Augmented Reality localization technology for Ancient Greek Heritage Exploration and Preservation

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Agenda

- Problem statement
- Digitizing Heritage
- Augmented Reality and localized simulation technology
- Virtual Reality
- Demonstration and evaluation activities
- Next Steps

Problem Statement
and
# Proposed solution

Existing archeological sites

Existing archeological sites

- their old view and appearance have undergone major changes
- they demand of large-scale 3D reconstruction,
- lack of internet connection,
- inability to do anything in the surroundings such as install sensors,
- variations in lighting and textures (flora changes a lot),
- visitors of these sites have smartphone devices with low processing power,
- little existing information to obtain via edge tracking techniques.

Problem vs Solution
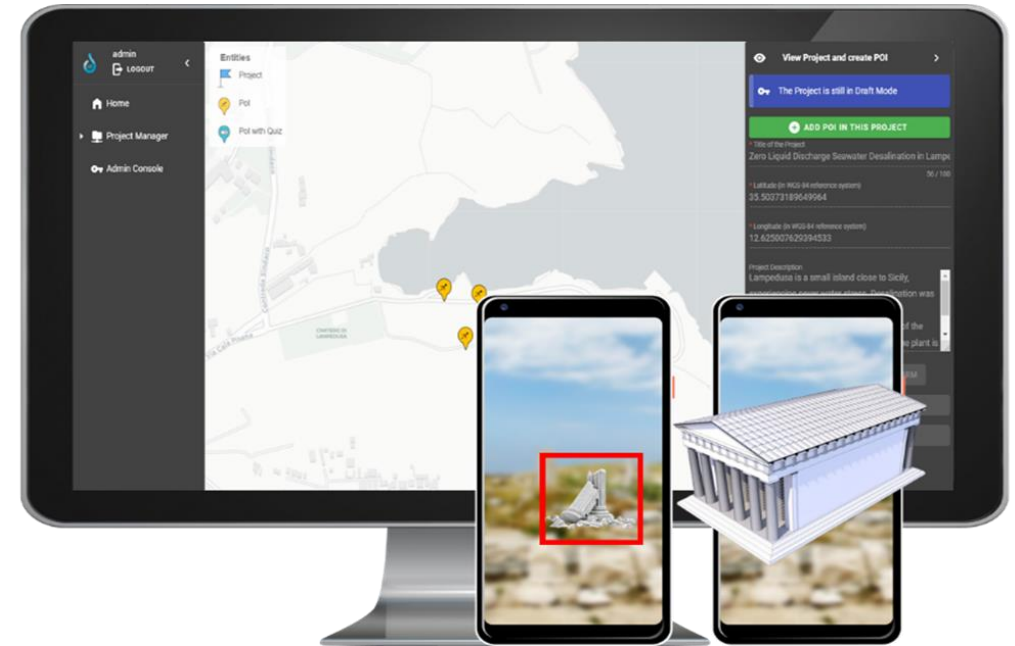
➢ CirculAR aspires to:
- ✓ enable the visualization of 3D large scale content;
- ✓ use localization technology to reposition the 3D artifacts at their original position as accurately and as stable as possible;
- ✓ seamlessly localize the 3D artefacts at field conditions with varying lighting, and textures;
- ✓ perform at common smartphone devices with low performance in terms of energy and power.

AR mobile app and Content Management System

❑ A Content Management System (CMS) enables curators, archaeologists, and other content creators to create campaigns consisting of multiple geolocated points of interest (POIs) with attached related multimedia files (text, images, videos, 3D models). The app is equipped with image and object trackers that recognize targets that are either precompiled or added in the runtime. The application is equipped with three main views for the end-user:

❑ The main **AR mode** where the user views the world augmented with the 3D content

❑ The view via a **3D viewer**, where the POI's model is rendered in the centre of the screen, and the user can use swipe gestures to rotate it and view it from any angle.

❑ A mobile **VR mode** that imitates a first-person camera where its rotational three degrees of freedom are controlled by the camera's gyroscope, while its translational three degrees of freedom are handled by corresponding UI buttons (forward, backward, left, right, up, down).

