



An Augmented Reality Application for the Frescoes of the Basilica of Saint Catherine in Galatina

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Who we are

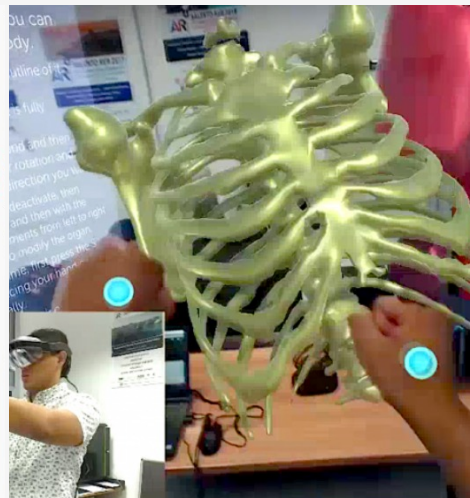


Augmented and Virtual Reality Laboratory (AVR Lab)

Dipartimento di Ingegneria dell'Innovazione
Università del Salento
avrlab.unisalento.it

Beni Culturali

Creare un ponte virtuale tra il patrimonio antico e la cultura moderna



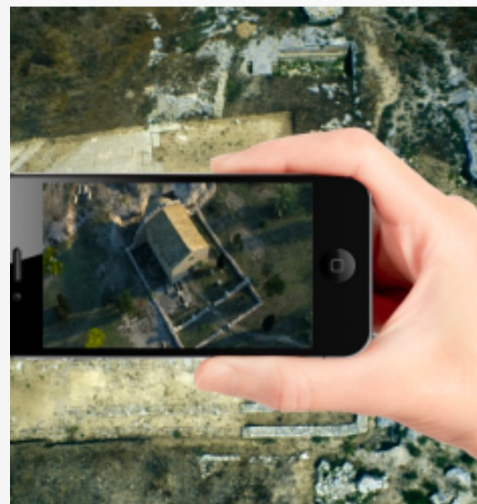
Education

Creare ambienti immersivi e sistemi innovativi basati sul *learning by doing*



Medicina

Migliorare le prestazioni del chirurgo e fornire soluzioni innovative per il trattamento di disturbi e fobie



Xrtechnology srl
Startup Innovativa
www.xrtech.it



AVR Med srl
ex Spin-off
www.avrmed.com



Goals

The project stems from the need to provide visitors with a tool that can:

- complement the traditional guided tour and enhance its use through thematic routes that enrich the cultural offer
- facilitate the reading of the frescoes



Digital technologies for the promotion of cultural heritage and territory

Starting from the new millennium, digital technologies have contributed to renew the strategies of promotion and tourist fruition of cultural and territorial heritage

Virtual Reality (VR)

Virtual Reality is a computer-generated, multisensory artificial world in which the user has the impression of being in that world with the ability to navigate through and the ability to manipulate virtual objects

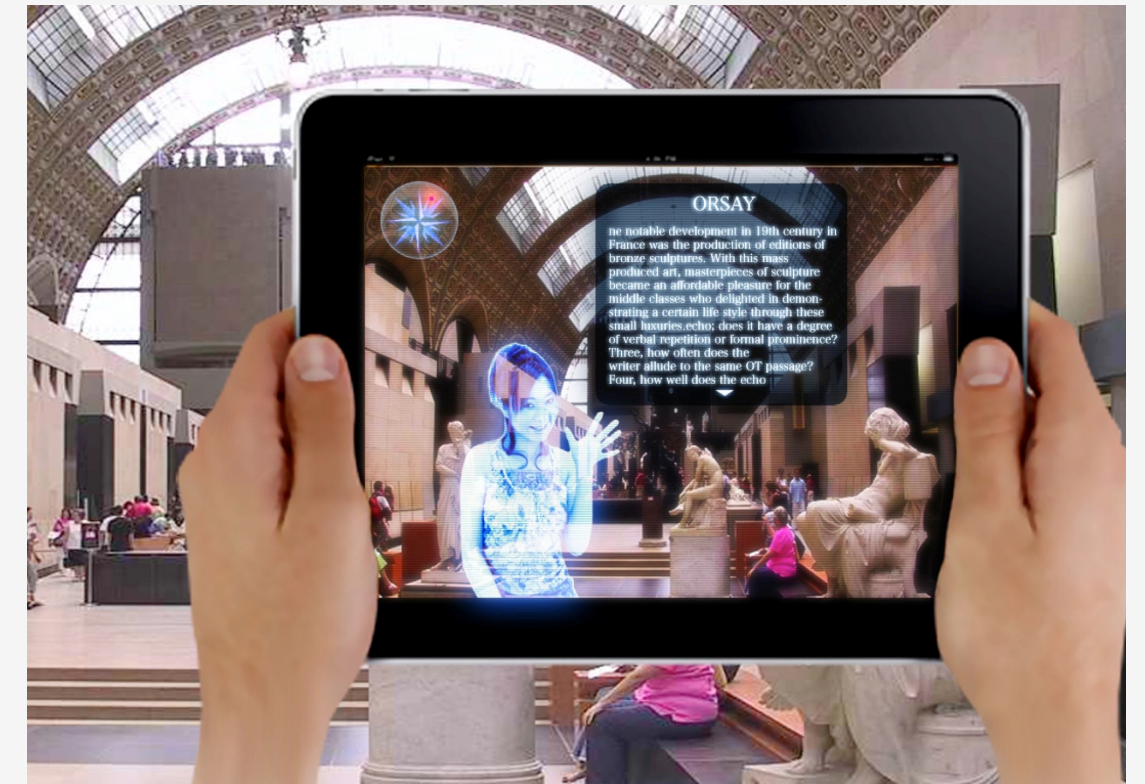
The user doesn't have any connection to the real world



