xR4DRAMA

Extended Reality For DisasteR management And Media planning
H2020-952133

D4.5
VR environment and collaborative tools v2

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Abstract

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

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History

Version	Date	Reason	Revised by
V0.1	21.09.2022	Table of contents	Yash Shekhawat
V0.2	15.10.2022	First Version	Yash Shekhawat
V0.3	10.11.2022	Second version	Yash Shekhawat/Holger Kuerten/Robin Kratz
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Executive Summary

The deliverable describes the second 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 updates of requirements from the use cases following the testing of the first prototype. These requirements gave us a starting point to implement the features of the second prototype of the VR Collaborative Tool.
The third section of the deliverable gives the information on the second prototype, from the internal architecture, current functionalities to installation requirements along with the demo information and screenshots.
The fourth section gives information about the next steps that will be implemented in the following period and the final section concludes the document.

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 2nd 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 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 situational 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 FEEDBACK FROM 1ST PROTOTYPE

After rigorous testing of the 1st prototype of the VR tool by both PUC leaders, a total of 15 issues were reported in the issue tracking system of the project. The issues ranged from functionality and usability to user experience and interface. The following section describes the issues reported by the users:

Issue Number	Issue Title	Issue Description
33	Mini maps	make mini map bigger and visible by default (click to hide); remove map from wrist menu in VR mode
36	POIs and photos not displayed in VR tool	Add functionality
37	fix avatars and profiles	- Remove profile pictures - Avatars are random; maybe use pre-selected avatars
39	introduce structured, coherent, global categories	Same categories across all tools
46	XR props and setups	- Create collection of setups for AR app - Scout can later on place virtual objects/people on a square, in a park etc. Allow users to (select and) place standard equipment. Ensure seamless updates: objects placed in AR should be visible in VR/Desktop tool and vice versa.
49	POI Creation + Task Creation in VR mode	Add functionality
50	Improve/extend VR locomotion	Teleport is good however: - users can't move around with a joystick (would be useful for continuous movement, small steps etc.) - Allow users to fly and climb: (climbing models via teleport is possible on some 3D reconstructions; mesh collider) - Allow users to climb Models in the desktop mode
53	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 probably safer if simple project members stick to a 'read only and send some updates' mode.

57	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
59	Locate users	Allow users to see each other's locations across all XR4DRAMA applications
60	XR scale	Implement a general scale reference, e.g. a (fully rendered) dummy avatar representing a human who is about 1,75m tall.
62	VR Overview	Allow users to view the entire VR model (area of production) in a smaller scale to get a better overview
63	VR tutorial	Implement a basic VR tutorial, as very few users are used to working in this mode
64	VR Drone flights	improve features: - bigger/better screen on remote - drone video recording feature - define and record flight
65	3D models inspection	3D models in the disaster management case are to be inspected from above, since they are made out of drone footage. Fly over mode needed.

Table 1: Feedback of 1st prototype

2.1 New functionalities implemented based on user feedback.

Based on the feedback received by the users we implemented multiple changes in the VR collaborative tool. The changes included are the following:

Issue Number	Issue Title	Updates made in v2. prototype
33	Mini maps	Larger Map
36	POIs and photos not displayed in VR tool	Functionality added
37	fix avatars and profiles	New Avatars added
39	introduce structured, coherent, global categories	Coherent categories implemented
46	XR props and setups	Integration between AR and VR app still in progress, planned for the final version.

49	POI Creation + Task Creation in VR mode	POI Creation added, Task creation requirement depreciated
50	Improve/extend VR locomotion	New fly mode added, and easier navigation implemented
53	User management system	To be implemented in the final version
57	POI indicators	Functionality added
59	Locate users	Functionality added
60	XR scale	A 1.75m model added in the props of VR.
62	VR Overview	Functionality added in desktop version
63	VR tutorial	To be implemented in the final version
64	VR Drone flights	Improvements have been made in the screen size and usability.
65	3D models inspection	Fly mode will help in solving this issue.

Table 2: New functionalities in 2nd prototype

3 2ND PROTOTYPE

The 2nd prototype was delivered in November 2022.