Digitizing Heritage

Use Cases

Content from three discrete archaeological sites, i.e. the islet of Delos, the ancient city of Dion, and the Athens Epigraphical Museum, has been reconstructed via 3D geometry-based modelling method to generate the 3D items required for the immersive experience.
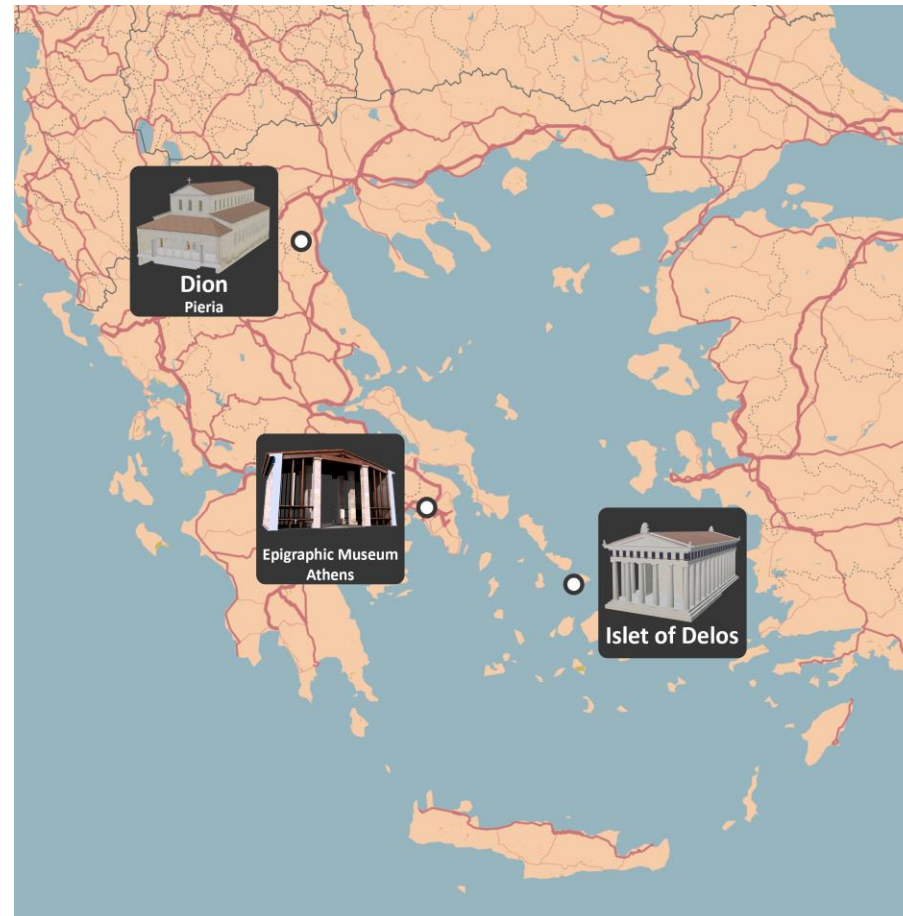
Augmented Reality and localized simulation technology
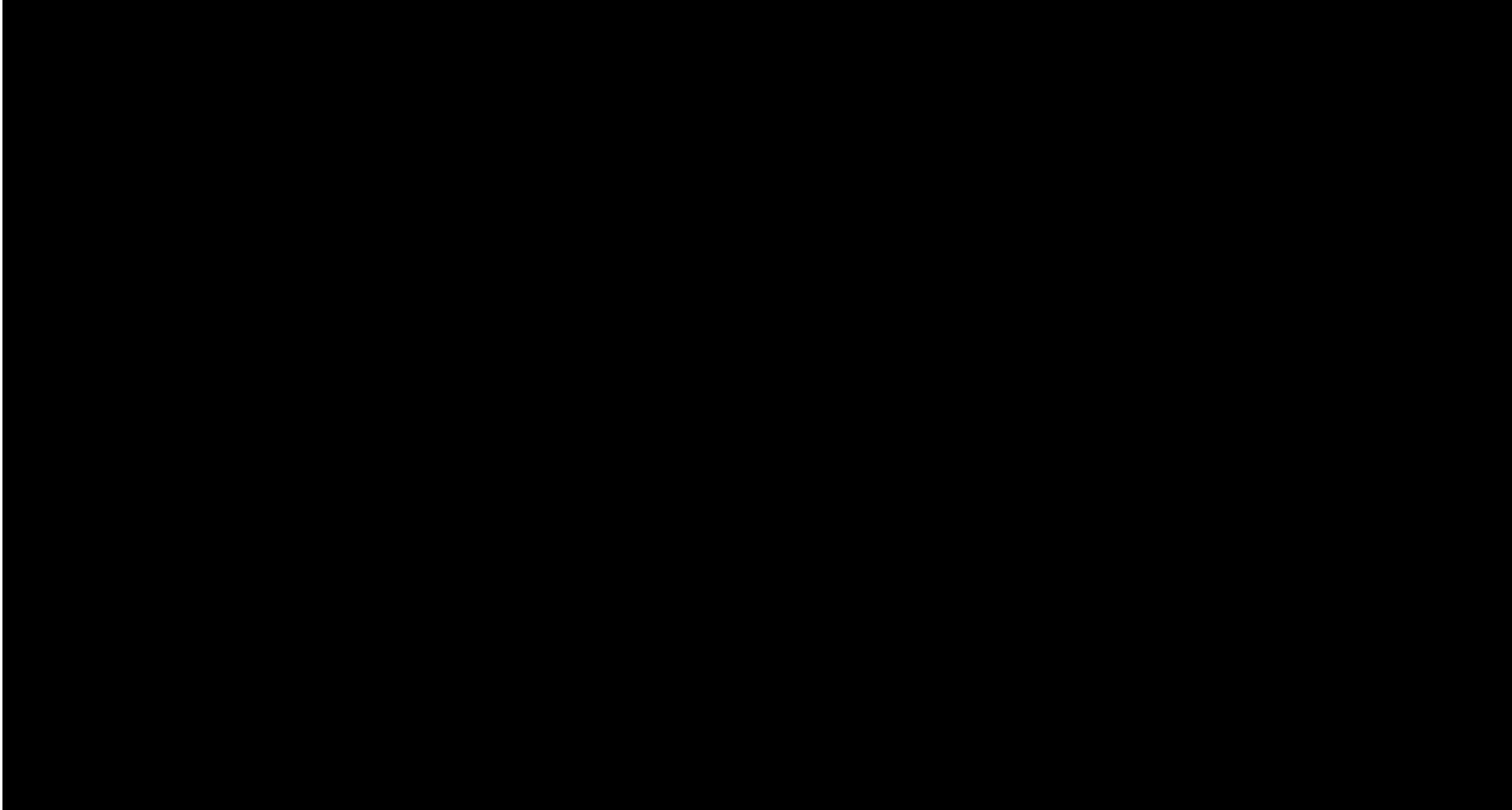
# AR and localization technology
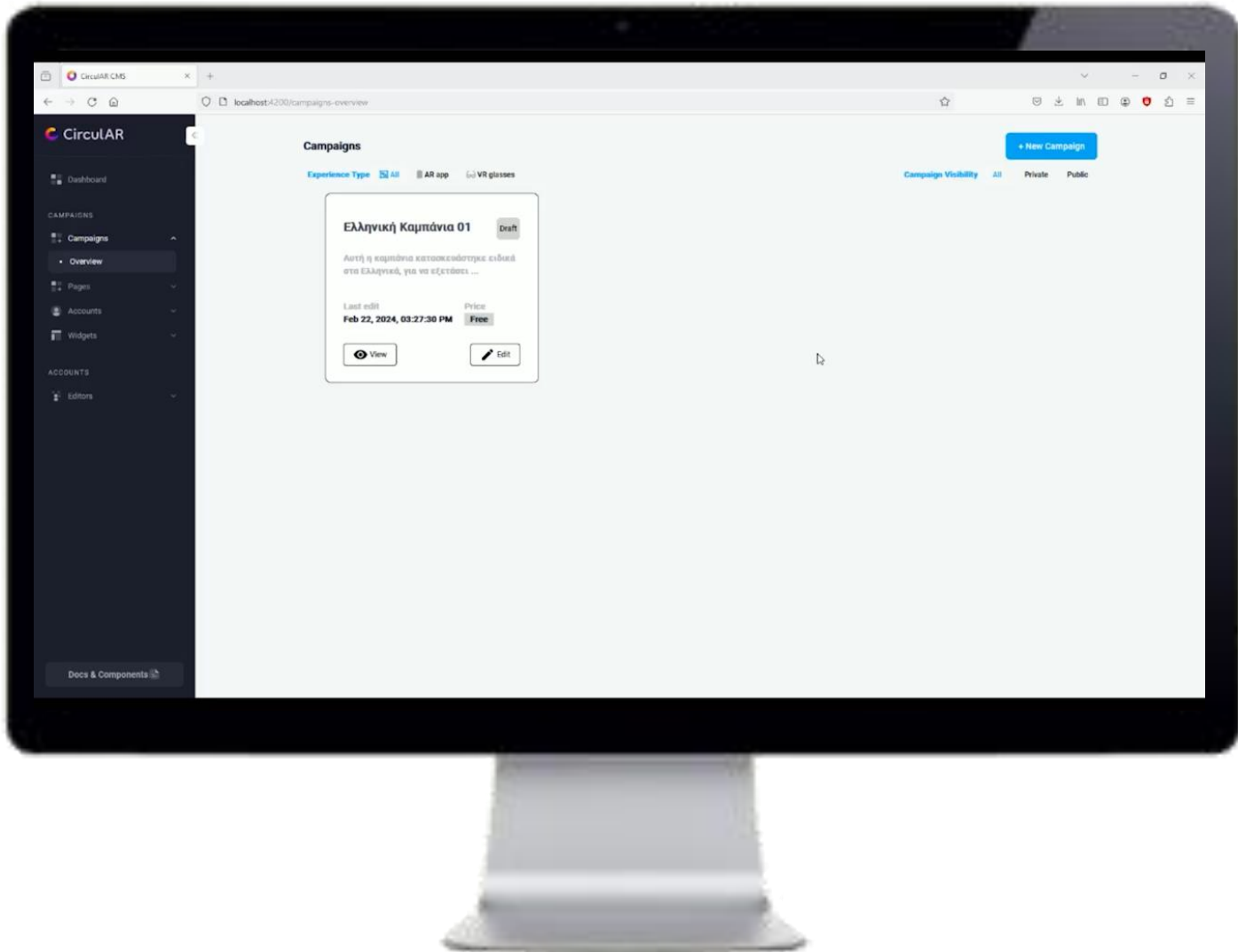
Virtual Reality

