xR4DRAMA

Extended Reality For DisasteR management And Media planning
H2020-952133

D4.3
VR environment and collaborative tools v1

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Abstract

This deliverable describes initial version of VR Environment and collaborative tools.

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Executive Summary

The deliverable provides the first prototype of the VR Collaborative tool. Section 1 introduces the deliverable with the structure and the contents.
The next section provides the overview of the requirements from the use cases. The requirements gave us a starting point to implement the features of the first prototype of the VR Collaborative Tool.
The third section of the deliverable gives the information on the first prototype, from the internal architecture, current functionalities to installation requirements along with the demo information and screenshots.
The final section gives information about the next steps that will be implemented in the future prototypes.

Abbreviations and Acronyms

POI	Points of interest
VR	Virtual Reality

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1 INTRODUCTION

This deliverable is a supporting document to the software components delivered as part of 1st prototype of the entire xR4DRAMA, developed as part of WP4. The deliverable covers the requirements from the users concerning the VR Collaborative Tool and the prototype development, from architecture of the tool to the functionalities and the installation requirements.

The main aim of the xR4DRAMA VR Collaborative Tool is to provide the entrance to the platform from a VR Headset and will be mainly used by producers as well as the management of the first responders.

The tool will allow access to the entire system where the users will be able to create projects that will include one incident or production. The tools main motive is to provide the situation awareness while the people are far away from the actual geographical location.

The deliverable provides the overview about the tool and the future work.

2 REQUIREMENTS

Based on the use cases, the users provided multiple requirements which were documented in "D6.2 – Final user Requirements", a report that was submitted in Month 8 of the project. The main requirements concerning the VR Collaborative Tool are noted here.

2.1 DISASTER MANAGEMENT USE CASE BASED REQUIREMENTS

Table 1 Disaster Management Requirements

Info-ID	Category	Name	Description
PUC1-01	Geography, Surroundings	Rivers, Embankments	indication of rivers, water courses, riverbanks
PUC1-02	Geography, Surroundings	Manholes, electrical and gas pipes	indication of manholes, electrical and gas pipes
PUC1-15	Geography, Surroundings	Land use change, past flood events' extent	Information derived by satellite images analysis

2.2 MEDIA PRODUCTION USE CASE REQUIREMENTS

Table 2 Media Production requirements

Info-ID	Category	Name	Description
PUC2-02	Environmental factors	Light Pollution	identification of possible sources like streetlights, ads etc.
PUC2-06	General information	General information on site/buildings	textual information on specific sites/buildings in the area of interest
PUC2-11	Facilities	Props&Gear	Possibility to put props/decoration/etc. in the environment
PUC2-12	Simulation	Drone flights	Possibility to simulate various flights of drones in VR