Augmented Reality (AR)

- enriches the sensory perception through the superimposition of multimedia elements (image, text, video, animation, sound) to the reality framed by a device
- enriches visits of monuments and places of historical and artistic interest by helping the user to visualize what is not directly visible
- improves the traveller's experience
- guides the exploration of a territory

The user maintains relationship to the real world



Mixed Reality (MR)

Mixed Reality refers to a merging of real and virtual worlds to produce new environments and visualization where physical and digital objects co-exist and interact in real time



eXtended Reality (XR)

- **Virtual Reality (VR)** immerses users in a fully artificial digital environment
- **Augmented Reality (AR)** overlays virtual objects on the real-world environment
- **Mixed Reality (MR)** not just overlays but anchors virtual objects to the real world



Virtual Reality (VR)

Completely digital environment.
Fully enclosed, synthetic
experience with no sense of the
real world.



Augmented Reality (AR)

Real world with digital
information overlay. Real world
remains central to the experience,
enhanced by virtual details.



Mixed Reality (MR)

Real and the virtual are
intertwined. Interaction with and
manipulation of both the physical
and virtual environment.

Extended Reality (XR) is a technological umbrella that includes
Virtual Reality, Augmented Reality and Mixed Reality

eXtended Reality and cultural tourism

eXtended Reality can be a valid support in cultural tourism as it facilitates the understanding and fruition of cultural heritage

We can have an evolution in travel and tourism with these technologies





The case of study:

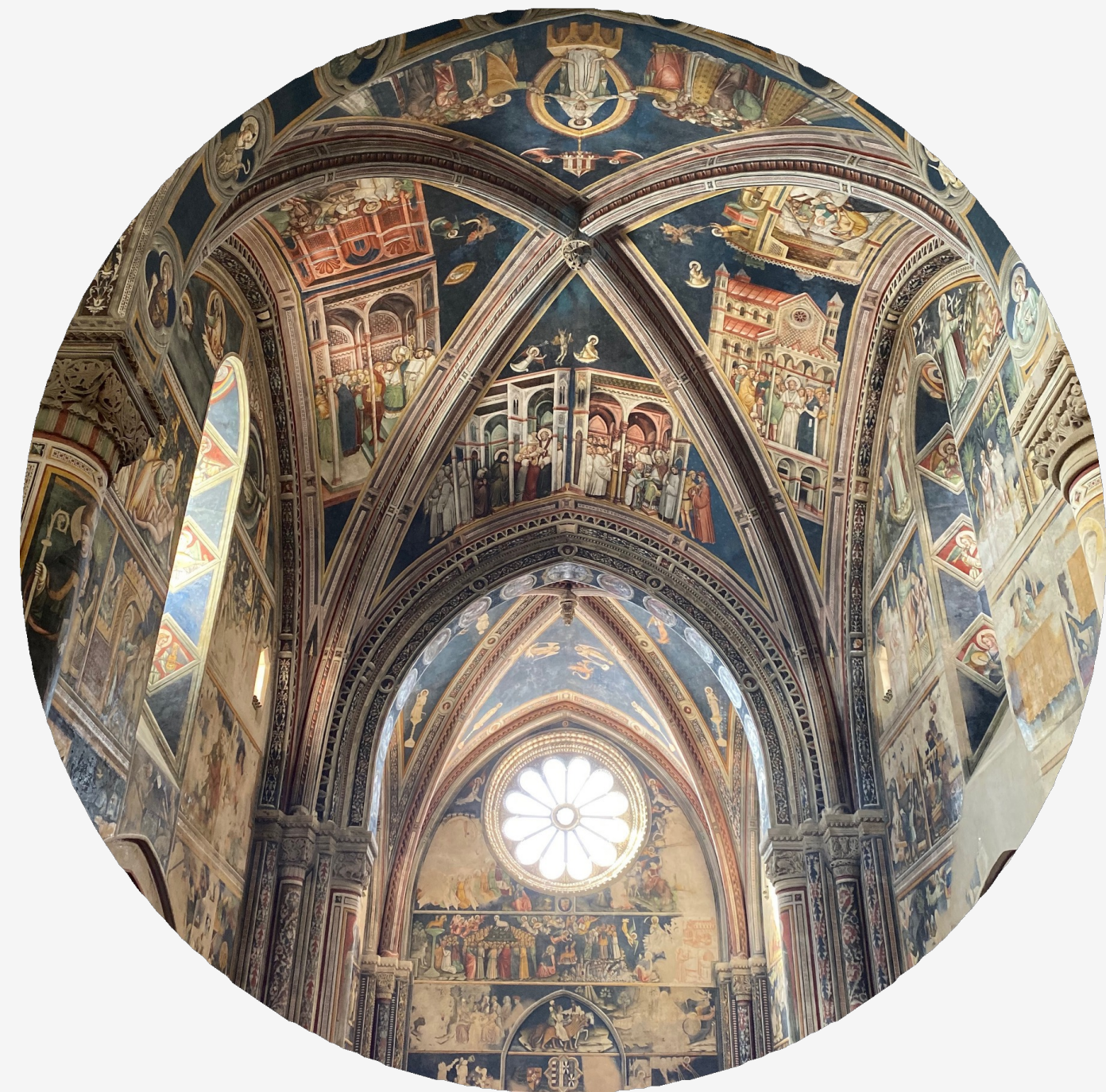
Basilica of Saint Catherine in Galatina

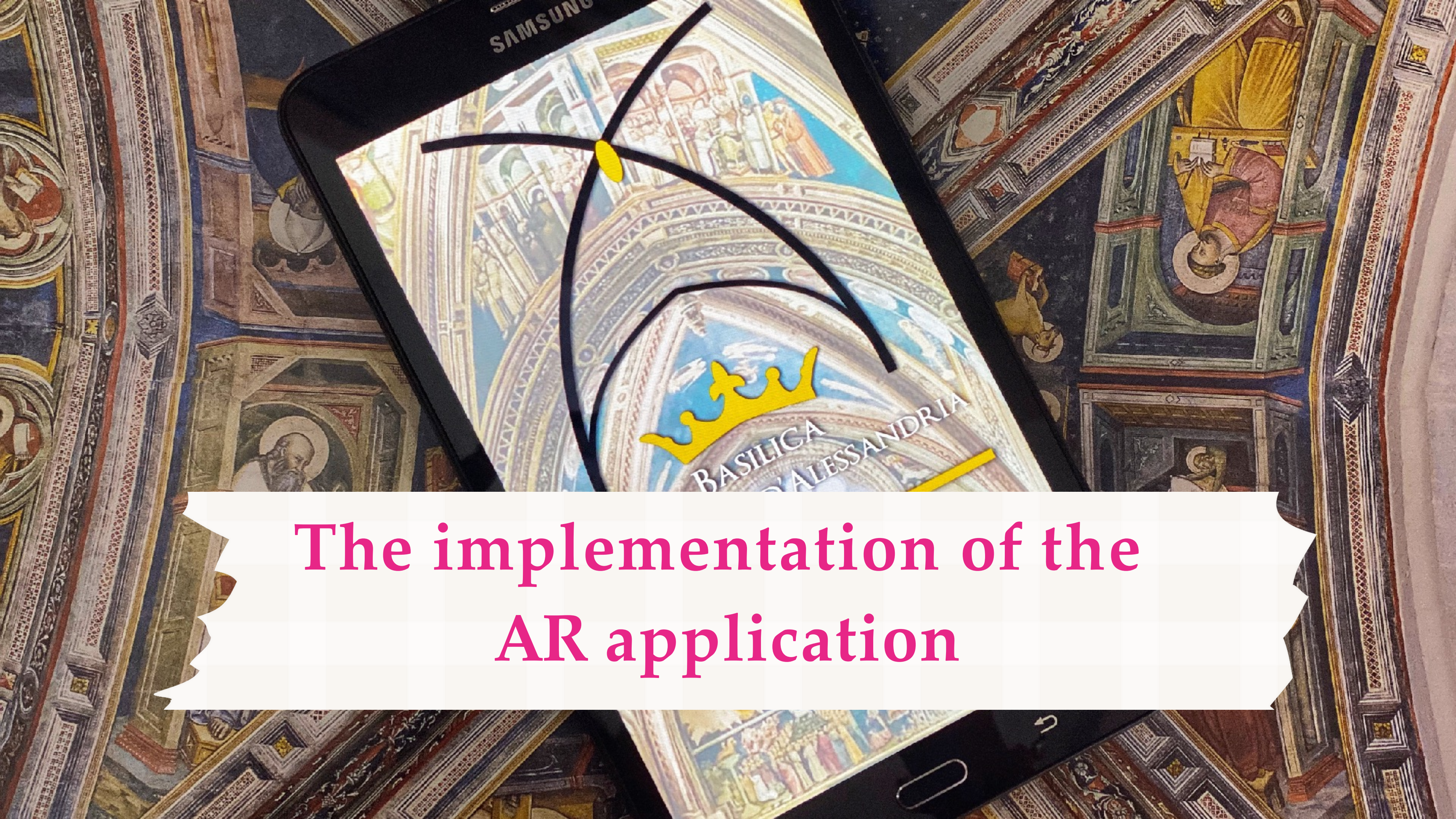


It was realized in the second half of the fourteenth century by Raimondello Orsini del Balzo

In 1391 the architectural part was surely finished, as attested by the inscription on the architrave of the left portal

The interior houses valuable pictorial cycles commissioned by Maria d'Enghien and executed by masters of the giottesque school



The background image shows the interior of the Basilica of Alexandria, featuring a high, vaulted ceiling with intricate frescoes of religious figures and scenes. A Samsung smartphone is held in the foreground, displaying a digital overlay of the same architectural space. The overlay includes a yellow crown icon and the text 'BASILICA D'ALESSANDRIA'. A yellow dot on the phone's screen is connected by a black line to a corresponding point on the real-world ceiling, illustrating the AR tracking and mapping process.

The implementation of the AR application

Methodology

Step 1:

- Analysis of the case study through repeated surveys aimed at analyzing the light sources, the position of the frescoes in relation to mobile devices and the optimal position of the user in the space
- Photographic surveys
- Bibliographic research in order to identify the peculiarities of the monument and build an adequate storytelling

Step 2:

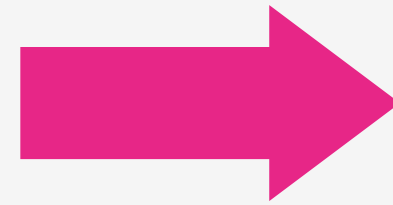
- Identification of software and libraries suitable to achieve the objective
- Selection of the frescoes and editing of the storytelling
- Design and discussion of the prototype

Step 3:

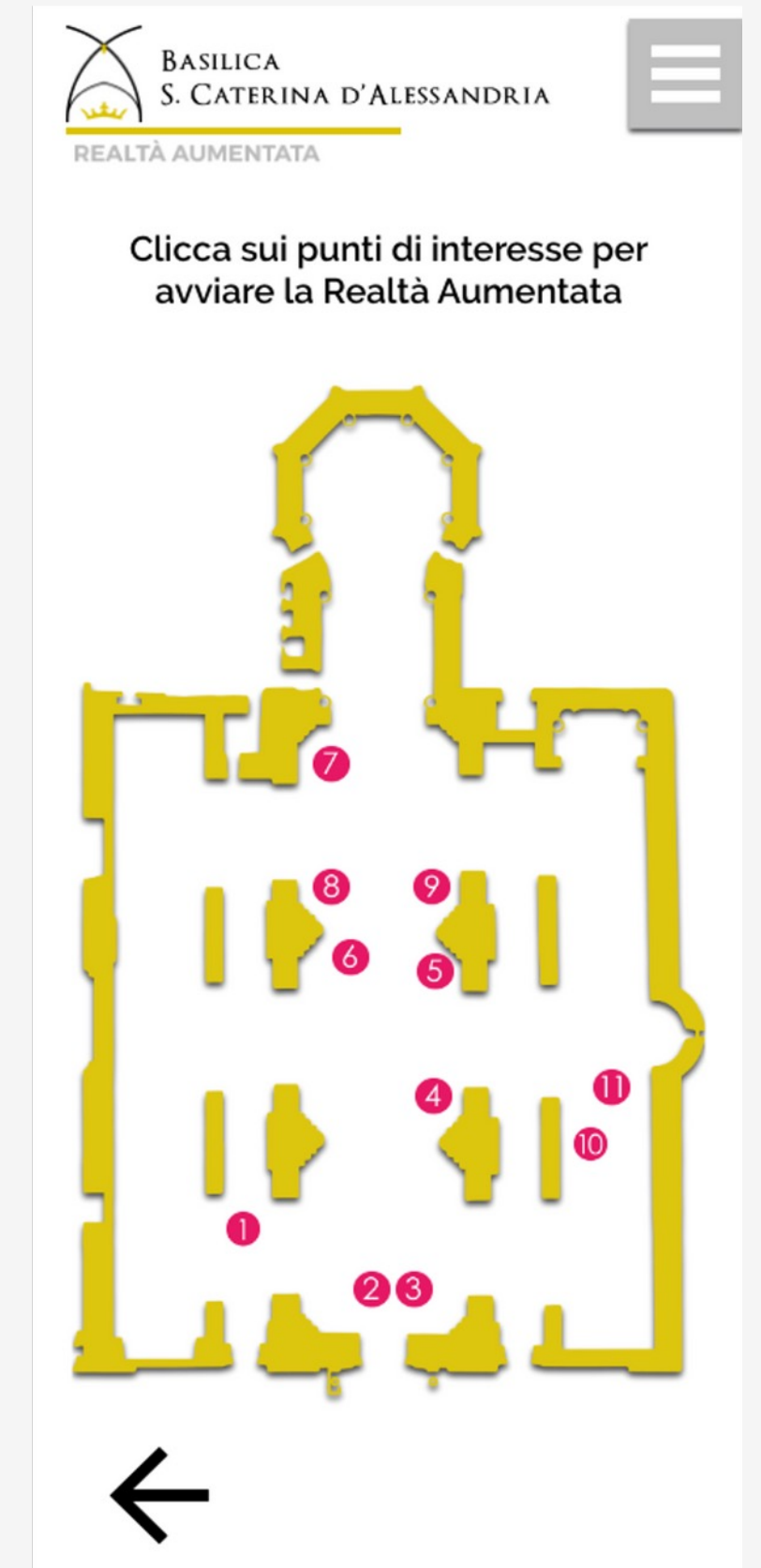
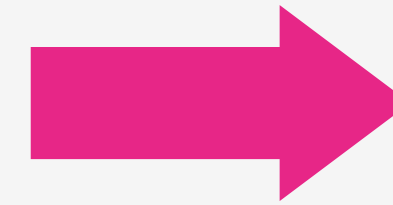
- Implementation
- Testing of the application