Agenda

- A Virtual Reality application has been developed to offer complete navigation freedom to the end-users.

APSIM

Wrapping up

Evaluation

⚎ All functionalities have been tested against a set of pre-defined metrics by a team of beta testers (12 participants) at the Athens Epigraphic Museum.

⚎ Demonstration activities have also been contacted at the ancient city of Dion.

⚎ The testers were able to assess the functionalities of object tracking, extended tracking, etc.

⚎ The testers successfully finalized the AR flow.

⚎ Performance evaluation has been performed at varying light conditions.

Conclusions
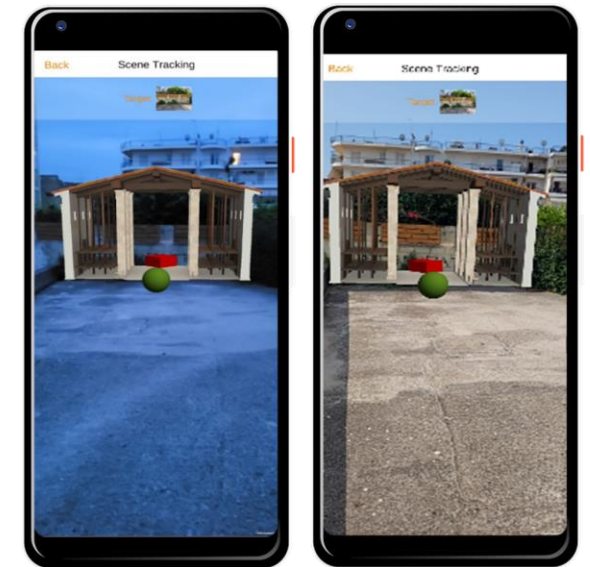
- CirculAR is designed and developed to assist visitations at archeological sites and museums.

- CirculAR contributes significantly to highlighting existing components and recovering missing fragments crucial for a comprehensive understanding of historical areas.

- CirculAR supports educational features to align its audience with long-term strategic approaches for resilience and sustainability of historical monuments by seamlessly integrating with established infrastructure and supporting the preservation and dissemination of cultural heritage data.

- CirculAR has been tested by a team of archaeologists at the afore-mentioned use cases to provide accurate and timely feedback in the domains of functionality and usability.

Future studies

- Elevating CirculAR's use by including crowdsourcing functionalities, leveraging enhanced algorithms and user participation to collaboratively map climate change and natural hazards affecting cultural heritage sites.

- To empower a diverse and interconnected user base to collectively generate valuable insights, fostering a sense of shared responsibility and innovation.

- In terms of system performance, the aim is to evaluate the algorithm's accuracy under diverse weather conditions.

Εταίροι του έργου
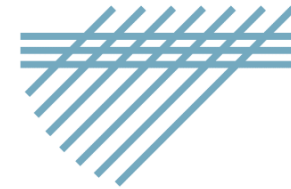
Ευχαριστούμε για την προσοχή σας!

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