the system to observe the query and aggregate the identified content (e.g. videos, images,	Partially implemented; buildings, POI, satellite images; no other data yet

		text) in an organized manner (categories, clusters, order)	some categories/clusters need to be refined
SYS-6	Immersive visual representation	A functionality that visualizes the location and additional information to enhance situation awareness (e.g., VR, AR)	Almost fully implemented, but 360° photos can be viewed in equirectangular mode only
SYS-7	**Initial situation awareness** for control room staff *refined requirement*	System can present available information in a spatial view ● Bird's Eye/map ● PoV	Fully implemented; Bonus: immersive mode can be activated even though Level 1 SA does not call for it; however, Bird's eye and POV can't be combined
SYS-8	Multilingual text generation	The system will provide relevant information in the user's language of choice (English, Italian or German).	Not implemented; system language is English for the moment
SYS-9	Edit query results	Control room staff must be able to filter, cluster, annotate and amend the query results	Not implemented (no query results yet)
SYS-10	Add own data	Control room staff can add images, videos, models or scans to improve data, or change certain data points that might not have been available, e.g., availability of public parking	Partially implemented; some type of media cannot be added yet (360° photos, photogrammetric scans, ambisonic audio)
SYS-11	Communicate own data *corrected version; error in previous deliverable*	Control room staff is able to send data or tasks (assignments) to other users (e.g. location scouts, first responders)	Implemented, but needs minor improvement (UI/UX)
SYS-12	Mobile application	An application that allows for operating the system in and from the field	fully implemented, with only a few lacking features

SYS-13	Citizen application	An application that allows citizens to send video, images and audio messages, reporting flooding emergencies (PUC1 only)	Fully implemented, missing the connection with authoring tool
SYS-14	Remote access to initial situation awareness	The capacity of the system to grant remote users (e.g. location scout) access to a Level 1 situation awareness representation (partly or in total) via the mobile application. Citizens (PUC 1 only) should receive useful information such as alerts, risk zone warnings about areas at risk, position of safe areas, sand-bag distribution, shelters.	not implemented yet
SYS-15	Information ingest	A functionality that allows the location scout to update information about a specific location and to add videos, images, text as well as data from other sensors	Fully implemented
SYS-16	System updates	The system processes new input (e.g. from location scout/first responders) and updates previous results and representations	Fully implemented, but not 100% stable (project refreshment issues, UX/UI)
SYS-17	Enhanced situation awareness	The updated data is used to create an enhanced version of the scene graph containing all available relevant content and information	Fully implemented (in terms of view updates)

SYS-18	**Immersive situation awareness** *refined requirement*	The system provides functionalities that further increase situation awareness and can be utilized by control room staff at will ● 6DoF immersive mode ● possibility to define camera positions ● possibility to simulate camera movements ● possibility to simulate solar altitude or darkness and specific weather conditions	Generally implemented, but lacking some features: ● camera positions/movements, ● immersive view of 360° photos ● weather conditions note that 6DoF is available in simpler modes as well – just like the simulation of day/night
SYS-19	Export situation awareness representation	The capacity of the system to export visualizations (and other immersive representations) on demand	not implemented yet
SYS-20	Global Search	allow users to search for places and assets inside a project; the basic functionality seems to be there (at least in the backend), but there is no frontend interface and no fuzzy logic yet (i.e. users need to enter exact strings)	Not implemented yet
SYS-21	User management system	allow users to have different roles and permissions; e.g. a project lead in the control room should be able to see all tasks, but location scouts only need to see their assignments; project leads should also have a lot of editing permissions (incl. project deletion), while it is	Not implemented yet

		probably safer if simple project members stick to a 'read only and send some updates' mode.	
SYS-22	OCR for uploads	implement an (open source) AI library that enables the system to recognize and store letters/words on uploaded images	Not relevant
SYS-23	Content filters	implement content filters in the file browser; allow user to display crawled content OR scouted content OR both; allow user to display media files based on visual analysis (scene recognition classes; building and object localization classes)	Not relevant
SYS-24	POI fav list	implement a POI favorites list, as users tend to find it difficult to remember/recognize important POIs when there are a lot of POIs and/or massively populated POI categories; ideally, the platform should offer multiple fav lists with custom names (example: a list of all filming locations – no matter which category)	Not implemented yet
SYS-25	POI indicators	Implement icons/visual aids that tell users if a POI is connected to a) a media file and/or b) a comment and/or c) a task	Implemented, new functionalities that will be implemented is the possiblity to see different POI symbls based on specific criteria
SYS-26	Asset location teleporter	In the file browser, implement a feature/icon that takes users to the place where an asset was created	implemented
SYS-27	Locate users	Allow users to see each other's locations across all	implemented

		xR4DRAMA applications	
SYS-28	XR scale	Implement a general scale reference, e.g. a (fully rendered) dummy avatar representing a human who is about 1,75m tall.	Not implemented,
SYS-29	XR measuring tape	Implement measuring feature in the AR mobile app (e.g.: Point A to Point B = 2,5m)	Not implemented
SYS-30	Overview	Allow users to view the entire VR model (selected area) in a smaller scale to get a better overview	New function that will be implemented is the fly mode
SYS-31	VR tutorial	Implement a basic VR tutorial, as very few users are used to working in this mode	Not implemented

Table 6 System requirements

6.2 General requirements

Info-ID	Category	Name	Description	Implementation status/Comments
G-01	Accessibility	Transportation	quality and type of road (highway, street, path), distance to railway station and airport, public transport	Implemented, revised after MIRO exchange
G-02	Geography, Surroundings	Buildings, Monuments	the shape, look and size of buildings, the purpose of buildings	Implemented, revised after MIRO exchange
G-03	Geography, Surroundings	Landmarks	indication of high voltage lines, windmills and other	Implemented, revised after MIRO exchange

				landmarks	
G-04	Geography, Surroundings	Roads, Railroads	indication of roads, highways, railroads	Implemented, revised after MIRO exchange
G-05	Environmental factors	Weather information	basic weather information through the year or a specific period of time	Implemented

Table 7 General requirements

6.3 Updated PUC1- specific user requirements

1	Category	Name	Description	Implementation status/Comments
PUC1-01	Geography, Surroundings	Rivers, Embankments	indication of rivers, water courses, riverbanks	Implemented, more layers required
PUC1-02	Geography, Surroundings	Manholes, electrical and gas pipes	indication of manholes, electrical and gas pipes	Not implemented already, should be in the final version
PUC1-03	General information	Areas of attention, safe waiting places, shelters	Information on the presence of areas of attention, safe waiting/parking places, shelters, sand-bag distribution areas	Not implemented already, should be in the final version
PUC1-04	Flood risk management	Flood maps	Raster data of flow velocity and water depth in flood scenarios	Not implemented, in the final version maps will be visualized only in the authoring tool
PUC1-05	Flood risk management	Risk maps	Information on flood risk level in the territory	Not implemented, in the final version maps will be visualized only in the authoring tool
PUC1-06	Flood risk management	Flood reports	Information about flood reports localised by audio analysis and categorised according to the problem issue	Not implemented already, should be in the final version

PUC1-07	Flood risk management	Flooded elements	Information on flooded elements (e.g. cars and people inside the river)	Not implemented already, should be in the final version
PUC1-08	Flood risk management	River embankment's overtopping and/or breaking	Information related river embankments overtopping or breaking	Not implemented already, should be in the final version
PUC1-09	Flood risk management	Elements at risk	Information on the presence of elements at risk and the degree of emergency	Not implemented already, should be in the final version
PUC1-10	Environmental factors	Sensor measures	Information on environmental variables: water level, rain, temperature, humidity	Not implemented already, should be in the final version
PUC1-11	Environmental factors	Radar meteo	Information available on radar meteo	Not implemented
PUC1-12	Human factors	Physiological parameters	Physiological parameters of first responders in the field	Implemented but need to be integrated in authoring tool
PUC1-13	Human factors	Stress level	detect by stress analysis the stress level in first responders affected by flooding/involved in rescue operations	Implemented but need to be integrated in authoring tool
PUC1-14	Accessibility	Navigation routes	Possibility to define an appropriate escape route or a suitable way to reach an intervention area	implemented
PUC1-15	Geography, Surroundings	Land use change, past flood events' extent	Information derived by satellite images analysis	Not implemented, should be in the final version
PUC1-16	Flood risk management	Population potentially in danger	Information on the potential presence of people in areas at risk	Not implemented, should be in the final version
PUC1-17	Flood risk management	Cultural heritage/natural sites potentially in danger	Information on the potential presence of cultural heritage/natural sites	Not implemented, should be in the final version

PUC1-18	Flood risk management	Civil Protection Plan procedures	Information on the localisation, type of action, activation threshold of the Vicenza Risk Management Plan procedures	Not implemented, should be in the final version

Table 8 PUC 1 specific requirements

6.4 Updated PUC2- specific user requirements

Info-ID	Category	Name	Description	Implementation status/Comments
PUC2-01	Environmental factors	Noise pollution	identification of possible sources like busy roads or highways, crowds of people, factories, airports, railway stations, railway tracks	Automatic aggregation not implemented yet; manual edits possible via POI
PUC2-02	Environmental factors	Light Pollution	identification of possible sources like streetlights, ads etc.	Automatic aggregation not implemented yet; manual edits possible via POI
PUC2-03	Accessibility	Parking	availability of parking	Automatic aggregation implemented (parking lots displayed as POI)
PUC2-04	Legal Issues	Necessity of filming permit on the ground	necessity of a permission for filming on the ground with a crew	Automatic aggregation not implemented yet, Manual editing feature ('legal section') under construction