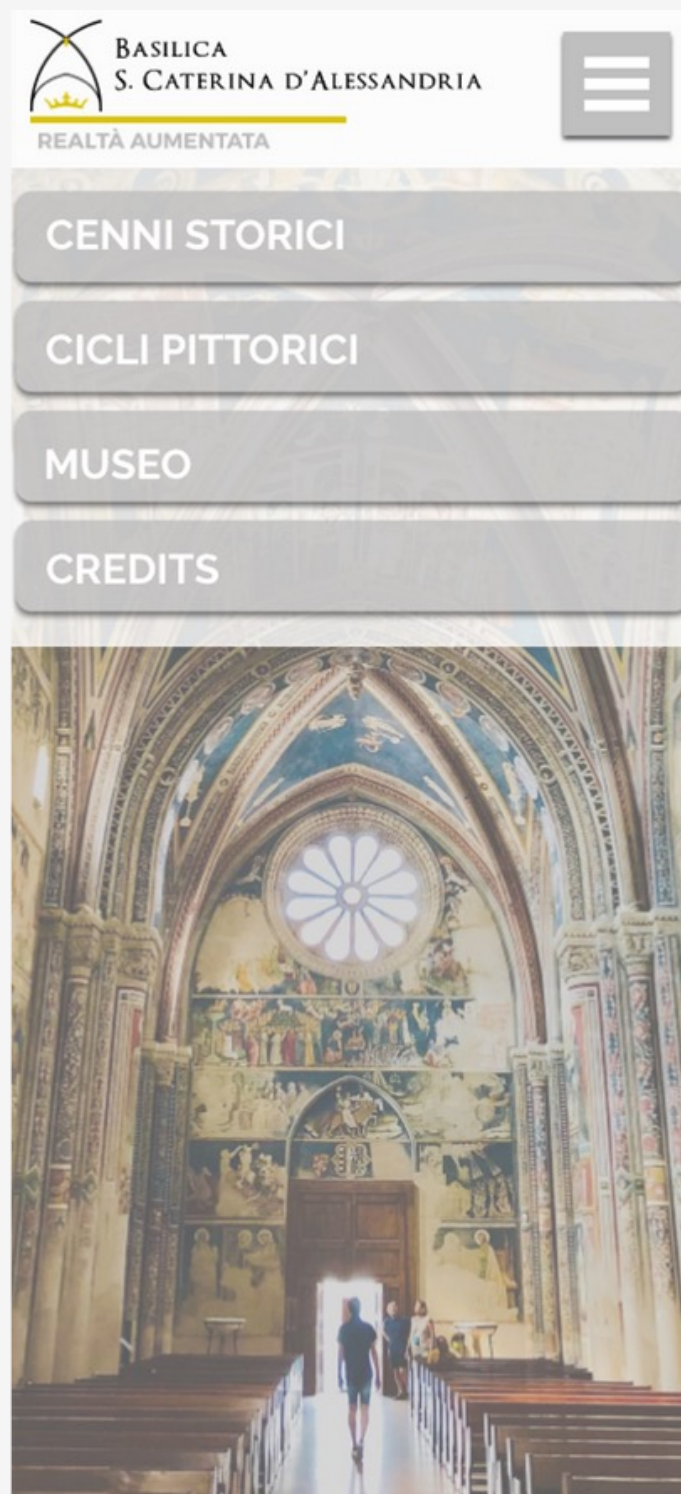
Homepage



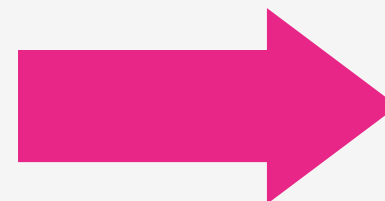
Instructions



Plant