3.1 Updated Architecture

During the 2nd prototype, one of the main requirements from the users included 3D reconstructed models being visualised in the VR tool. Therefore, we had to upgrade the architecture of the system. The updated architecture connected to a cloud-based microservice for generating unity asset bundles from the 3d reconstructed models. The updated architecture is depicted below:

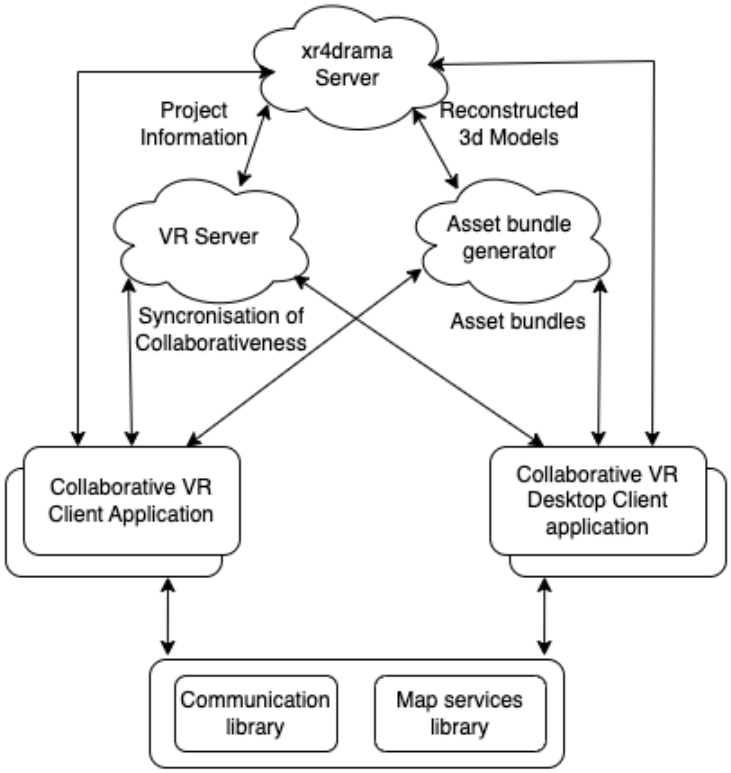

Figure 1: Updated Architecture

3.2 UI Design updates and activities

After the implementation of the first prototype, one of the most important aspects outlined by the users were the updates in the UI of the entire xR4DRAMA user tool line-up. For the VR tool, we used prototyping and agile iteration tool Invision App for the development of the UI and getting feedback on the UI.
The old UI lacked the design aspects of xR4DRAMA. The screenshot below shows the old UI:

Figure 2: Old UI

The UI mockups shown in the figures below were the outcomes of the UI design exercise for the Desktop version of the VR tool:

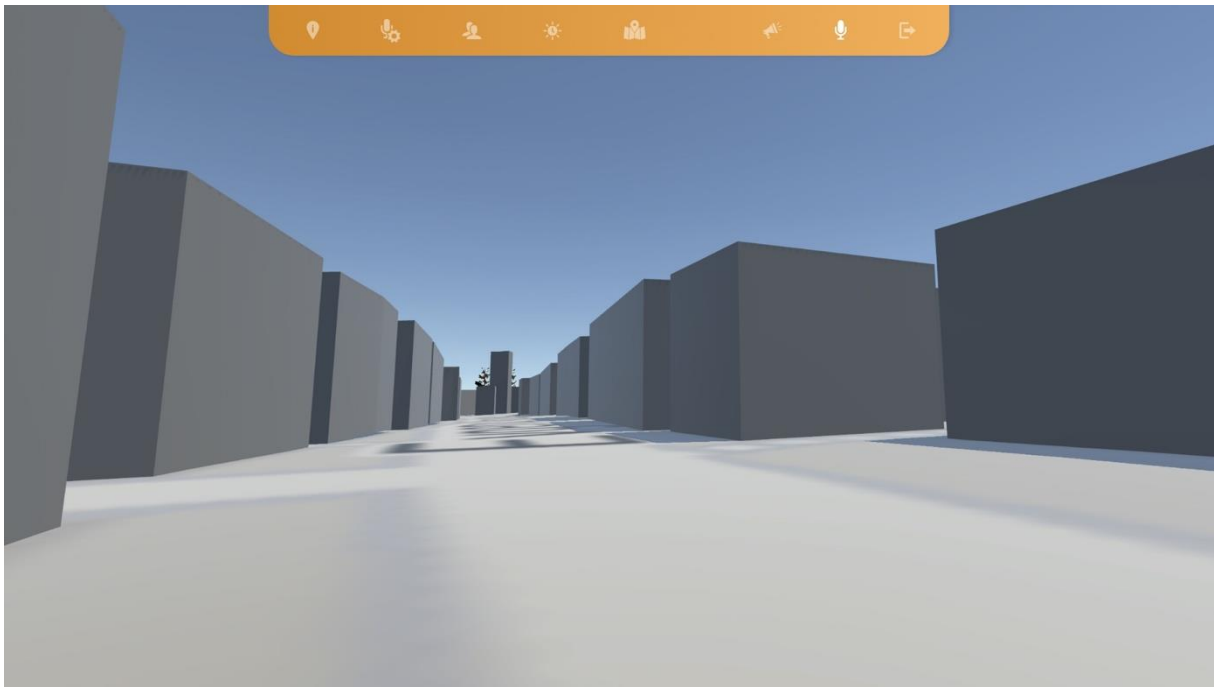

Figure 3: Basic UI design

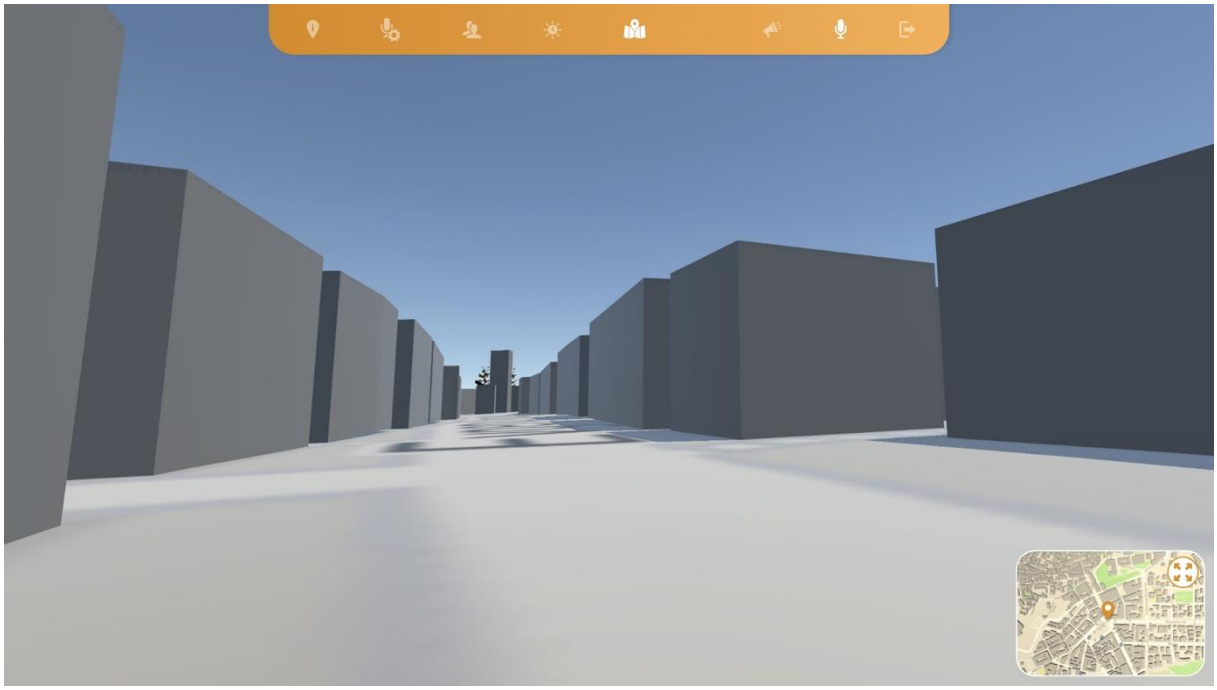

Figure 4: Small Map UI

Figure 5: Enlarged Map UI

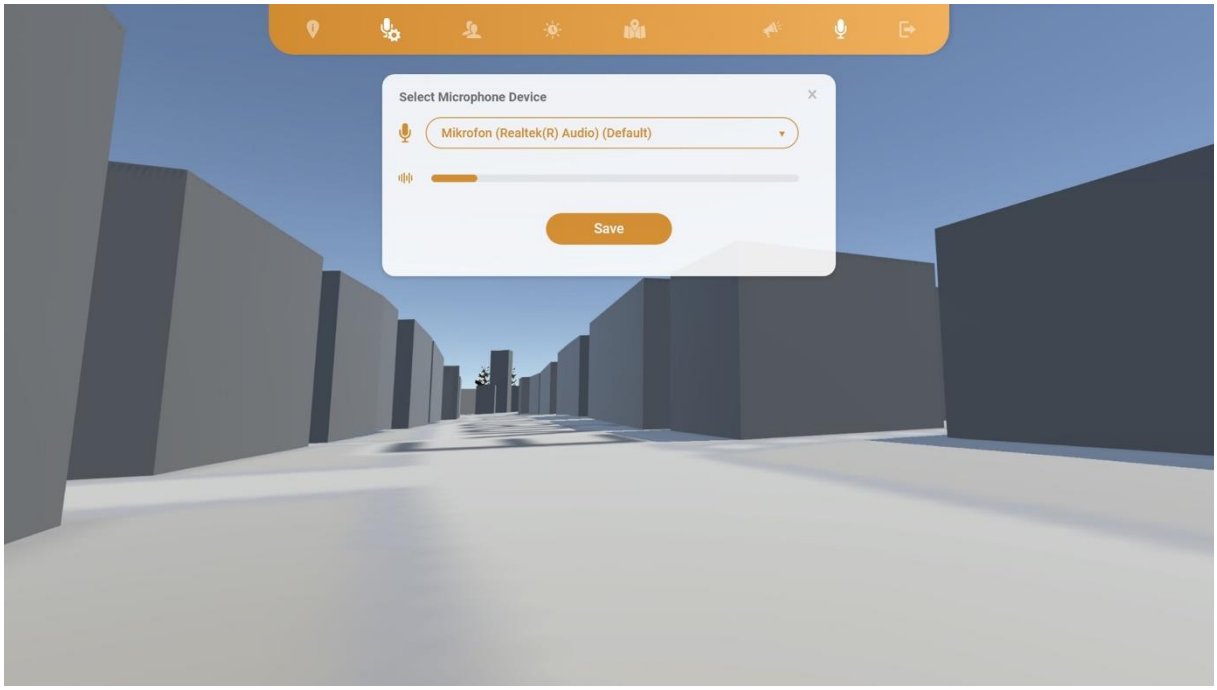

Figure 6: Microphone settings UI