Info-ID	Category	Name	Description	Implementation status/Comments
PUC2-05	Legal Issues	Necessity of filming permit in the air	type of permission for filming with drones, possible restrictions for filming	Automatic aggregation not implemented yet, manual editing feature ('legal section') under construction
PUC2-06	General information	General information on site/buildings	textual information on specific sites/buildings in the area of interest	Automatic aggregation not implemented yet, manual edits possible, buildings can be annotated via POI feature
PUC2-07	Environmental factors	solar altitude during the day	simulation of the course of the sun during a day	Implemented (via 'sun slider')
PUC2-08	Facilities	Power	availability and accessibility of power outlets	not implemented yet (missing POI category)
PUC2-09	Facilities	Bathrooms	availability and accessibility of bathrooms	automatic aggregation via POI, manual edits possible
PUC2-10	Facilities	Restaurants, Cafés etc.	list of/indication of available places to eat/drink	automatic aggregation via POI, manual edits possible
PUC2-11	Facilities	Props & Gear	Possibility to put props/decoration/etc. in the environment	not implemented yet, in the making (AR+VR mode)

Info-ID	Category	Name	Description	Implementation status/Comments
PUC2-12	Simulation	Drone flights	Possibility to simulate various flights of drones in VR	partly implemented; UX/UI needs to be improved
PUC2-13	General information	Travel- and Security Advice	Information on the security situation in the designated country	automatic aggregation not yet implemented, manual edit not yet possible
PUC2-14	Environmental factors	Noise situation on site	the noise situation on site recorded by the location scout via a Smartex device as mp3-file	implemented; audio files can be uploaded/attached to POIs (ambisonic files currently played back in stereo only)

Table 9 PUC 2 specific requirements

7   SUMMARY AND CONCLUSION

Following the evaluation, the most important result is that for both PUCs the platform worked well to permit acquisition of feedback and all functionalities developed in the first prototype were tested. From the material provided by users the xR4DRAMA platform prototype seems a solid prototype. After the evaluation the consortium managed to have a final clear vision on the platform and this is also very important; some functionalities should be fixed or better implemented following the feedback acquired, mainly concerning some categories of data that should provide an added value to the pilots tasks. The exercises demonstrate that the platform should be extensively used during the pilots to continuously test its functionalities.

As a result, feedback acquired is the starting point for the development of the final product starting from a solid shared base.

Figure 20 Team xR4DRAMA exploring the island of Corfu

A APPENDICES

Appendix A.1: Results of PUC 1 Questionnaires

Appendix A.2: Information Sheet and Consent Form (PUC1)
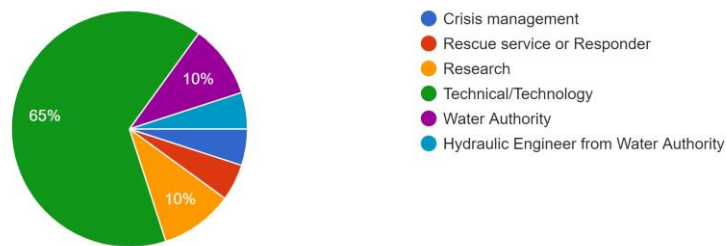
Appendix A.3: Observation sheet (PUC1)

Appendix A.4: Questionnaire (PUC1)

Appendix A.5: Information Sheet and Consent Form (PUC2)

Appendix A.1: Results of PUC 1 Questionnaires

General requirements

What is your professional background?
20 responses

- Crisis management
- Rescue service or Responder
- Research
- Technical/Technology
- Water Authority
- Hydraulic Engineer from Water Authority

65% — 10% — 10%

Which option(s) best describes you (you can select more than one):
20 responses

I am a decision maker/policy maker	1 (5%)
I am a emergency manager	1 (5%)
I am a first responder	4 (20%)
I am a scientist / data aggregator	15 (75%)
I am a citizen	4 (20%)
Flood modeller	1 (5%)

Gender
20 responses

- Male
- Female
- Prefer not to say

50% / 50%
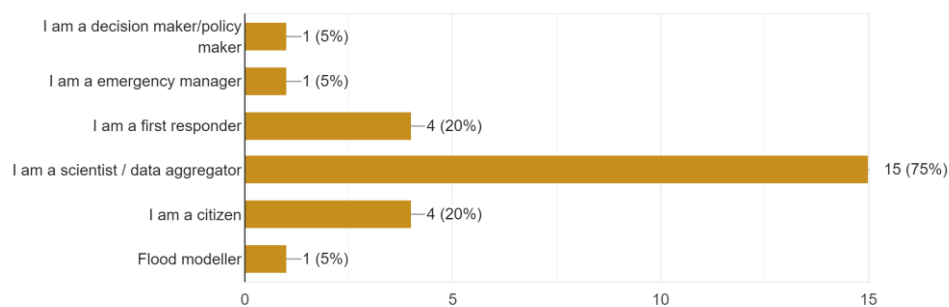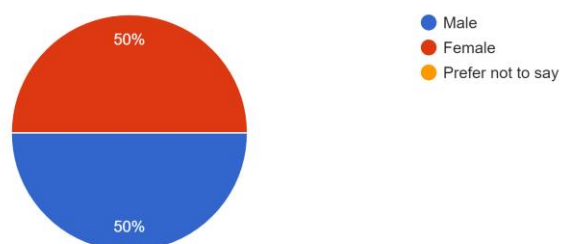
What was your role in the Pilot?
20 responses

- Decision maker/emergency manager (control room)
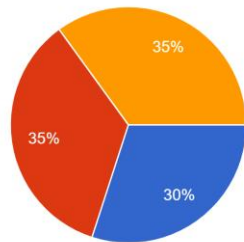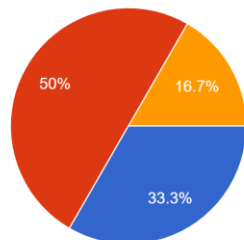- First responder
- Citizen

35%
35%
30%

Authoring tool

Is the User interface (UI) clear and user-friendly?
6 responses

- Easy to use and intuitive
- Requires some effort but is good to use
- Usable but would like training
- Difficult, I would need training

50%
16.7%
33.3%

Is the tool useful from a 'decisional' point of view?
6 responses

- It is useful. I can see that I can benefit
- It is partially useful but I would like to see some improvements. (specify in next box)
- No, I do not see the benefit.

33.3%
66.7%

Is the tool useful from a 'operational' point of view?
6 responses

- It is useful. I can see that I can benefit
- It is partially useful but I would like to see some improvements. (specify in next box)
- No, I do not see the benefit.

33.3%
66.7%

Did you find in the tool all the information you need to remotely create and enhance your situation awareness in managing disasters?

6 responses

- Yes, I found good quality and speed of information
- Partially, I need other information (specify in next box)
- No, I do not find any useful information.

66.7%

33.3%

How do you define the clearness in visualizing the provided information from the system?

6 responses

- Very good
- Good
- Sufficient
- Not good at all (specify in next box)

83.3%

16.7%

What is your general impression?

6 responses

- Good, I can start working with it straightaway
- Useful, It offers features I need but I would want more information/features (specify in next box)
- Not useful

50%

50%

VR tool

Were you acquainted to using the tools needed to create an immersive environment (e.g. VR glasses, VR environments, complex authoring tools)?

6 responses

- ● Yes, I use them often
- ● Yes, I had occasion to use them in the past
- ● No, never used them
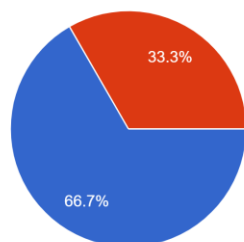
Is the User interface (UI) clear and user-friendly?

6 responses

- ● Easy to use and intuitive
- ● Requires some effort but is good to use
- ● Usable but would like training
- ● Difficult, I would need training

Is the tool useful from a 'decisional' point of view?

6 responses

- ● It is useful. I can see that I can benefit
- ● It is partially useful but I would like to see some improvements. (specify in next box)
- ● No, I do not see the benefit.

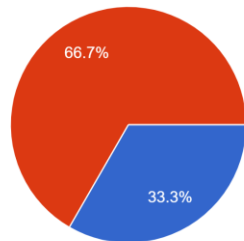Is the tool useful from a 'operational' point of view?
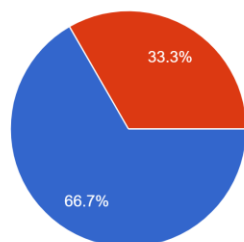
6 responses

- It is useful. I can see that I can benefit
- It is partially useful but I would like to see some improvements. (specify in next box)
- No, I do not see the benefit.

Did you find in the tool all the information you need to remotely create and enhance your situation awareness in managing disasters?
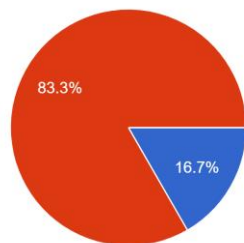
6 responses

- Yes, I found good quality and speed of information
- Partially, I need other information (specify in next box)
- No, I do not find any useful information.