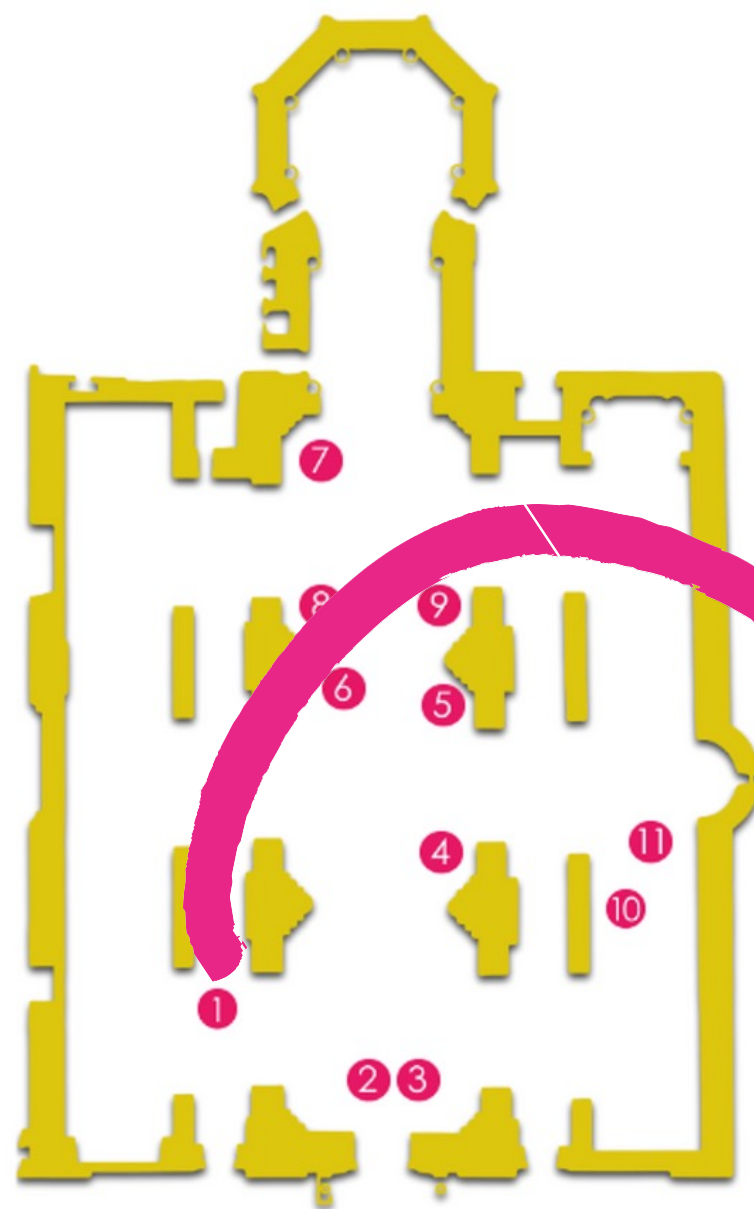


Menu

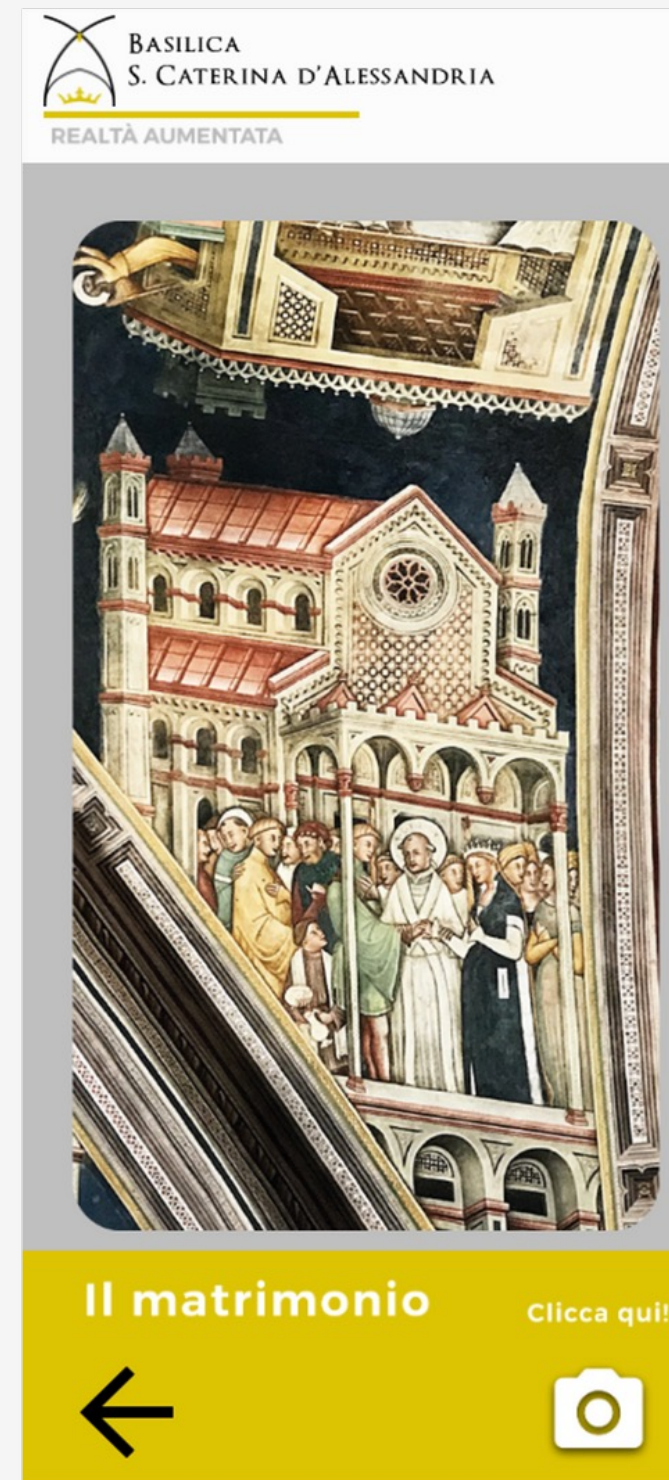
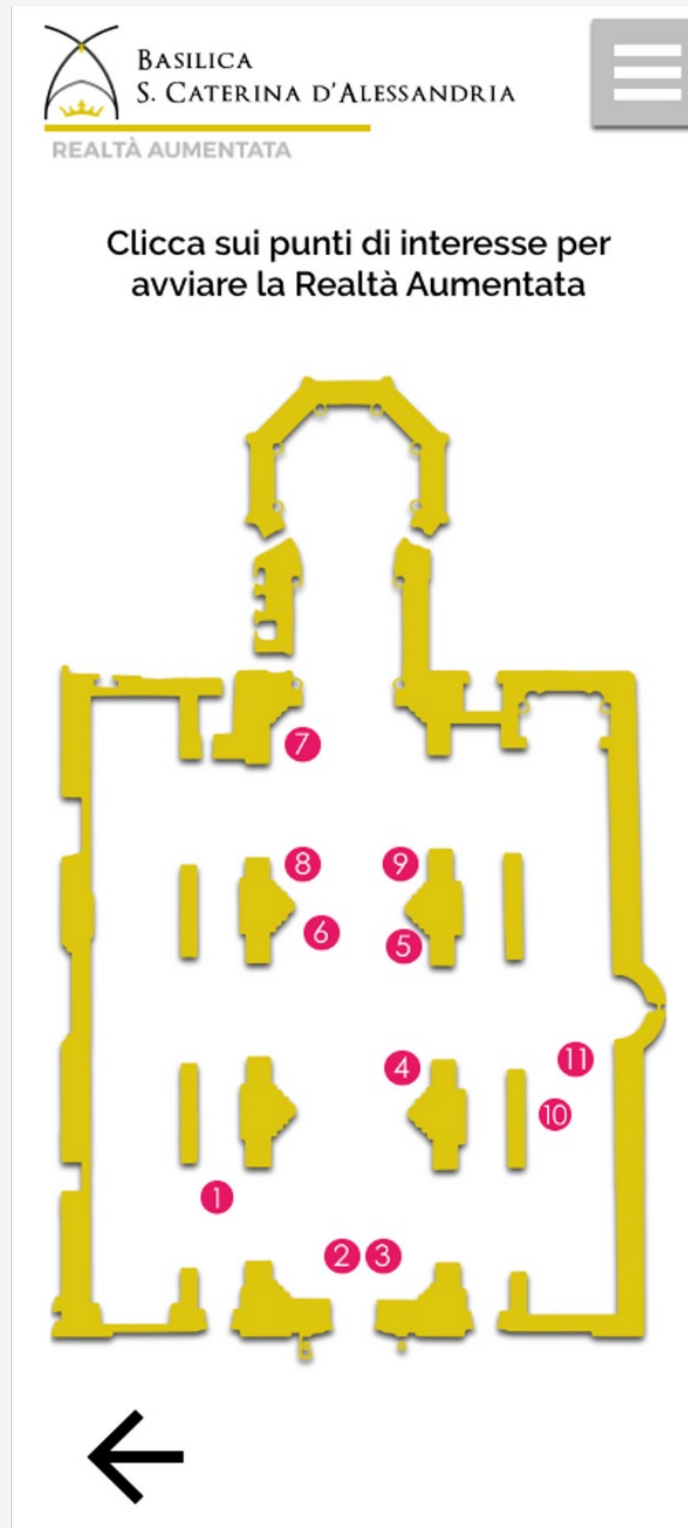