3 OPERATIONAL PROTOTYPE

3.1 INTERNAL ARCHITECTURE

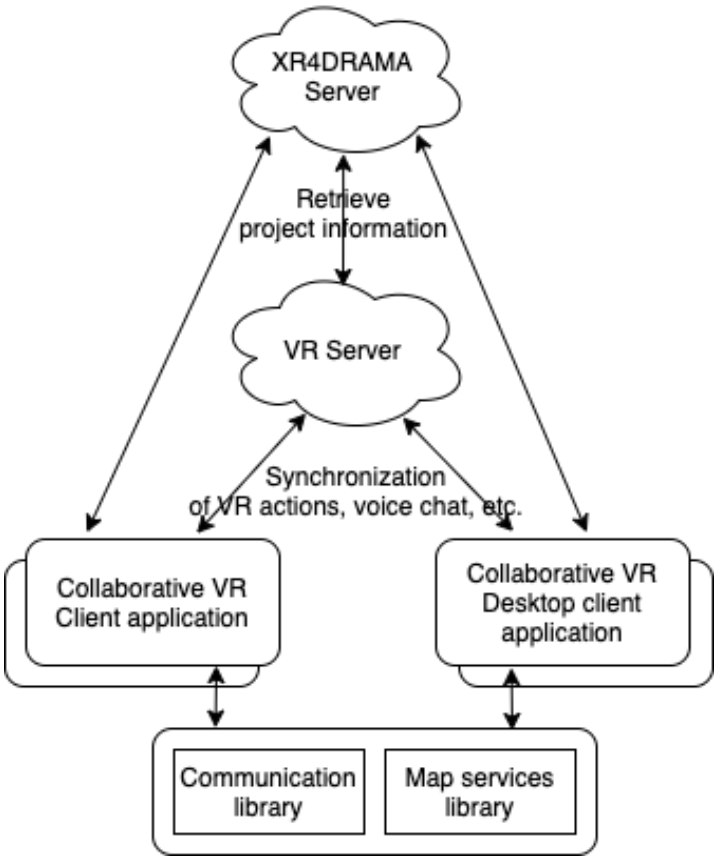

Figure 1 Internal Architecture of the xR4DRAMA VR Collaborative Tool

The VR Collaborative Tool is connected to the main Authoring tool to display Maps and custom user generated/uploaded Data. Apart from this the tool is also connected to a specialized server, which enables the collaborativeness aspect and allows multiple people to share the same VR Environment. The tool also connects to the xR4DRAMA backend to load and save custom data. The tool has 2 major visualization modes, the Desktop application which enables the users to go in the Shared environment form their desktop computers and the VR Application, which runs on the VR HMD, hence allowing user to be fully immersed in the shared environment. The tool has 2 major components:

1. Communications Library: This library handles the communication aspects of the tool.
2. Map Services library: This library helps in loading and visualization of the Map.

3.2 CURRENT FUNCTIONALITIES

Currently, for the first prototype the following functionalities are developed:

1. 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
2. 2D Map view: The users can also view a small 2D Map on their HUDs

3. 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
4. Talk to people in VR: During a VR Session, all users can talk to each other
5. View User generated content: The users can view images etc., generated by other users and put on a specific location

3.3 INSTALLATION REQUIREMENTS

To run the tool with and be able to launch the Collaborative VR Tool, the following is required:

- OS: Windows
- CPU: Intel i7/i9
- RAM: Minimum 32 GB
- HDD: Minimum 5 GB Free
- Graphics Card: NVIDIA GTX 2080 or above
- VR Headset: HTC Vive

A "VR Ready" Laptop will also be able to run the tool.

3.4 SCREENSHOTS AND DEMO DETAILS

The demo can be downloaded at the following link:
https://drive.google.com/drive/folders/1WQsctB4RLUwoTPYTNnUb6gmj8KtcKozB?usp=sharing
To use the tool, download and open the file xR4DRAMA Authoring Tool.exe and once logged in, and a project is chosen, then using the "launch in VR" button the VR Collaborative tool can be started.

