



This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101037424.



Virtual Reality videos

Deliverable 2.6

WP2: Systems Innovation Approach

Authors: Georgios Gkaniias, Dimitra Petousi, Akrivi Katifori, Lori Kougioumtzian, Ebum Akinsete (ATHENA)

Date: 31.01.2025

Deliverable Number and Name	D2.6: Virtual Reality videos
Work Package	WP2– Systems Innovation Approach
Dissemination Level	Public
Author(s)	Georgios GKANIAS, Dimitra PETOUI, Akrivi KATIFORI, Lory KOUGIOUMTZIAN, Ebun AKINSETE.
Primary Contact and Email	Akrivi Katifori, vivi@athenarc.gr
Date Due	31/01/2025
Date Submitted	31/01/2025
File Name	ARSINOE_D2.6_fv
Status	Public
Reviewed by (if applicable)	Giannis Adamos (UTH)
Suggested citation	Georgios Ganas, Dimitra Petousi, Akrivi Katifori, Lori Kougioumtzian, Ebun Akinsete (2025). Virtual Reality videos. ARSINOE D2.6, H2020 grant no. 101037424

© ARSINOE Consortium, 2025

This deliverable contains original unpublished work except when indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation, or both. Reproduction is authorised if the source is acknowledged.

This document has been prepared in the framework of the European project ARSINOE. This project has received funding from the European Union’s Horizon 2020 innovation action programme under grant agreement no. 101037424.

The sole responsibility for the content of this publication lies with the authors. It does not necessarily represent the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	4
2. INTRODUCTION	5
2.1 Objectives and scope	5
2.2 Content of this report	5
3. ARSINOE VR – EDUCATION	5
4. ARSINOE VIRTUAL REALITY VIDEOS	6
5. CONCLUSIONS AND NEXT STEPS.....	8
6. REFERENCES.....	9

1. EXECUTIVE SUMMARY

Virtual Reality (VR) environment creation (Task 2.5) aims to support the creation of the VR engagement and decision support experiences described in the context of Task 2.6 through the modelling of appropriate virtual environments. It produced virtual environments showcased in the context of the ARSINOE VR immersive virtual reality experience, available in two different versions: ARSINOE VR - choice experiment and ARSINOE VR - education. The design concept and supporting previous research for these two versions is presented in D2.2 (Design of 3D models and visual elements) and D2.5: Report on an innovation approach to train to climate change to increase local adaptive capacity. The choice experiment version has been developed in collaboration with WP7 and incorporated the outputs of the Case Study (CS) 1 – Athens Metropolitan Area Living Labs. The ARSINOE VR choice experiment application was then re-purposed as an application for environmental awareness.

The work is grounded on existing theory and practice on environmental valuation and education, focusing on environmental awareness, citizenship and empathy. For the educational version, the methodology leverages an immersive VR application with a facilitated dialogue approach, designed to inform on different aspects of the climate change crisis as well as proposed solutions, and engage participants in joint reflection and meaning making activities.

The ARSINOE Virtual Reality (VR) videos aim to provide an accessible alternative for users without immersive VR equipment, offering a low-cost, web-based solution tailored for educators. This approach also addresses the needs of younger children under 12, for whom immersive VR is not recommended, by repurposing the VR application into child-friendly educational materials. The videos will be hosted on a dedicated webpage, updated based on educator feedback and evaluation feedback from educators and students, which will take place by July 2025.

The webpage features two types of videos: 360-degree walkthroughs showcasing panoramic views of educational scenarios, such as worst-case future alternatives, decision-making activities in a spacecraft, and best-case nature-based solutions; and comparative videos highlighting key differences between worst-case and best-case scenarios. Additionally, the webpage provides access to the facilitated dialogue interactive multimedia application, designed as a post-experience complement to ARSINOE VR. Clear instructions and an introduction will guide users through the materials, ensuring ease of access and engagement/ The webpage is temporarily hosted here: <https://narrative.github.io/ArsinoeVR/>

D2.6 (Virtual Reality Videos) reports on the progress in the context of Task 2.6: Citizens preferences elicitation and engagement on interventions towards a resilient adaptation to climate change through VR. The deliverable describes the approach introduced by ARSINOE to create and offer the aforementioned videos to train citizens to climate change and increase their adaptive capacity.