Menu

Clicca sui punti di interesse per
avviare la Realtà Aumentata



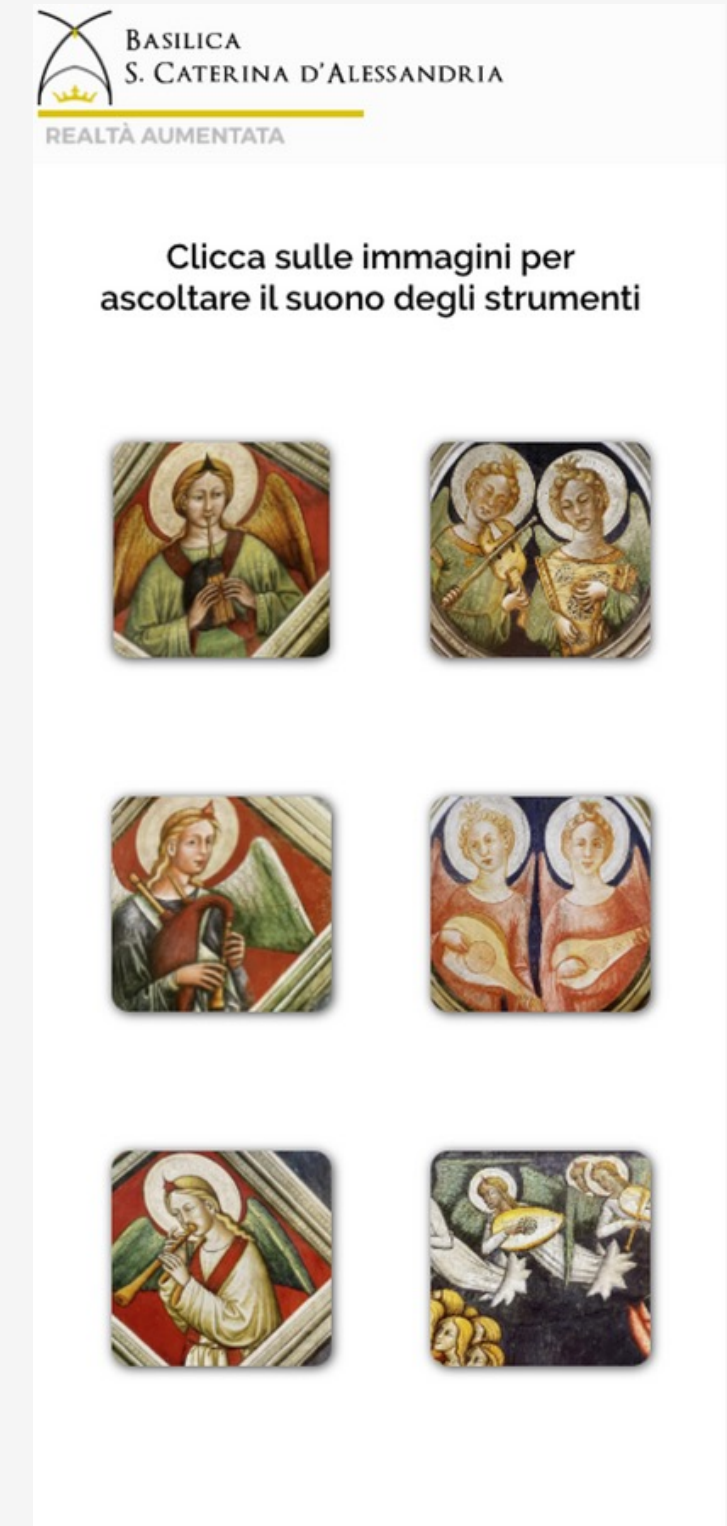
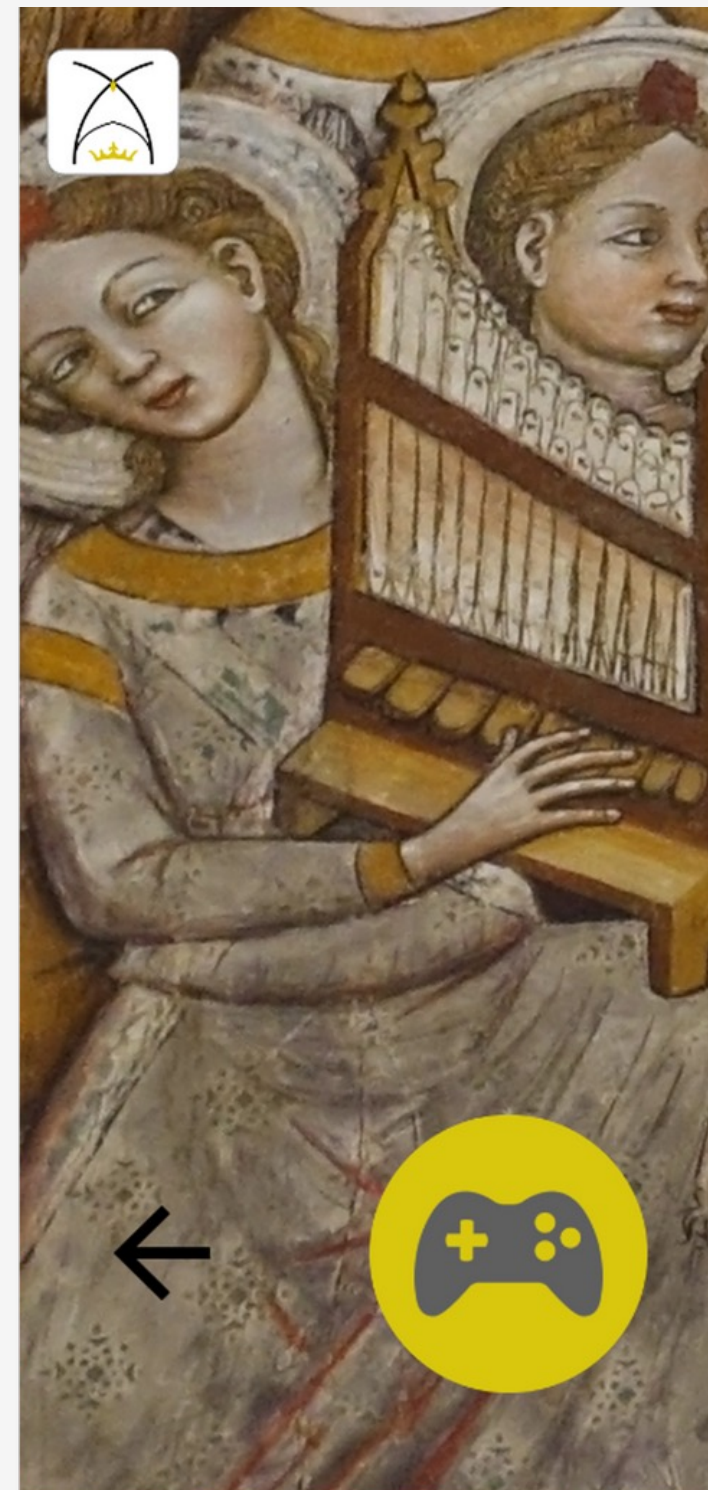
Point 1