How do you define the clearness in visualizing the provided information from the system?
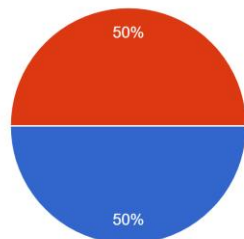
6 responses

- Very good
- Good
- Sufficient
- Not good at all (specify in next box)

What is your general impression?
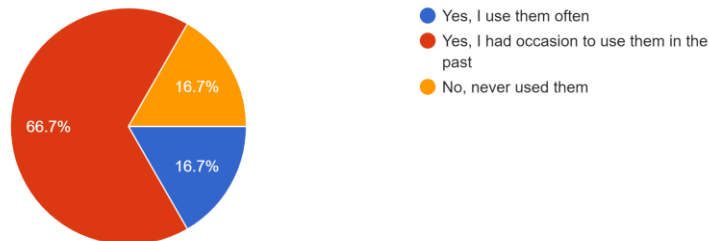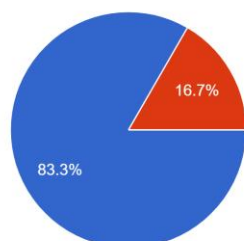
6 responses

- Good, I can start working with it straightaway
- Useful, It offers features I need but I would want more information/features (specify in next box)
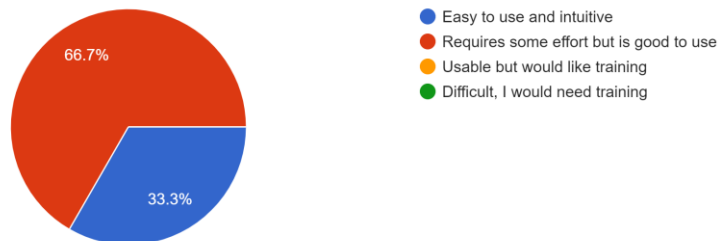- Not useful

AR App

Is the User interface (UI) clear and user-friendly?
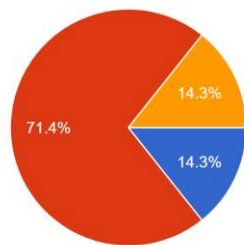
7 responses

- ● Easy to use and intuitive
- ● Requires some effort but is good to use
- ● Usable but would like training
- ● Difficult, I would need training

Is the tool useful from a 'operational' point of view?

7 responses
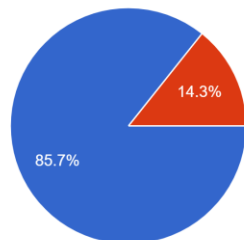
- ● It is useful. I can see that I can benefit
- ● It is partially useful but I would like to see some improvements. (specify in next box)
- ● No, I do not see the benefit.
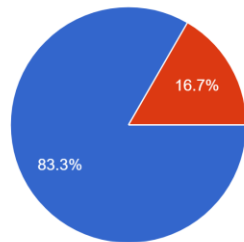
Did you find in the tool all the information you need to remotely create and enhance your situation awareness in managing disasters?

7 responses
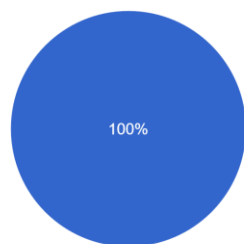
- ● Yes, I found good quality and speed of information
- ● Partially, I need other information (specify in next box)
- ● No, I do not find any useful information.

How do you define the clearness in visualizing the information requested from the system and the way to upload it through the app?

7 responses

- Very good
- Good
- Sufficient, the procedures should be improved/simplified (specify in the box)
- Not good at all (specify in the box)

14.3%
85.7%

What is your general impression?

7 responses

- Good, I can start working with it straightaway
- Useful, It offers features I need but I would want more information/features (specify in next box)
- Not useful

14.3%
85.7%
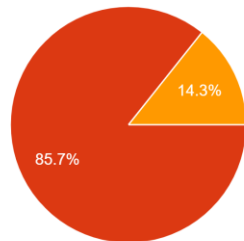
Citizen app for RUSA device

Is the User interface (UI) clear and user-friendly?

7 responses

- Easy to use and intuitive
- Requires some effort but is good to use
- Usable but would like training
- Difficult, I would need training

42.9%
14.3%
42.9%
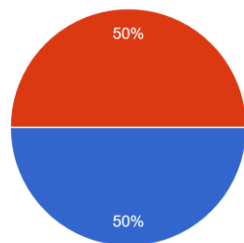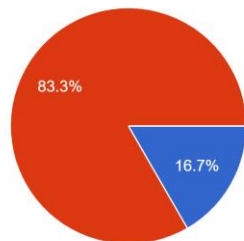
Is the tool useful from a 'operational' point of view?
7 responses

- It is useful. I can see that I can benefit
- It is partially useful but I would like to see some improvements. (specify in next box)
- No, I do not see the benefit.

28.6%

71.4%
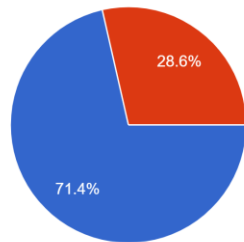
What is your general impression?
7 responses

- Good, I can start working with it straightaway
- Useful, It offers features I need but I would want more features (specify in next box)
- Not useful

28.6%

71.4%

Smart vests

Size of the garment?
7 responses
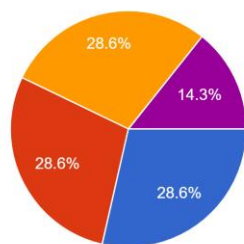
- S (cc: 76-82 cm)
- M (cc: 83-89 cm)
- L (cc: 90-96 cm)
- XL (cc: 97-103 cm)
- XXL (cc: 104-110 cm)
- XXXL (cc: 111-117 cm)

28.6%

14.3%

28.6%

28.6%

The overall comfort of the garment was
7 responses
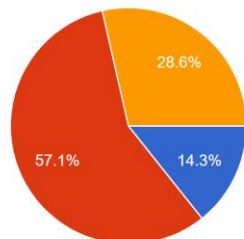
- Totally comfortable
- Comfortable enough
- Acceptable
- Totally uncomfortable

28.6%

57.1%

14.3%

While wearing the breathability of the fabric was

7 responses

- Totally comfortable
- Comfortable enough
- Acceptable
- Totally uncomfortable

57.1%

14.3%

28.6%
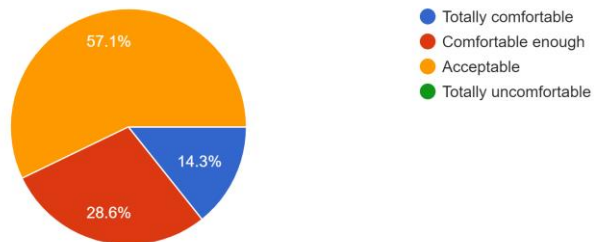
During the pilot, does the band maintain its position?

7 responses

- Yes
- No
- I don't feel it

14.3%

85.7%

What is your general impression?

7 responses

- Good, I can start working with it straightaway
- Useful, but I would want some changes
- Not useful

28.6%

14.3%

57.1%
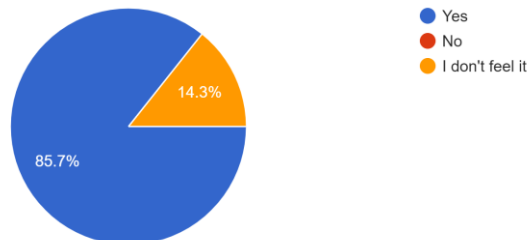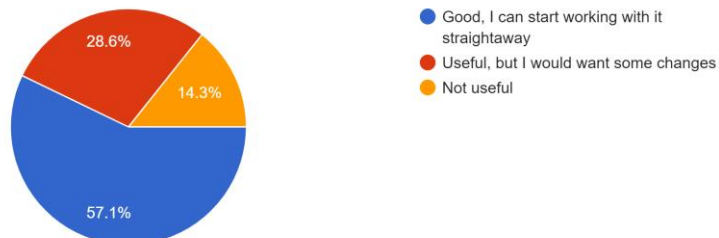
Citizen mobile app

Is the User interface (UI) clear and user-friendly?

7 responses

- Easy to use and intuitive
- Requires some effort but is good to use
- Usable but would like training
- Difficult, I would need training

42.9%

57.1%

Did you find in the notification center functionality useful?

7 responses
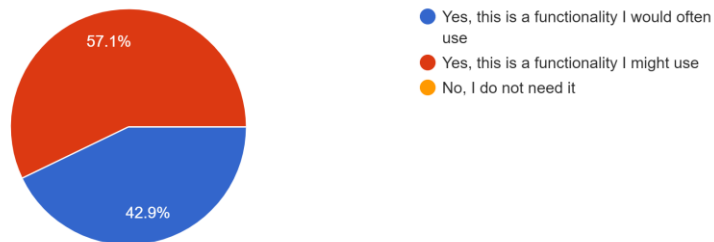
57.1%

42.9%

● Yes, this is a functionality I would often use
● Yes, this is a functionality I might use
● No, I do not need it

How do you define the clearness in visualizing the information requested from the system and the way to upload it through the app?
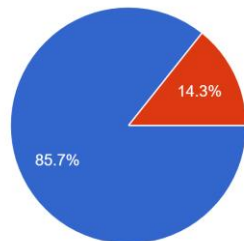
7 responses

28.6%

71.4%

● Very good
● Good
● Sufficient, the procedures should be improved/simplified (specify in the box)
● Not good at all (specify in the box)
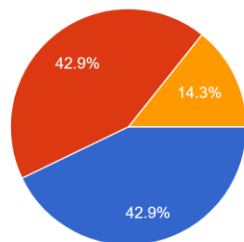
What is your general impression?