2. INTRODUCTION

2.1 Objectives and scope

Task 2.5: Virtual Reality environment creation aims to support the creation of the VR engagement and decision support experiences described in the context of T2.6 through the modelling of appropriate virtual environments. It produced virtual environments showcased in the context of the ARSINOE VR immersive virtual reality experience, available in two different versions: ARSINOE VR - choice experiment and ARSINOE VR - education. The design concept and supporting previous research for these two versions is presented in D2.2 Design of 3D models and visual elements and D2.5: Report on an innovation approach to train to climate change to increase local adaptive capacity.

Amongst T2.6 aims for citizen engagement and communication of environmental issues to promote local climate change impacts' awareness, is the creation of a series of video material based on the ARSINOE-VR education experience. More details about the VR experience will be available in D2.7 (Report on Virtual Reality experiences). The videos can be used as educational material in formal and informal educational contexts and for the ARSINOE dissemination purposes.

2.2 Content of this report

This report presents the approach for the creation of the ARSINOE VR videos. Section 2 described briefly the concept and experience flow of the ARSINOE VR - education application and the supporting facilitated dialogue experience. Section 3 describes the concept and presentation of the videos and Section 4 concludes the report and mentions the next steps.

3. ARSINOE VR – EDUCATION

ARSINOE VR foresees a methodology that aspires to promote environmental citizenship. Environmental citizenship (Dobson, 2007) refers to the capacity and willingness of individuals to understand environmental challenges, reflect on their causes and implications, and participate actively in collective efforts toward sustainable solutions. It emphasises informed decision-making, empathy for the more-than-human world, and responsible action at individual and community levels. ARSINOE VR addresses its key components by a combination of an immersive collaborative VR application and a facilitated dialogue experience.

The facilitated dialogue experience will stimulate collaborative reflection and dialogue on different scenarios and pathways and aims to consolidate the direct view of what certain participant decisions would mean for the future, in the context of these scenarios, as experienced in the VR. Consequently, the approach combines group decision making with an immersive interactive presentation of the outcomes of the choices, engaging the participants in an embodied exploration of different scenarios, stimulating additional constructive dialogue and the understanding of different perspectives.

Set in a reimagined Athens city square symbolizing the intersection of humanity and the natural world, ARSINOE VR guides two users through a collaborative journey. Wearing a futuristic virtual helmet with a Heads-Up Display (HUD), participants assume the roles of "Flora Expert" or "Fauna Expert," tasked with exploring alternate realities and making impactful decisions.

The journey begins in a spacecraft training room where users learn the interaction mechanics. After learning how to move around and grab objects, the two players are asked to decide together which role will be assigned to each of them. To do this, they are presented with two similar crates with different decorations, one flora-related and the other fauna-related. Then, they each open the selected crate to find the respective helmet for the role. When wearing the helmet, a virtual HUD appears with distinctive visual elements for each role.

After they learn how to scan elements related to their role and how to activate machinery by pressing buttons simultaneously, they can activate a portal leading to a dystopian future city square. Here, they encounter the harsh realities of climate change and observe its detrimental effects on plant and animal life.

Through collaborative tasks and data collection, users analyse the degraded environment and return to the spacecraft to strategize solutions. While presented with a miniature of the environment they just visited, ARSINOE (the spacecraft's AI) asks players to choose between a series of different solutions, such as trees versus artificial shade or cool materials versus green infrastructure. Players engage in discussions to prioritize their choices and then they add the selected virtual elements to the miniature, transforming the environment and receiving feedback from ARSINOE. This process of collaborative decision-making (Johnson & Johnson, 2013; Johnson, Johnson & Stanne, 2000) encourages players to actively listen to one another's perspectives, negotiate, and synthesize ideas, fostering critical thinking and teamwork skills. When done, they travel again to the square to observe and explore the positive impact of their decisions in an alternate, this time positive, reality.

The immersive VR application will be combined with a post-experience facilitated dialogue activity, designed to inform on different aspects of the climate change crisis as well as proposed nature-based solutions, and engage participants in joint reflection and meaning making. The facilitated dialogue experience is addressed to groups of 2-8 participants. The dialogue is guided by a web application responsive to mobile devices. Each participant has their own device. They are guided to explore the multimedia content individually as well as, when prompted by the application, discuss with the group specific topics relevant to the main themes identified within the Athens CS: heat, air pollution, noise and traffic and biodiversity loss.

4. ARSINOE VIRTUAL REALITY VIDEOS

The ARSINOE Virtual Reality videos will offer the possibility for those users who do not have access to immersive VR equipment to experience the virtual environment and view the relevant information. The aim is to re-purpose the VR application and environment to offer a low-cost solution for educators. Furthermore, the approach considers the need to offer

educational material for children that are too young to use immersive VR equipment, which is not advisable for children less than 12 years old.