Figure 2 Desktop Version of Collaborative VR Tool

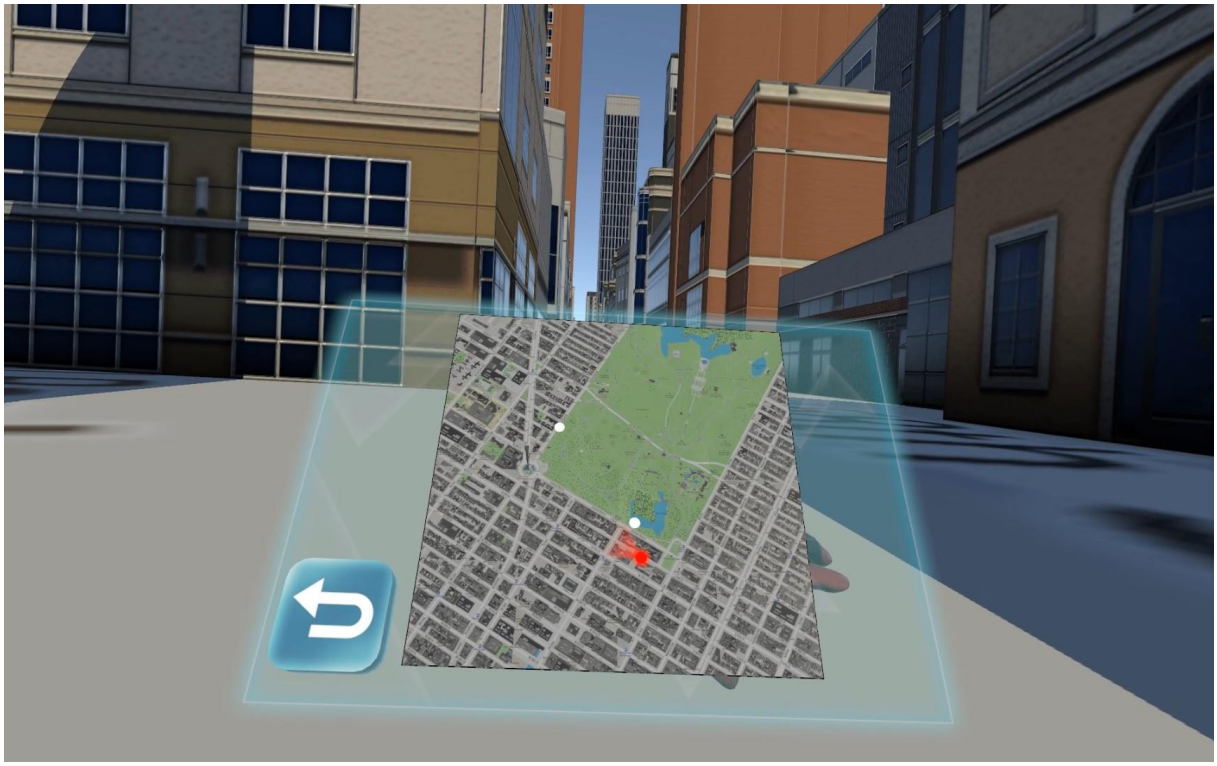

Figure 3 2D Map View inside VR

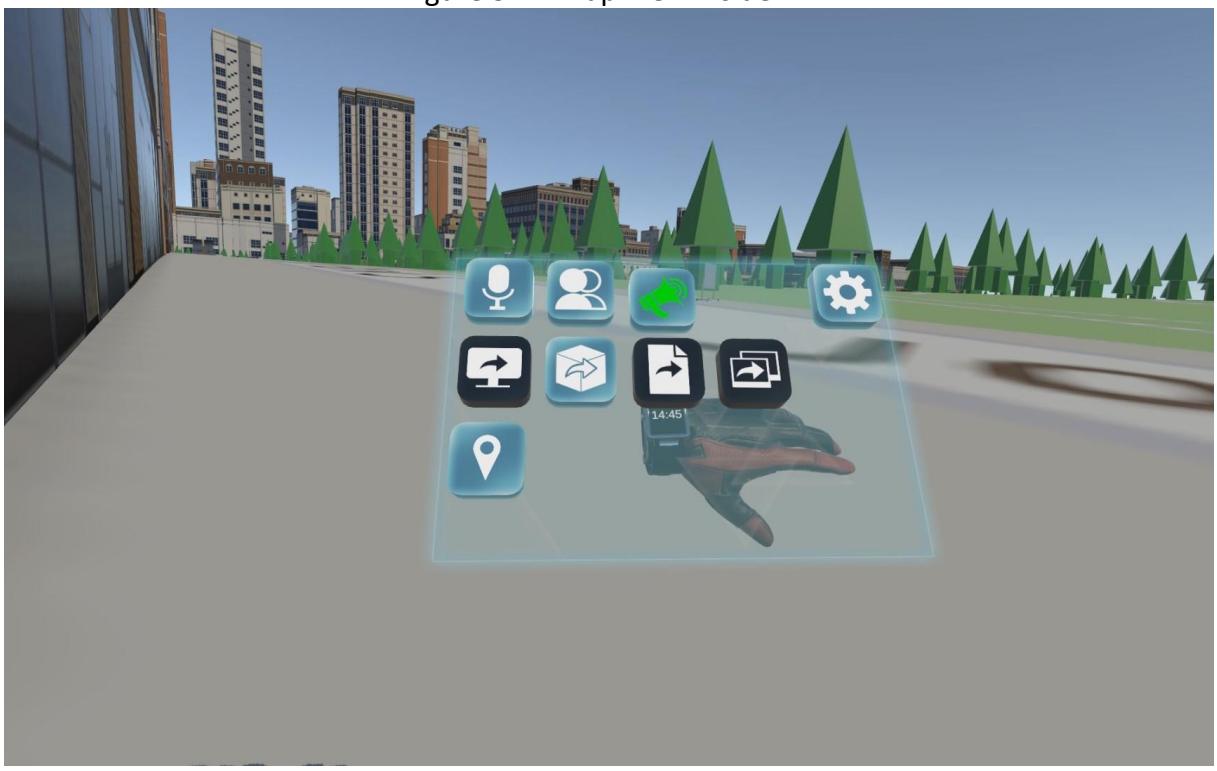

Figure 4 VR tool menu

Figure 5 VR Tool session participants

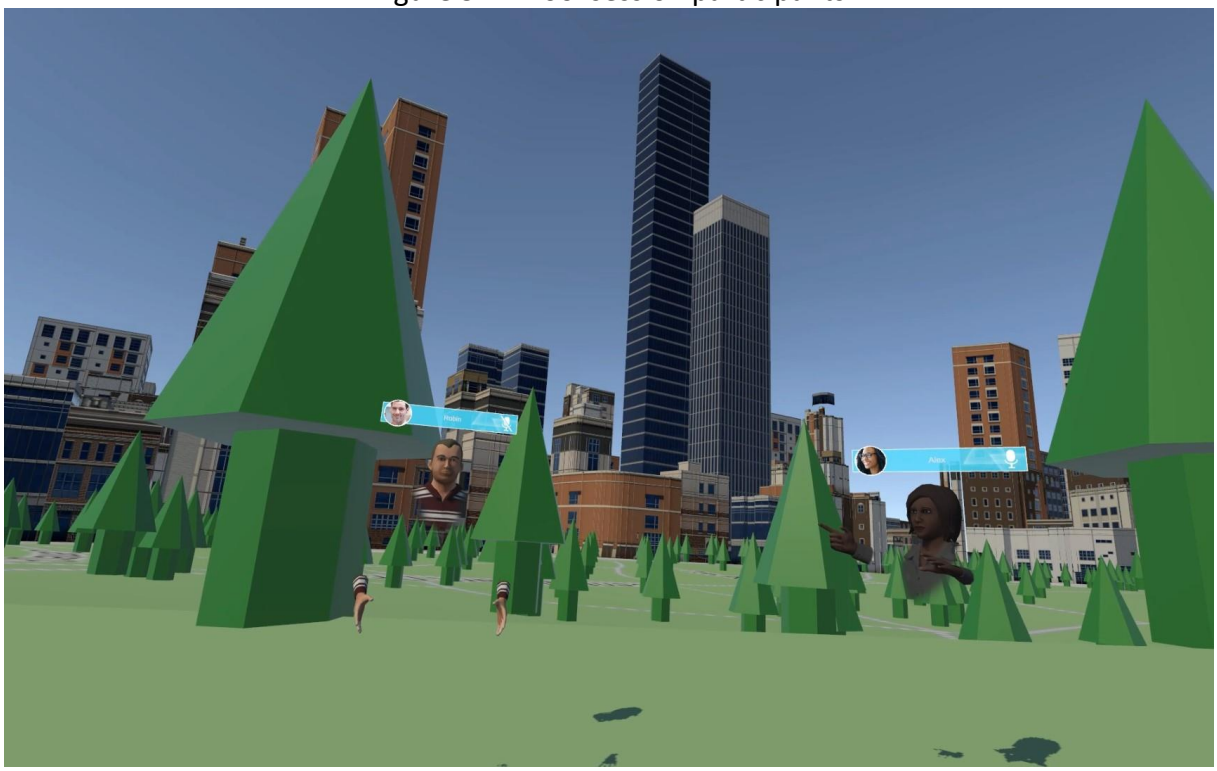

Figure 6 VR Collaborative Avatars

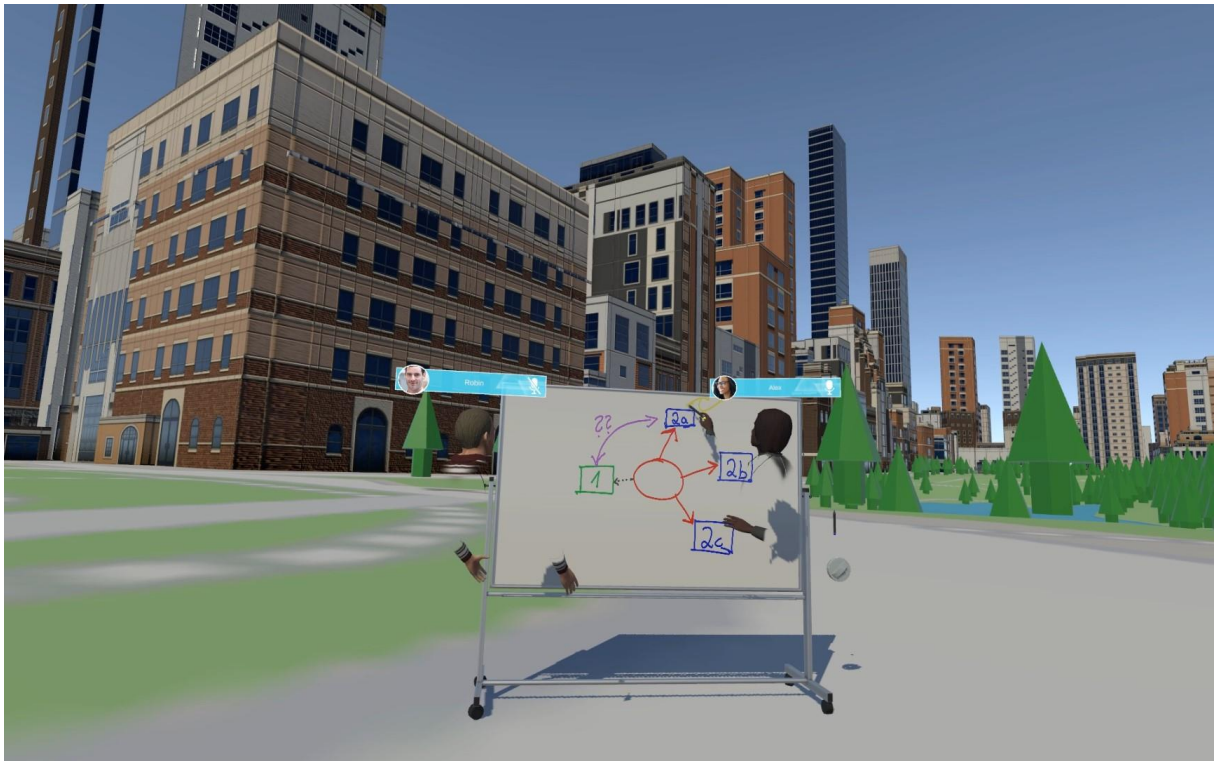

Figure 7 VR Collaborative Whiteboard

4 NEXT STEPS

In the next version of the app, the focus will be on creating a more collaborative environment with various props that the users can put in the VR Environment to create various simulations and visualizations. The users will also be able to place drones and view the footage from the cameras of the drones to view various camera angles. Furthermore, the users will be able to use flood maps, to put as a layer in the VR Environment to view the direct effects of a flood situation in the given area.

5 CONCLUSION

The deliverable provides an overview on the functionalities implemented in the 1st prototype of the VR Collaborative Tool. The prototype due in the first year of the project will help giving users the initial idea of the main features of the tool. The feedback from the testing will help us in improving the performance of the tool.

The next prototype will include the new features such as drone flight simulations, prop visualization and sharing data with other visualization tools of the platform.

The tool provides as the most immersive experience for the xR4DRAMA platform. In the next deliverable, the final prototype will be provided including the above mentioned features and inputs from the users.