7 responses

57.1%

42.9%

● Good, I can start working with it straightaway
● Useful, it offers features I need but I would want more features
● Not useful
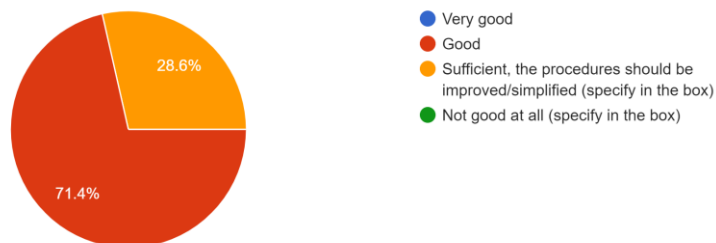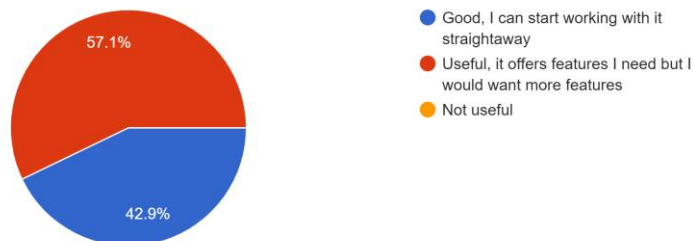
Trial session

The setup of the Trial was clear and every person involved knew their role and activities to be performed.

20 responses
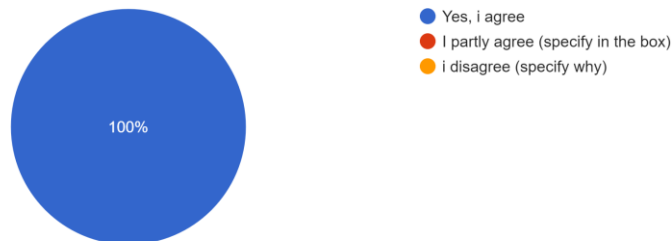
Yes, i agree
I partly agree (specify in the box)
i disagree (specify why)

100%

The Trial was realistic to reproduce a disaster management scenario (its evolution and related cascading effects).

20 responses
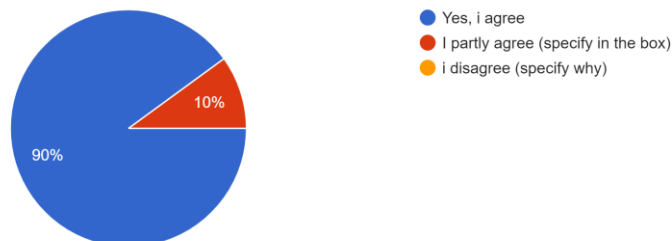
Yes, i agree
I partly agree (specify in the box)
i disagree (specify why)

10%
90%

The Trial sessions scenario was adequate to evaluate the solutions developed by XR4DRAMA and their impact on the disaster management

20 responses

Yes, i agree
I partly agree (specify in the box)
i disagree (specify why)

10%
90%
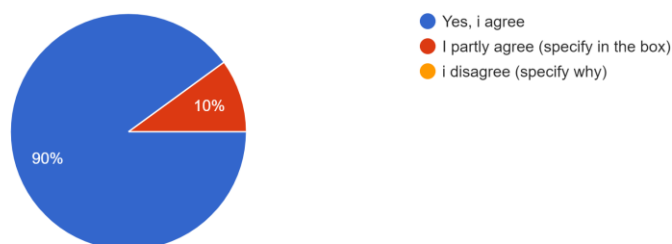
Appendix A.2: Information Sheet and Consent Form (PUC1)

PARTICIPANT INFORMATION SHEET

General Information

You have been invited to participate in a research conducted by xR4DRAMA's Consortium coordinated by CERTH (Centre for Research and Technology – Hellas). xR4DRAMA is an EU funded project (Grand Agreement No.: 952133, Call: H2020-ICT-2019-3, Topic, ICT-55-2020 - Interactive Technologies, https://cordis.europa.eu/project/id/952133) concerning a solution that will improve the situational awareness of those user groups who are responsible for handling disasters, man-made crises, or public events. This document provides you with all the necessary information you need to completely understand why this research is taking place and what it involves, before providing us with your consent for participation.

xR4DRAMA project aims to create a solution that will improve the situational awareness of those user groups who are responsible for handling disasters, man-made crises or public events. The groups range from first responders, local authorities and security forces to media companies and event planners. Situational awareness is crucial for them to execute tasks efficiently, plan things and take the appropriate decisions.

xR4DRAMA's research started in November 2020 and will be completed in October 2022 – more information can be found at the project's website https://xr4drama.eu/.) and is run by 7 partners across Europe:

Partner	Short name	Country
ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	Greece
DEUTSCHE WELLE	DW	Germany
NUROGAMES GMBH	NURO	Germany
UP2METRIC IDIOTIKI KEFALAIOUCHIKI ETAIREIA	U2M	Greece
UNIVERSIDAD POMPEU FABRA	UPF	Spain
AUTORITA' DI BACINO DISTRETTUALE DELLE ALPI ORIENTALI	AAWA	Italy
SMARTEX S.R.L.	STX	Italy

xR4DRAMA results will be validated through 2 field tests in each of the two pilot use cases (PUCs):

- Disaster Management

- Media Production

Description of Research

	Description of research/ Data Collection
Aim of the research study	xR4DRAMA system provides first responders with important information to act safe and efficiently during an emergency, reproducing in real time the actual event inside the control room to allow for well-informed and efficient decision making. xR4DRAMA system detects the stress level of the first responders, send them warnings, and allows them to be guided in the action on site in safe conditions (e.g., indications on the best routes to reach the area of intervention or to avoid dangerous areas/elements).
Time and Location	The pilot takes place in Vicenza on 17-18 May 2022
How you will participate	**Before:** Prior to each demonstration a briefing session will take place in order to inform all involved participants about the research activities that are going to take place as well as what is going to be needed from them in the field of the demonstration in order to execute the Pilot Use Case scenario. In the same manner, a debriefing session is also going to take place after the execution of the demonstration in order to recap all actions and proceed with the evaluation of the system. **During** You will join the relevant activities, specifically: you will send data (video, images, audio, text, physiological parameters) through your mobile device. **After:** After the end of the activity, your feedback will be collected through: ● Oral questions/interviews – mostly to technical partners participating in the demo in order to see how the technical solution operates during the demo and if modifications will be required. End user partners will also be asked some questions during the pre-evaluation event that will take place prior to the demo and will serve as an opportunity for

	Description of research/ Data Collection
	them to be familiarized with the platform and report any issues resulted. ● Follow up questionnaire – mostly to end user partners involved after the execution of the demo. This will assist the evaluation of the system's ability to operate properly and the feeling of satisfaction for the produced outcome by the end users. ● Observation sheets - mostly to end user partners. This will assist to collect the feedbacks and notes taken by the 'observers' in each of the trial sessions in which the pilot is divided, with the aim to take note of every task performed and the problems occurred.
Is your participation mandatory?	It should be highlighted that your participation is completely **voluntary,** and you can **withdraw** at any time of the process without providing any reason and without any negative consequences for you. For this objective, please contact Michele Ferri (**michele.ferri@distrettoalpiorientali.it**). After contacting him, you might be asked whether you would like to permanently delete your data or if you consent to continue processing these data. You are also able to raise any objections or lodge a complaint to the relevant DPO/authorities. In addition, you might be asked for the reason why you would like to withdraw from the research, but you are not obliged to respond. *Under no case will the participation be obligatory for any of the employees of the data controller. The employees-data subjects are voluntarily invited to participate in the present research and they are free to deny any participation. No negative repercussions will follow any withdrawal of the research.* You are free to also decide the questions you are going to answer during the feedback session.
Advantages and Risks of your participation	Although there will be no immediate benefits from participating in this research, the outcomes will contribute to enhancing the European Union's exploitation of interactive technologies in disaster management. You will also have the chance to interact with other experts in the field and exchange ideas and inputs, around important issues on Interactive Technologies for the

Description of research/ Data Collection
improvement of Situation Awareness. No physical harm, damage or risk is expected to be inflicted on the participants. In all arrangements of this PUC, the Covid-19 restrictions and instructions will be taken into account and be fully implemented. Personal details will not be used during or after the PUCS, other than by the organizers, to contact participants in relation to your participation or if you wish to be contacted about anything after the focus group. Nothing in your responses will be linked or used with their name or any other identifying information. All the recordings will be retained securely by the project team and will not be linked with other identifying information. Access to any personal information you provide, will be limited strictly to the people involved in the research directly (*please check also the exact clarifications given below for the collected data and the security related to them*)