The videos will be offered through a web page which will be updated until the end of the project, based on the feedback of educators and the evaluation activities with children. The webpage will offer access to two types of videos:

- (1) **360° panoramic video walkthroughs** offering a panoramic view of the educational experience, including the worst-case future alternative, the decision-making activity in the space-craft and the best-case scenario where nature-based solutions have been applied.
- (2) **Comparative videos** presenting comparative snapshots of the virtual environment features, comparing the worst case and best-case scenarios.

In addition to the two contrasting future environments currently depicted (worst-case and best-case), the approach allows for the incorporation of an intermediate, “middle-ground” scenario. Such a scenario already exists conceptually in the ARSINOE VR choice-experiment version and can be integrated into the educational videos in future iterations. This would allow learners to explore futures shaped by partial or uneven adoption of nature-based solutions, broadening the range of reflections and discussions supported by the educational materials.

The webpage will also offer access to the **facilitated dialogue web-based interactive multimedia application**, designed as a post-experience for the ARSINOE VR.

The web page will include a brief description and instructions for the material and an introduction.

The introduction to the material will be the following:

Throughout history, mankind has significantly altered the natural world... Sometimes with catastrophic consequences.

Climate change, soil degradation, and water pollution are among the major challenges we have to face.

Nature-based Solutions include actions to protect, sustainably manage, and restore natural and human-modified ecosystems, benefiting people and nature at the same time. For example, planting trees in cities to cool them down, restoring wetlands to prevent floods, or building green roofs to reduce energy use. These solutions protect nature and make our world healthier and stronger.

You will now have the opportunity to visit two alternative futures of an Athens city square in 2048, one where nature-based solutions have been applied and one without any, where the effects of human-induced environmental degradation is evident.

The videos are available in this URL: <https://narralive.github.io/ArsinoeVR/>

5. CONCLUSIONS AND NEXT STEPS

This report describes the concept and objectives of the demonstrator deliverable D2.6 Virtual Reality Videos, in the context of Task 2.6: Citizens preferences elicitation and engagement on interventions towards a resilient adaptation to climate change through VR. It describes the approach for the structure and presentation of the video material, which will be available in a web page to be updated throughout the project.

The VR videos described in this deliverable complement the ARSINOE VR educational approach by offering a widely accessible, low-cost alternative to immersive VR. As introduced in Section 2, their purpose is to support environmental education, awareness, and citizenship by providing intuitive visualisations of climate impacts and nature-based solutions. Recontextualising the immersive VR experience into video form enables its use in diverse educational settings, including classrooms, museums, youth programmes, and public engagement workshops. For instance, educators can use the comparative videos to initiate discussions on climate adaptation pathways, or employ the 360° walkthroughs as prompts for reflective writing, group decision-making exercises, or facilitated dialogues.

The work is grounded on existing theory and practice on environmental education, focusing on environmental awareness, citizenship and empathy. The outcomes of the formative evaluation and co-design workshop with educators and students are available in (Katifori et al, 2025).

The VR videos support goals relevant to promoting environmental citizenship by offering experiential access to contrasting environmental futures, allowing learners to observe consequences and discuss potential actions. Because this approach does not rely on Athens-specific prior knowledge, it can be readily transferred to other case studies: the same structure - paired scenarios, comparative visualizations, and facilitated dialogue - can be adapted to different cities, ecosystems, or climate challenges by re-contextualising the narrative and adjusting local flora, fauna, and environmental stressors. Thus, the video-based format offers a flexible tool for formal and informal education beyond the Athens case. This ensures long-term extensibility and positions the video-based framework as a transferable tool for climate education and citizen engagement.

6. REFERENCES

Dobson, A. (2007). Environmental citizenship: Towards sustainable development. *Sustainable Development*, 15(5), 276–285.

Johnson, D. W., & Johnson, R. T. (2013). The impact of cooperative, competitive, and individualistic learning environments on achievement. In J. Hattie & E. Anderman (Eds.), *International handbook of student achievement* (372-374). New York: Routledge.

Johnson, D. W., Johnson, R. T. & Stanne M. B. (2000). *Cooperative learning methods: A meta-analysis*. University of Minnesota.

Katifori, A., Petousi, D., Ganas, G., Koutiva, G., Stergiou, M., Servi, K., Gourdoglou, G., Boile, M., Ioannidis, Y., & Kousis, I. (2025). Designing for Environmental Citizenship: Insights from Combining Immersive VR and Dialogue-Based Activities. In *Interactive Storytelling* (pp. 95–112). Springer. https://doi.org/10.1007/978-3-032-12405-0_6