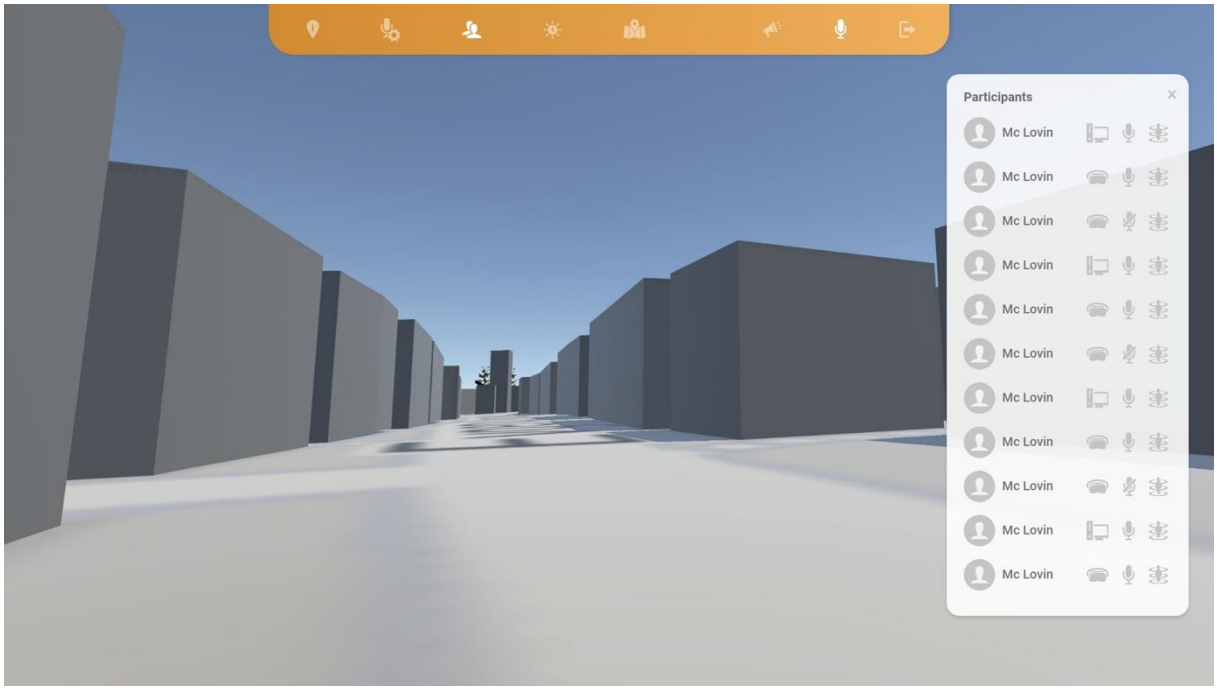

Figure 7: Users in VR/Desktop UI

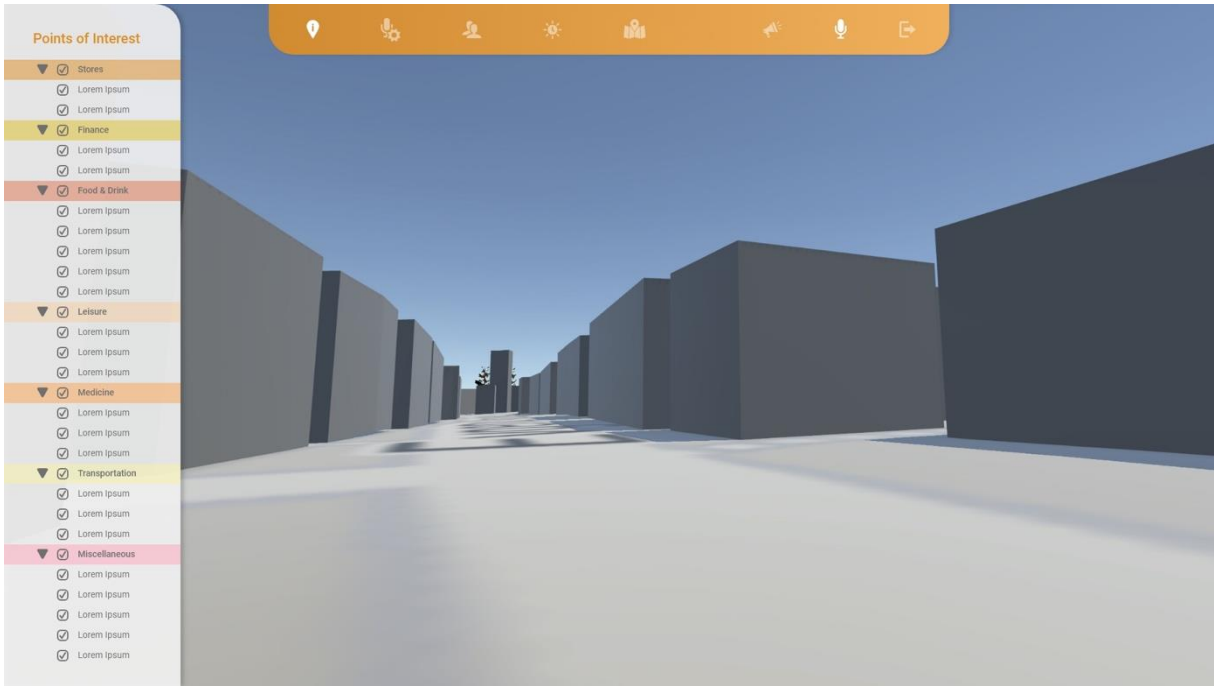

Figure 8: POI UI for Desktop VR

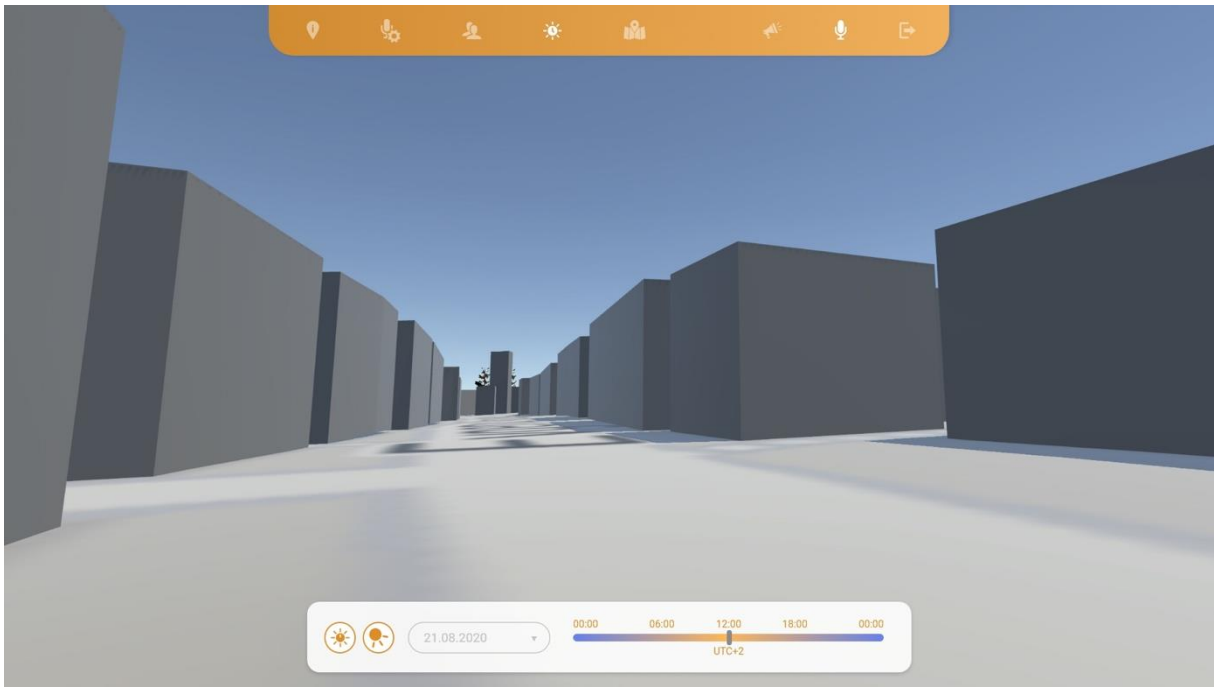

Figure 9: Daylight simulation UI

3.3 Installation Requirements

To run the tool 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/1ikl53GkOqb7FBQYemvzxUFl6XAkuNKq-?usp=share_link
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.