Data Protection Issues	
The type of (personal) data to be collected and the people that will have access to them	Generally, the type of data that will be collected: ● Textual data ● Visual data (images and videos) ● Audio Data ● Physiological data (ECG, Heart Rate, Breathing signal, Breath Rate and movement indicators: accelerometer, gyroscope, magnetometer) The Consortium is only collecting and processing personal data in connection with the research's informed consents within the project's timeframe[3]. Only the absolute necessary data for the collection of your feedback will be collected and processed, respecting the data minimization principle as required to achieve the purpose of this research activity. ● Full name, in order to come back to you in case any further clarification is required

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[3] Legal basis: "The data subject has given consent to the processing of his or her personal data for one or more specific purposes" [article 6, 1(a) GDPR

	Description of research/ Data Collection
	● Professional affiliation, in order to identify for which components, we should contact you for feedback based on your professional background and experience. ● Gender, in order to ensure that our research is gender-balanced ● Contact information, in order to keep you updated on the research's outcomes ● Photographs, video, audio recordings might be acquired, upon your explicit consent during your participation in this research (e.g., audio recordings, video recording of participation in the demonstration, etc.). ● Physiological parameters recordings might be acquired, upon your explicit consent during your participation in this research, to be analyzed by the xR4DRAMA system to detect your stress level (the system is intended for first responders: it allows through the system to assign them tasks based on their actual personal physical status in crisis situations). These data will be strictly retained as confidential and will not be shared outside of the Consortium **UNLESS** it is required to share your information with the European Commission/national authorities as a part of our obligations. Only the project partners in charge of the focus groups will have confidential access to your personally identifiable data. That is the authorized personnel directly involved in the project from AAWA, along with the respective DPO.
The method(s) of collecting and processing data	Data will be recorded through mobile devices and the feedback will be collected through on-line questionnaires. You will use throughout the pilot the SMARTEX equipment (smart vest) to send your physiological parameters and your personal mobile device (smartphone or tablet with ANDROID OS) to install and use the mobile applications developed by the project to send data (photographs, video, text, audio recordings) to the xR4DRAMA platform.
Where these data will be used.	All this information will be used for adjusting the project's user requirements, system design and used technologies for object/individual detection. Additionally, the information provided, and the demonstration's outcomes may also be used for writing articles in journals or industry magazines, conference presentations and workshops or for further dissemination

Description of research/ Data Collection
purposes. No further use of your information will take place without your written permission.

| | To begin with, before the start of the research activity, you will be provided with this information sheet and you will be asked to sign a consent form, where all your rights are being described (Section: Participants Rights).

All personal data are processed in accordance with the [EU General Data Protection Regulation (2016/679)](#). Video, audio, physiological parameters recordings and still imagery will be collected but only for the purposes of an improvement in situation awareness for handling disasters.

The recordings of the research activity will be deleted after the end of the project.

During data collection
Collection of only absolutely necessary personal data (*as described in Section: The type of (personal) data to be collected and the people that will have access to them*)
Unforeseen sensitive information, or incidental findings which will be treated by us with the utmost confidentiality (*please check Section: Details of any insurance indemnity for the research*)
After data collection:

a. Storing personal data.
All personal data will be immediately transferred to encrypted and/or secure and password protected servers or devices. If we use a mobile device to record data, we are making sure that it is encrypted and that we are transferring the collected data to secure servers or devices as soon as possible. The signed informed consent will be **safely stored** in the premises of the Pilot Use Case leader partners until the **project's end** (October. 2022), in order to be available for demonstration in case of an inspection or an audit. The data collected from the field (imagery, videos, geolocation, physiological parameters) will only be temporarily stored in xR4DRAMA's system (until the **demo's/test's end**) in the case of a real-time, online |
| The way security is ensured of your personal data | |

Description of research/ Data Collection

| | processing is not applicable, due to the technical partners' equipment capabilities. This will depend on which technical partner/ UAV provider is involved in each Pilot Use Case and what their system's capabilities are.

b. Processing personal data into depersonalized data.

• Before data can be used, they will be depersonalized, unless there is an explicit agreement with the research participant that says otherwise, e.g., in the case of photos.

    o   Pseudonymisation refers to the process of replacing a personal identifier (e.g. name) or semi-obvious identifier (e.g. postal code) with a pseudonym, tag, or coded reference. In this case, the data is altered in that it cannot be related to the particular research participant in whom it came from. For this to be successful, all potential identifiers need to be changed and/or replaced. |
| Details of any insurance indemnity for the research | In case of incidental findings, meaning that the xR4DRAMA system detects something illegal or unintentionally captures personal data through its sensors (e.g., cameras) that may result to the identification of individuals, one of the following procedures will be followed according to each case:

• In case of a person working for xR4DRAMA has enacted an illegal activity with the sole purpose of testing the system and has been detected by the system, the local practitioner authority (e.g., National Police) will issue this person with a Letter of Commission stating that he or she has performed the action resembling an illegal act for the sole purpose of testing the system. No further action is required.

• In case for a person not involved in any way in the project and engages an illegal activity detected by the system, then the person will be handed over to the present national police who will carry out standard operational procedures determined by regulations on the given case, and all relevant data has to be secured/encrypted and handed over to the police as |

Description of research/ Data Collection	
	evidence.
	o Any data collected from video, imagery or other sensors that incidentally may be considered relevant for the identification of individuals not involved in the project will be immediately isolated and erased from all storage devices.
	It is important to point out that the xR4DRAMA research will not involve any clinical trials.
What will happen to the data after the end of the project	Regarding the hard copies of the collected signed informed consents, after the project's end (Oct. 2022) they are going to be destroyed with paper shredders and no digital copies will be kept. The data collected from the field will be immediately deleted from the system as soon as the demo/test is completed. No copies will be kept in additional servers or communication channels.
Participants' rights	● **Right to information:** you may request information about whether we hold personal information about you, and, if so, what that information is and why we are holding it. ● **Right to decline**: you may decline to offer any particular information requested by the researcher ● **Right to access:** you may access your data and ask for copies of your data whenever you wish to. ● **Right to rectification**: you may ask us to rectify the information you have provided us in case you consider that something is missing or is incorrect. ● **Right to erasure**: you may ask us to erase your personal data at any given moment without a specific reason. ● **Right to object**: you may request to stop processing your personal data and withdraw from the research at any desired moment. ● **Right to data portability**: you have the right to request the transfer of your personal data to another party or directly to you. ● **Right to withdraw**: you may have the opportunity to withdraw from the pilot at any time with no adverse consequences
The name and contact	Name: Stefanos Vrochidis (Project Coordinator)

	Description of research/ Data Collection
details of the Project Coordinator, in case you would like to receive more information of the project	Affiliation: CERTH – ITI, Center for Research and Technology Hellas – Information Technologies Institute Address: 6th km Charilaou-Thermi Road, 57001 Thermi-Thessaloniki, Greece Email: stefanos@iti.gr
The name and contact details of the person(s) responsible for the data collection and processing (xR4DRAMA's DPO)	Data Protection Officer: Name: Stella Papastergiou Affiliation: CERTH – ITI, Center for Research and Technology Hellas – Information Technologies Institute Address: 6th km Charilaou-Thermi Road, 57001 Thermi-Thessaloniki, Greece Email: dpo@certh.gr
The name and contact details of another person who can receive enquiries about any matters which cannot be satisfactorily resolved with the Project Coordinator and the person(s) responsible for the data collection and processing	Data Protection Officer: Name: Cesare Lanna Affiliation: Autorità di bacino distrettuale delle Alpi orientali Address: Cannaregio 4314, 30121 Venice (IT) Email: **cesare.lanna@distrettoalpiorientali.it**

Statement of Informed Consent

I have been invited to participate in a research conducted by xR4DRAMA's Consortium partner AAWA, coordinated by CERTH – Centre for Research and Technology Hellas.

With this informed consent I explicitly confirm that:

☐	I am above 18 years old
☐	I have read the **Information Sheet** concerning the research and I had the opportunity to ask questions for all aspects of the research.
☐	I have gained sufficient understanding about the research, the processing of my data and the rights that I have concerning the processing of my personal data, thus agreeing to take part in this study and for my data to be used for the purpose of this

	study
☐	I understand that it is completely **voluntary** to participate in this research and consent to the processing of my personal data. I have at any time the **right to withdraw my consent** to any of the above without announcing any specific reason for my withdrawal and without any adverse consequences.
☐	I understand that any kind of information that will be shared in the demonstration is confidential, and I am not allowed to disseminate, share, or use it in any other manner outside the scope of this demonstration.
☐	I agree that my interview may be audio/video recorded
☐	I agree that my personal data can be used for contacting me in the context of inviting me in **future events of interest, related to the xR4DRAMA project**

The contact person at AAWA for withdrawal of my participation is:

Name: Michele Ferri

Affiliation: AAWA

Email: michele.ferri@distrettoalpiorientali.it

Full Name:

Professional affiliation:

Email address:

Phone:

Signature of Participant:

Date: ___/___/20__

With my signature I hereby confirm my participation in the described research and state my voluntary consent to the processing of the personal data in accordance with the information contained in the above-mentioned documen

Appendix A.3 : Observation sheet (PUC1)

Trial Session - Phase 1 (UC_1) - pre emergency							
Expected action	Place	Action correctly executed	Action correctly executed after some issues or action partially executed (write the problems in the section 'Notices')	Not executed (write in the section 'Notices' the reason why)	Front-end tool	Time required for performing the action (if is possible to evaluate it)	Notices and comments
The operator logs in	**CONTROL ROOM**				**Authoring tool**		
The operator creates a project by selecting an area and entering the necessary information	**CONTROL ROOM**				**Authoring tool**		
The operator designates the collaborators	**CONTROL ROOM**				**Authoring tool**		
The operator views the various GIS layers	**CONTROL ROOM**				**Authoring tool**		
The operator creates tasks	**CONTROL ROOM**				**Authoring tool**		
The operator launches the VR of the area	**CONTROL ROOM**				**VR collaborative tool**		
The operator explores the area in VR mode - drone flight	**CONTROL ROOM**				**VR collaborative tool**		

Trial Session - Phase 2 (UC_2) - during crisis, information by citizens and first responders							
Expected action	**Place**	**Action correctly executed**	**Action correctly executed after some issues or action partially executed (write the problems in the section 'Notices')**	**Not executed (write in the section 'Notices' the reason why)**	**Front-end tool**	**Time required for performing the action (if is possible to evaluate it)**	**Notices and comments**
The operator monitors the situation	**CONTROL ROOM**				**Authoring tool**		
The operator displays the information arriving from citizens	**CONTROL ROOM**				**Authoring tool**		
The operator displays the information arriving from the first responders	**CONTROL ROOM**				**Authoring tool**		
The operator checks the stress level of the operators in the field	**CONTROL ROOM**				**Authoring tool**		
A first responder logs into the app	**IN THE FIELD**				**AR app**		
A first responder inserts a POI warning in the app	**IN THE FIELD**				**AR app**		

A first responder inserts a POI risk area in the app	**IN THE FIELD**				**AR app**	
A first responder inserts a POI flood element into the app	**IN THE FIELD**				**AR app**	
A first responder inserts an overtopping POI into the app	**IN THE FIELD**				**AR app**	
A first responder inserts a POI safe area in the app	**IN THE FIELD**				**AR app**	
A first responder is instructed to verify a report	**IN THE FIELD**				**AR app**	
A first responder accepts, performs and completes an assigned task	**IN THE FIELD**				**AR app**	
A citizen opens the app	**IN THE FIELD**				**Citizen app**	
A citizen reports a critical issue by writing a text and sending it	**IN THE FIELD**				**Citizen app**	
A citizen sends an audio recording	**IN THE FIELD**				**Citizen app**	

A citizen sends a photo of the event	**IN THE FIELD**				**Citizen app**	
A citizen receives a notification	**IN THE FIELD**				**Citizen app**	
A first responder records and transmits their physiological parameters	**IN THE FIELD**				**Citizen app**	
A first responder notifies citizens	**IN THE FIELD**				**Citizen app**	

Trial Session - Phase 3 (UC_3) - emergency management

Expected action	Place	Action correctly executed	Action correctly executed after some issues or action partially executed (write the problems in the section 'Notices')	Not executed (write in the section 'Notices' the reason why)	Front-end tool	Time required for performing the action (if is possible to evaluate it)	Notices and comments
The operator monitors the situation in real time	**CONTROL ROOM**				**Authoring tool**		
The operator monitors the situation in real time	**CONTROL ROOM**				**VR collaborative tool**		
The operator sends tasks to the teams	**CONTROL ROOM**				**Authoring tool**		
The operator displays the information arriving from the first responders	**CONTROL ROOM**				**Authoring tool**		
The operator checks the stress level of the operators in the field	**CONTROL ROOM**				**Authoring tool**		
A first responder logs into the app (first responder mode)	**IN THE FIELD**				**Citizen app**		
A first responder activates the RUSA for the acquisition of physiological	**IN THE FIELD**				**Citizen app**		

data							
A first responder is instructed to verify a report	**IN THE FIELD**				**AR app**		
A first responder is instructed to take measurements	**IN THE FIELD**				**AR app**		
A first responder is instructed to rescue a person	**IN THE FIELD**				**AR app**		
A first responder is instructed to send a report from a zone	**IN THE FIELD**				**AR app**		
A first responder is instructed to reach an area (navigation)	**IN THE FIELD**				**AR app**		
A first responder is tasked with surveying a building for 3D reconstruction	**IN THE FIELD**				**AR app**		

Appendix A.4: Questionnaire (PUC1)

This questionnaire is used to collect data based on your participation and observations during the disaster management pilot in Vicenza (17-18 May 2022).

All participants involved in the pilot are given the opportunity to complete this questionnaire. The results of the completed questionnaires will be collated and will be used to support evaluation of xR4DRAMA.

Within the questionnaire, you will first be asked to fill in personal information, and to answer questions about the Pilot.

There are no right or wrong answers.

Participating in this questionnaire is voluntary. You do not have to answer any questions you do not wish to answer, and you may cease to participate at any time.

Your responses to this questionnaire will be used for xR4DRAMA research work which ultimate objective is to improve preparation and response to crisis events.

Your responses will remain confidential and data will always be presented in such a way that your identity cannot be connected with specific published data.

Shall you have any question, please ask the pilot administrator.

Part 1– Personal information.

In this part the end user is asked to provide some personal information that will help the researchers to evaluate the results of the questionnaire:

- *What is your professional background?*

☐ *Crisis management* ☐ *Rescue service or Responder* ☐ *Research* ☐ *Technical/Technology*

☐ *Other, please indicate……………………………………………….*

- *Which option(s) best describes you (you can select more than one):*

◯ *I am a decision maker/policy maker*

◯ *I am a emergency manager*

◯ *I am a first responder*

◯ *I am a scientist / data aggregator*

◯ *I am a citizen*

◯ *Other (please explain)..*

- *Gender*

☐ *Male*   ☐ *Female*

- *Age range*

☐*< 30* ☐*31 – 40* ☐*41 – 50* ☐*51+*

- *What was your role in the Pilot?*

☐*Decision maker/emergency manager (control room)*   ☐*First responder*
☐*Citizen*

(by selecting the role the user will be directed to the relevant part for compilation):

Part 2– Trial session: Decision maker/ emergency manager (control room) role

In this part the end user is asked to evaluate the tools made available by the xR4DRAMA to the operators in the control room, to improve their level of situation awareness in the management of flood emergencies.

The results of the evaluation, in terms of feedback and suggestions, will be addressed for the next prototype of xR4DRAMA system.

1) **Authoring tool:**

   a) Is the User interface (UI) clear and user-friendly?

      o   Easy to use and intuitive

      o   Requires some effort but is good to use

      o   Usable but would like training

      o   Difficult, I would need training

   b) Is the tool useful from a 'decisional' point of view?

      o   It is useful. I can see that I can benefit

      o   It is partially useful but I would like to see some improvements.

(please specify which ones)

………………………………………………………………………………………………………

      o   No, I do not see the benefit.

   c) Is the tool useful from a 'operational' point of view?

      o   It is useful. I can see that I can benefit

- o It is partially useful but I would like to see some improvements.

(please specify which ones)

……

- o No, I do not see the benefit.

d) Did you find in the tool all the information you need to remotely create and enhance your situation awareness in managing disasters?

- o Yes, I found good quality and speed of information
- o Partially, I need other information
- o (please specify which ones)

……

- o No, I do not find any useful information.

e) How do you define the clearness in visualizing the provided information from the system?

- o Very good
- o Good
- o Sufficient
- o Not good at all

(Please specify why) ………………………………………………………………………………..

f) What is your general impression?

- o Good, I can start working with it straightaway
- o Useful, It offers features I need but I would want more information/features

(please specify which ones)…………………………………………………………………………………

- o Not useful

2) VR collaborative tool:

a) Were you acquainted to using the tools needed to create an immersive environment (e.g. VR glasses, VR environments, complex authoring tools)?

- o Yes, I use them often
- o Yes, I had occasion to use them in the past
- o No, never used them

b) Is the User interface (UI) clear and user-friendly?

- o Easy to use and intuitive
- o Requires some effort but is good to use
- o Usable but would like training
- o Difficult, I would need training

c) Is the tool useful from a 'decisional' point of view?

- o It is useful. I can see that I can benefit
- o It is partially useful but I would like to see some improvements.

(please specify which ones)

…………………………………………………………………………………………………

- o No, I do not see the benefit.

d) Is the tool useful from a 'operational' point of view?

- o It is useful. I can see that I can benefit
- o It is partially useful but I would like to see some improvements.

(please specify which ones)

…………………………………………………………………………………………………

- o No, I do not see the benefit.

e) Did you find in the tool all the information you need to remotely create and enhance the situation awareness in managing disasters?

- o Yes, I found good quality and speed of information
- o Partially, I need other information
- o (please specify which ones)

…………………………………………………………………………………………………

- o No, I do not find any useful information.

f) How do you define the clearness in visualizing the provided information from the system?

- o Very good

o Good

o Sufficient

o Not good at all

(Please specify why) …………………………………………………………………..

g) What is your general impression?

o Good, I can start working with it straightaway

o Useful, It offers features I need but I would want more information/features

(please specify which ones)………………………………………………………………………

o Not useful

Part 3– Trial session: First responder role

In this part the end user is asked to evaluate the tools made available by the xR4DRAMA to the first responders in the field, to improve their level of situation awareness in the management of flood emergencies.