The following screenshots show various functionalities of the VR Tool:

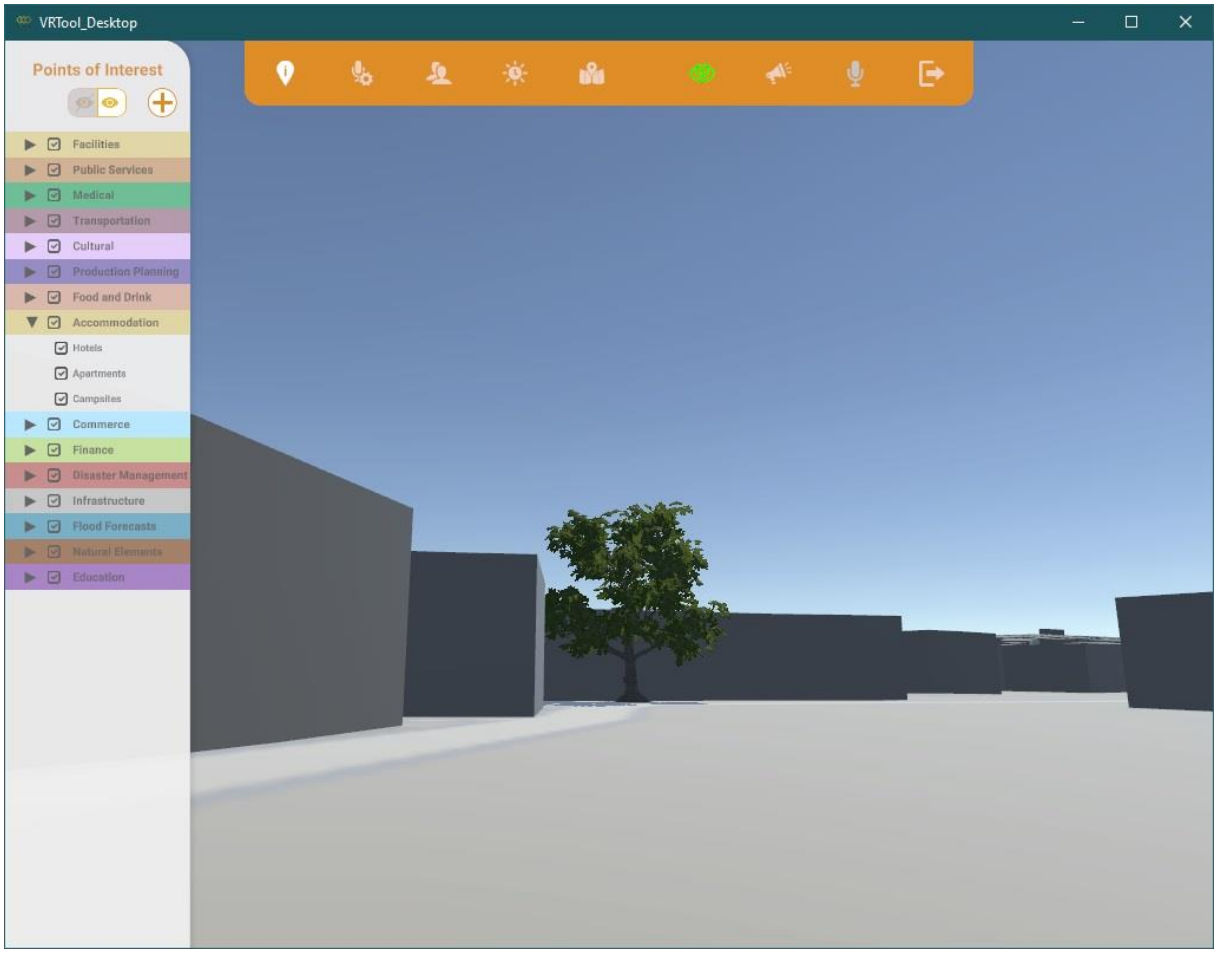

Figure 10: UI and POIs

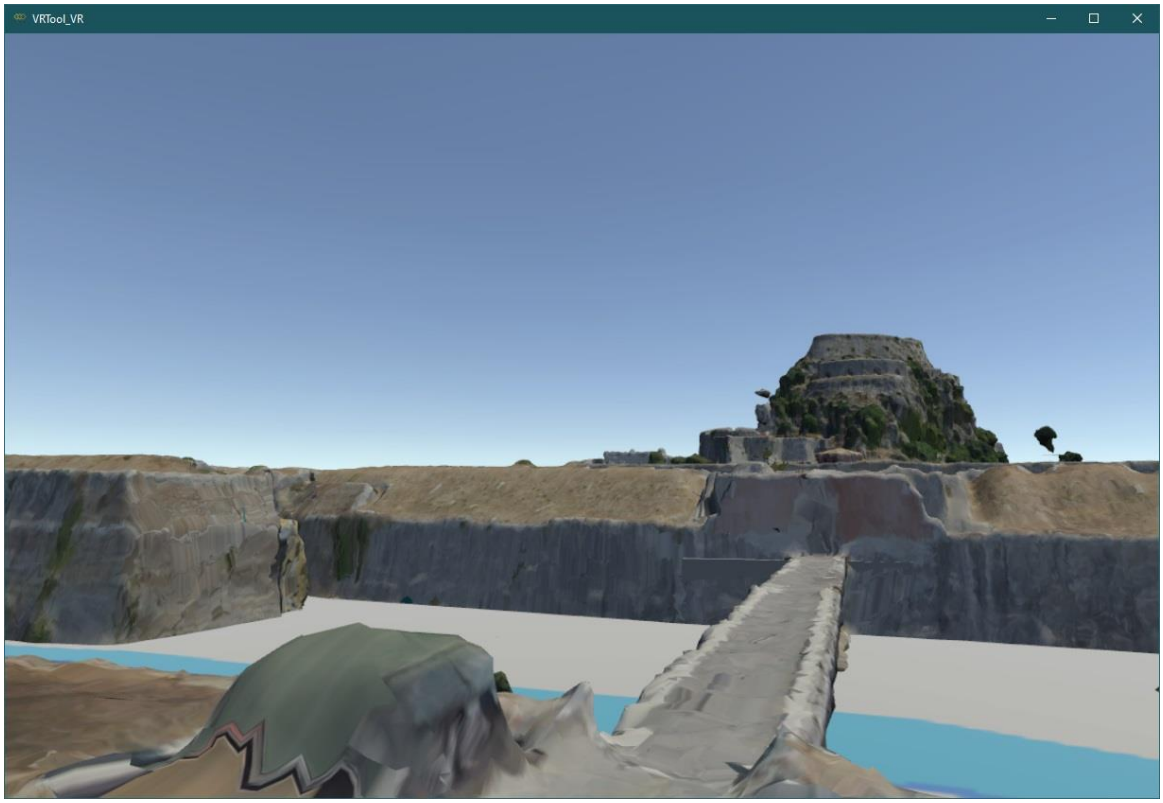

Figure 11: 3D model with bird's eye view

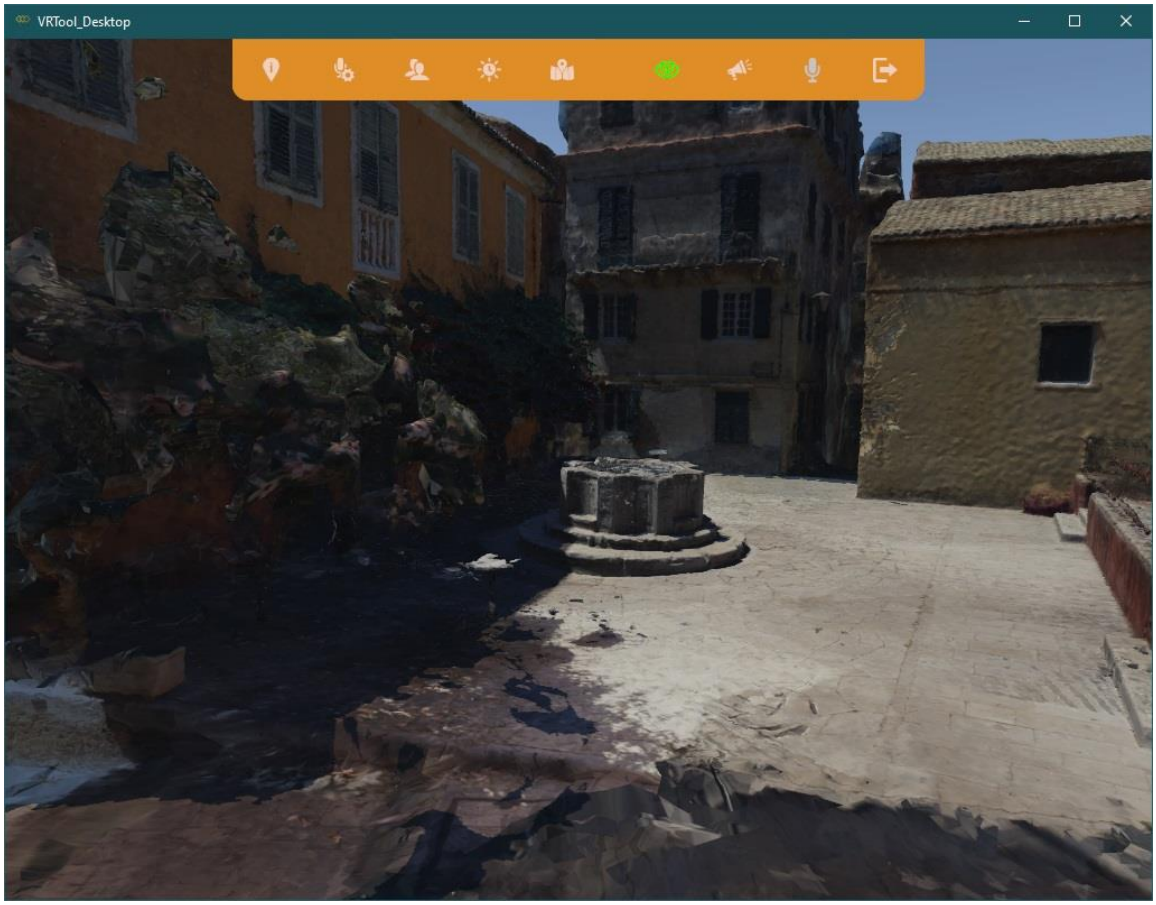

Figure 12: Navigating 3D model

Figure 13: Corfu 3D model

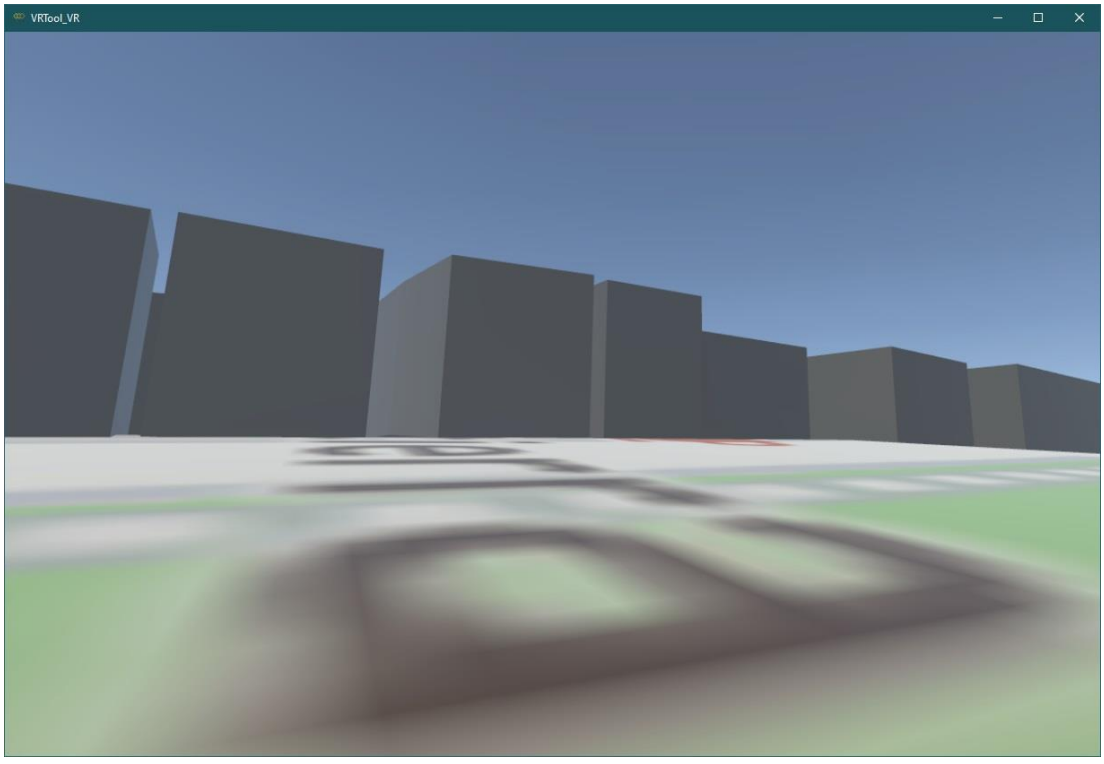

Figure 14: General VR View

4 NEXT STEPS

In the following period, up to the final pilot tests, the focus will be on the finalization of new features, the correction of bugs identified in intermediate testing sessions of the project and the proper handling of the remaining issues from the 1st testing cycle. The next version of the VR Tool will be the final in the framework of the xR4DRAMA project. The final tool will be packaged and given as an executable for the project users. Further testing would be done for exploitation purposes.

5 CONCLUSION

The deliverable provides an overview of the functionalities implemented in the 2nd prototype of the VR Collaborative Tool. The prototype due in the third year of the project is created by adding new features and resolving bugs discovered during the testing of the 1st prototype. The feedback from continuous testing of this prototype will help us improve its performance and finalize the tool.

The tool provides the most immersive experience in the xR4DRAMA platform. In the next few months, the final prototype will be provided, including the above-mentioned features based on input from the users.