The results of the evaluation, in terms of feedback and suggestions, will be addressed for the next prototype of xR4DRAMA system.

1) AR app:

a) Is the User interface (UI) clear and user-friendly?

o Easy to use and intuitive

o Requires some effort but is good to use

o Usable but would like training

o Difficult, I would need training

b) Is the tool useful from a 'operational' point of view?

o It is useful. I can see that I can benefit

o It is partially useful but I would like to see some improvements.

(please specify which ones)

………………………………………………………………………………………………………

o No, I do not see the benefit.

c) Did you find in the tool all the information you need to enhance your situation awareness in managing disasters?

      o   Yes, I found good quality and speed of information

      o   Partially, I need other information

      o   (please specify which ones)

………………………………………………………………………………………………

      o   No, I do not find any useful information.

d) How do you define the clearness in visualizing the information requested from the system and the way to upload it through the app?

      o   Very good

      o   Good

      o   Sufficient, the procedures should be improved/simplified

      o   (please specify how)

………………………………………………………………………………………………

      o   Not good at all

(Please specify why) …………………………………………………………………..

e) What is your general impression?

      o   Good, I can start working with it straightaway

      o   Useful, It offers features I need but I would want more features

(please specify which ones)…………………………………………………………………………………

      o   Not useful

2) Citizen mobile app (first responder mode only) + RUSA device:

   a) Is the User interface (UI) clear and user-friendly?

      o   Easy to use and intuitive

      o   Requires some effort but is good to use

      o   Usable but would like training

      o   Difficult, I would need training

   b) Is the tool useful from a 'operational' point of view?

      o   It is useful. I can see that I can benefit

      o   It is partially useful but I would like to see some improvements.

(please specify which ones)

……

       o   No, I do not see the benefit.

c) What is your general impression?

       o   Good, I can start working with it straightaway

       o   Useful, It offers features I need but I would want more features

(please specify which ones)………………………………………………………………………………………

       o   Not useful

3) Smart Vest for health state and stress level monitoring

   a) Size of the garment?

       o   S (cc: 76-82 cm)

       o   M (cc: 83-89 cm)

       o   L (cc: 90-96 cm)

       o   XL (cc: 97-103 cm)

       o   XXL (cc: 104-110 cm)

       o   XXXL (cc: 111-117 cm)

   b) The overall comfort of the garment was

       o   Totally comfortable

       o   Comfortable enough

       o   Acceptable

       o   Totally uncomfortable

   c) While wearing the breathability of the fabric was

       o   Totally acceptable

       o   Breathable enough

       o   Acceptable

       o   Totally unacceptable

d) During the pilot, does the band maintain its position?

- o Yes

- o No

- o I don't feel it

e) What is your general impression?

- o Good, I can start working with it straightaway

- o Useful, but I would want some changes

(please specify any suggestion to improve the design of the garment)…………………………………………………………………………

- o Not useful

Part 4– Trial session: Citizen

In this part the end user is asked to evaluate the tools made available by the xR4DRAMA to the citizens, to report on flood-related issues and receive alerts and notification by the Authorities during emergencies.

The results of the evaluation, in terms of feedback and suggestions, will be addressed for the next prototype of xR4DRAMA system.

1) Citizen mobile app (citizen mode only):

a) Is the User interface (UI) clear and user-friendly?

- o Easy to use and intuitive

- o Requires some effort but is good to use

- o Usable but would like training

- o Difficult, I would need training

b) Did you find in the notification center functionality useful?

- o Yes, this is a functionality I would often use

- o Yes, this is a functionality I might use

- o No, I do not need it

c) How do you define the clearness in visualizing the information requested from the system and the way to upload it through the app?

- o Very good

- o Good

- o Sufficient, the procedures should be improved/simplified

- o (please specify how)

………

- o Not good at all

(Please specify why) …………………………………………………………………………..

d) What is your general impression?

- o Good, I can start working with it straightaway

- o Useful, It offers features I need but I would want more features

(please specify which ones)…………………………………………………………………………

- o Not useful

Part 4– Trial session: All

In this part the end user is asked to evaluate the organization of the pilot itself. The results of the evaluation, in terms of feedback and suggestions, will be addressed in the pilot set-up to test the final XR4DRAM system.

a) The setup of the Trial was clear and every person involved knew their role and activities to be performed.

- o Yes, I agree.

- o I partly agree

(please specify what was not clear)……………………………………………………………..

- o I disagree

(please tell us why)…………………………………………………………..

b) The Trial was realistic to reproduce a disaster management scenario (its evolution and related cascading effects).

- o Yes, I agree.

- o I partly agree

(please specify what was not realistic)……………………………………………………………..

- o I disagree

(please tell us why)…………………………………………………………..

c) The Trial sessions scenario was adequate to evaluate the solutions developed by xR4DRAMA and their impact on the disaster management

- o Yes, I agree.
- o I partly agree

(please specify what was missing)………………………………………………………………..

- o I disagree

(please tell us why)…………………………………………………………………..

Thank you for your collaboration!

Appendix A.5: Information Sheet and Consent Form (PUC2)

PARTICIPANT INFORMATION SHEET

General Information

You have been invited to participate in a research conducted by xR4DRAMA's Consortium coordinated by CERTH (Centre for Research and Technology – Hellas). xR4DRAMA is an EU funded project (Grand Agreement No.: 952133, Call: H2020-ICT-2019-3, Topic, ICT-55-2020 - Interactive Technologies, https://cordis.europa.eu/project/id/952133) concerning a solution that will improve the situational awareness of those user groups who are responsible for handling disasters, man-made crises, or public events. This document will provide you with all the necessary information you will need to completely understand why this research is taking place and what it involves, before providing us with your consent for participation.

xR4DRAMA project aims to create a solution that will improve the situational awareness of those user groups who are responsible for handling disasters, man-made crises or public events. The groups range from first responders, local authorities and security forces to media companies and event planners. Situational awareness is crucial for them to execute tasks efficiently, plan things and take the appropriate decisions.

xR4DRAMA's research started in November 2020 and will be completed in 31st of October 2022 – more information can be found at the project's website https://XR4DRAMA.eu/.) and is run by 7 partners across Europe:

Partner	Short name	Country
ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	Greece
DEUTSCHE WELLE	DW	Germany
NUROGAMES GMBH	NURO	Germany
UP2METRIC IDIOTIKI KEFALAIOUCHIKI ETAIREIA	U2M	Greece
UNIVERSIDAD POMPEU FABRA	UPF	Spain
AUTORITA' DI BACINO DISTRETTUALE DELLE ALPI ORIENTALI	AAWA	Italy
SMARTEX S.R.L.	STX	Italy

xR4DRAMA results will be validated through one field test and one demonstration in two pilot use cases (PUCs):

- Disaster Management

- Media Production

Description of Research

	Description of research/ Data Collection
Aim of the research study	The situation awareness that we intend to create within the xR4DRAMA project specifically aims for supporting production managers who have not visited and experienced the production location in person. This lack of awareness about the location and the condition in situ often complicates their work considerably and might even have negative impact on production quality. Therefore, the xR4DRAMA project will focus on bringing situation awareness to a production management team that is working from a remote position.
Time and Location	The test of the first xR4DRAMA prototype will take place on the island of Corfu mostly in the old town and around the old fortress from May 3-4.
How you will participate	Before: Prior to each demonstration a briefing session will take place in order to inform all involved participants about the research activities that are going to take place as well as what is going to be needed from them in the field of the demonstration in order to execute the Pilot Use Case scenario. In the same manner, a debriefing session is also going to take place after the execution of the demonstration in order to recap all actions and proceed with the evaluation of the system. During The participants will join the relevant activities, which include the planning of a mock-up media production on the island of Corfu. As part of this planning, a location scout will be assigned with various tasks (e.g. taking photos and videos, gathering other information). After the input of this information into the system the team will use the VR part of the Software to test the result. After: After the end of the activity, their feedback will be collected through: ● Oral questions/interviews – mostly to technical partners participating in the demo in order to see how the technical solution operates during the demo and if modifications will be required. End user partners will also be asked some questions during the pre-evaluation event that will take place prior to the demo and will serve as an opportunity for them to be familiarized with the platform and report any issues resulted. ● Questionnaire – mostly to end user partners involved after the execution of the demo. This will assist the evaluation of the system's ability to operate properly and the feeling of satisfaction

	Description of research/ Data Collection
	for the produced outcome by the end users.
Is your participation mandatory?	It should be highlighted that your participation is completely voluntary, and you can withdraw at any time of the process without providing any reason and without any negative consequences for you.
	For this objective, please contact Axel Primavesi whose contact details can be found at the end of this document. After contacting him, you might be asked whether you would like to permanently delete your data or if you consent to continue processing these data. You are also able to raise any objections or lodge a complaint to the relevant DPO/authorities. In addition, you might be asked for the reason why you would like to withdraw from the research, but you are not obliged to respond.
	Under no case will the participation be obligatory for any of the employees of the data controller. The employees-data subjects are voluntarily invited to participate in the present research and they are free to deny any participation. No negative repercussions will follow any withdrawal of the research.
	You are free to also decide the questions you are going to answer during the feedback session.
Advantages and Risks of your participation	Although there will be no immediate benefits from participating in this research, the outcomes will contribute to enhancing the European Union's exploitation of space data. You will also have the chance to interact with other experts in the field and exchange ideas and inputs, around important issues on how extended reality could enhance situation awareness during the planning of a media production.
	No physical harm, damage or risk is expected to be inflicted on the participants. In all arrangements of this PUC, the Covid-19 restrictions and instructions will be taken into account and be fully implemented. Personal details will not be used during or after the PUCS, other than by the organizers, to contact participants in relation to your participation or if you wish to be contacted about anything after the focus group. Nothing in your responses will be linked or used with their name or any other identifying information. All the recordings will be retained securely by the project team and will not be linked with other identifying information. Access to any personal information you provide, will be limited strictly to the people involved in the research directly (*please check also the exact clarifications given below for the collected data and the security related to them*)
	Data Protection Issues

	Description of research/ Data Collection
The type of (personal) data to be collected and the people that will have access to them	Generally, the type of data that will be collected: ● Textual data ● Visual data (images and videos) ● Audio Data The Consortium is only collecting and processing personal data in connection with the research's informed consents within the project's timeframe[4]. Only the absolute necessary data for the collection of your feedback will be collected and processed, respecting the data minimization principle as required to achieve the purpose of this research activity. ● Full name, in order to come back to you in case any further clarification is required ● Professional affiliation, in order to identify for which components, we should contact you for feedback based on your professional background and experience. ● Contact information, in order to keep you updated on the research's outcomes ● Photographs, video, or audio recordings might be acquired, upon your explicit consent during your participation in this research (e.g., audio recordings, video recording of participation in the demonstration, etc.). These data will be strictly retained as confidential and will not be shared outside of the Consortium UNLESS it is required to share your information with the European Commission/national authorities as a part of our obligations. Only the project partners in charge of the activity will have confidential access to your personally identifiable data. That is the authorized personnel directly involved in the project from CERTH and DW, along with the respective DPOs
The method(s) of collecting and processing data	Oral questions/interviews, a questionnaire, and detailed notes by the responsible project partners from DW. These information will be stored but won't include personally identifiable data.
Where these data will be used.	All this information will be used for adjusting the project's user requirements, system design and used technologies for object/individual detection. Additionally, the information provided,

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[4] Legal basis: "The data subject has given consent to the processing of his or her personal data for one or more specific purposes" [article 6, 1(a) GDPR

	Description of research/ Data Collection
	and the demonstration's outcomes may also be used for writing articles in journals or industry magazines, conference presentations and workshops or for further dissemination purposes. No further use of your information will take place without your written permission.
The way security is ensured of your personal data	To begin with, before the start of the research activity, you will be provided with this information sheet and you will be asked to sign a consent form, where all your rights are being described (Section: Participants Rights). All personal data are processed in accordance with the EU General Data Protection Regulation (2016/679). Video and still imagery will be collected but only for the purposes of enhancing the situation awareness of the site of the mock-up media production. This information will be used for the purposes of monitoring places in order to ensure that they are compliant with EU rules and legislation. Taking guidance from the EU Opinion 05/2014[5] on Anonymization Techniques, as well as the EU Opinions and Recommendations on Data Protection[6], this Anonymization Guide aims to help xR4DRAMA members protect the rights and privacy of research participants. The recordings of the research activity will be deleted after the end of the project. *During data collection* ● Collection of only absolutely necessary personal data (*as described in Section: The type of (personal) data to be collected and the people that will have access to them*) ● Unforeseen sensitive information, or incidental findings which will be treated by us with the utmost confidentiality (*please check Section: Details of any insurance indemnity for the research*) *After data collection:* ● All personal data will be immediately transferred to encrypted and/or secure and password protected servers or devices. If we use a mobile device to record data, we are making sure that it is encrypted and that we are transferring the collected data to secure servers or devices as soon as possible. ● The signed informed consent will be safely stored in the premises of the Pilot Use Case leader partners until the

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[5] https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2014/wp216_en.pdf

[6] https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/index_en.htm

	Description of research/ Data Collection
	project's end (31st of October. 2022), in order to be available for demonstration in case of an inspection or an audit. ● The data collected from the field (imagery, videos, geolocation) will only be temporarily stored in xR4DRAMA's system (until the demo's/test's end) in the case of a real-time, online processing is not applicable, due to the technical partners' equipment capabilities. This will depend on which technical partner/ UAV provider is involved in each Pilot Use Case and what their system's capabilities are.
Details of any insurance indemnity for the research	In case of incidental findings, meaning that the xR4DRAMA system detects something illegal or unintentionally captures personal data through its sensors (e.g., cameras) that may result to the identification of individuals, one of the following procedures will be followed according to each case: ● In case of a person working for xR4DRAMA has enacted an illegal activity with the sole purpose of testing the system and has been detected by the system, the local practitioner authority (e.g., National Police) will issue this person with a Letter of Commission stating that he or she has performed the action resembling an illegal act for the sole purpose of testing the system. No further action is required. ● In case for a person not involved in any way in the project and engages an illegal activity detected by the system, then the person will be handed over to the present national police who will carry out standard operational procedures determined by regulations on the given case, and all relevant data has to be secured/encrypted and handed over to the police as evidence. o Any data collected from video, imagery or other sensors that incidentally may be considered relevant for the identification of individuals not involved in the project will be immediately isolated and erased from all storage devices It is important to point out that the xR4DRAMA research will not involve any clinical trials;
What will happen to the data after the end of the project	Regarding the hard copies of the collected signed informed consents, after the project's end (31st of Oct. 2022) they are going to be destroyed with paper shredders and no digital copies will be kept. The data collected from the field will be immediately deleted from the system as soon as the demo/test is completed. No copies will be kept in additional servers or communication channels.
Participants' rights	● Right to information: you may request information about whether we hold personal information about you, and, if so,

Description of research/ Data Collection	
	what that information is and why we are holding it.
	● Right to decline: you may decline to offer any particular information requested by the researcher
	● Right to access: you may access your data and ask for copies of your data whenever you wish to.
	● Right to rectification: you may ask us to rectify the information you have provided us in case you consider that something is missing or is incorrect.
	● Right to erasure: you may ask us to erase your personal data at any given moment without a specific reason.
	● Right to object: you may request to stop processing your personal data and withdraw from the research at any desired moment
	● Right to data portability: you have the right to request the transfer of your personal data to another party or directly to you.
	● Right to withdraw: you may have the opportunity to withdraw from the pilot at any time with no adverse consequences
The name and contact details of the Project Coordinator, in case you would like to receive more information of the project	Name: Stefanos Vrochidis (Project Coordinator) Affiliation: CERTH – ITI, Center for Research and Technology Hellas – Information Technologies Institute Address: 6th km Charilaou-Thermi Road, 57001 Thermi-Thessaloniki, Greece Email: stefanos@iti.gr
The name and contact details of the person(s) responsible for the data collection and processing (xR4DRAMA's DPO)	Data Protection Officer: Name: Stella Papastergiou Affiliation: CERTH – ITI, Center for Research and Technology Hellas – Information Technologies Institute Address: 6th km Charilaou-Thermi Road, 57001 Thermi-Thessaloniki, Greece Email: dpo@certh.gr
The name and contact details of another person who can receive enquiries about any matters which cannot be satisfactorily resolved with the Project Coordinator and the person(s) responsible for the	Data Protection Officer: Name: Thomas Gardemann Affiliation: Head of Deutsche Welle's Corporate Legal Affairs Department Address: Kurt Schumacher Str. 3, 53113 Bonn Email: thomas.gardemann@dw.com

Description of research/ Data Collection	
data collection and processing	

Statement of Informed Consent

I have been invited to participate in a research conducted by xR4DRAMA's Consortium partner Deutsche Welle, coordinated by CERTH – Centre for Research and Technology Hellas.

With this informed consent I explicitly confirm that:

☐	I am above 18 years old
☐	I have read the **Information Sheet** concerning the research and I had the opportunity to ask questions for all aspects of the research.
☐	I have gained sufficient understanding about the research, the processing of my data and the rights that I have concerning the processing of my personal data, thus agreeing to take part in this study and for my data to be used for the purpose of this study
☐	I understand that it is completely **voluntary** to participate in this research and consent to the processing of my personal data. I have at any time the **right to withdraw my consent** to any of the above without announcing any specific reason for my withdrawal and without any adverse consequences.
☐	I understand that any kind of information that will be shared in the demonstration is confidential, and I am not allowed to disseminate, share, or use it in any other manner outside the scope of this demonstration.
☐	I agree that my interview may be audio/video recorded
☐	I agree that my personal data can be used for contacting me in the context of inviting me in **future events of interest, related to the xR4DRAMA project**

The contact person at Deutsche Welle for withdrawal of my participation is:

Name: Deutsche Welle

Affiliation: DW

Email: axel.primavesi@dw.com

Full Name:

Professional affiliation:

Email address:

Phone:

Signature of Participant:

Date: ___/___/20__

With my signature I hereby confirm my participation in the described research and state my voluntary consent to the processing of the personal data in accordance with the information contained in the above-mentioned documents.