AR Scenes



Virtual Restoration



Points of interest



Point 2–3
Noble coats of arms



Point 4
The construction
of Babylon



Point 5
The universal deluge



Point 6
The wedding



Point 7
The Baptism of Christ



Point 8
The Resurrection of Lazarus



Point 9
The ascent to Calvary



Point 10
The Coronation of the Virgin



Point 11
Birth of the Virgin

Software



Adobe Photoshop

Graphic reworking of images and virtual restoration



Adobe Illustrator

Graphic design



Vuforia

Augmented reality development kit to recognize and track planar images and 3D objects in real time.

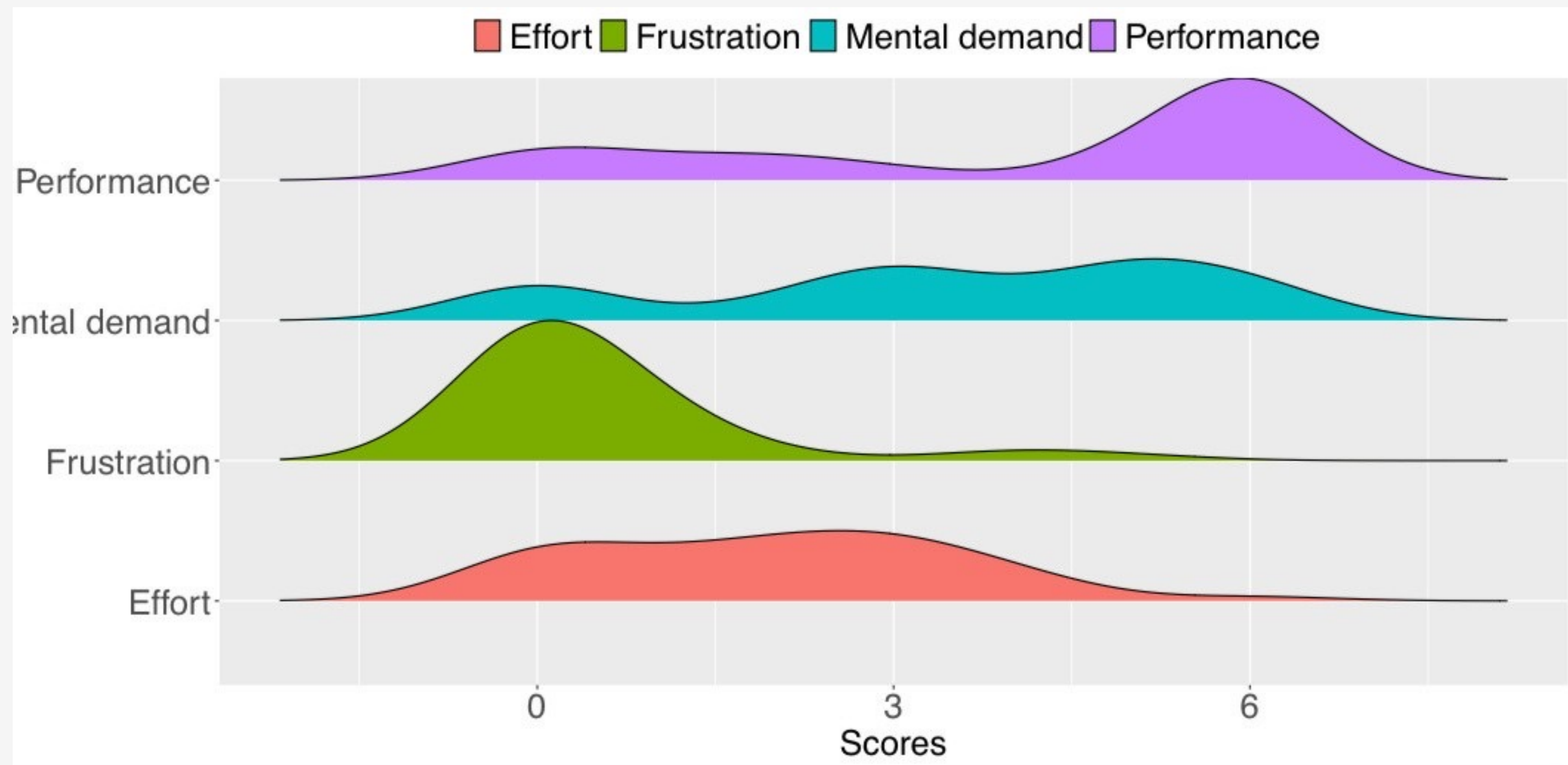


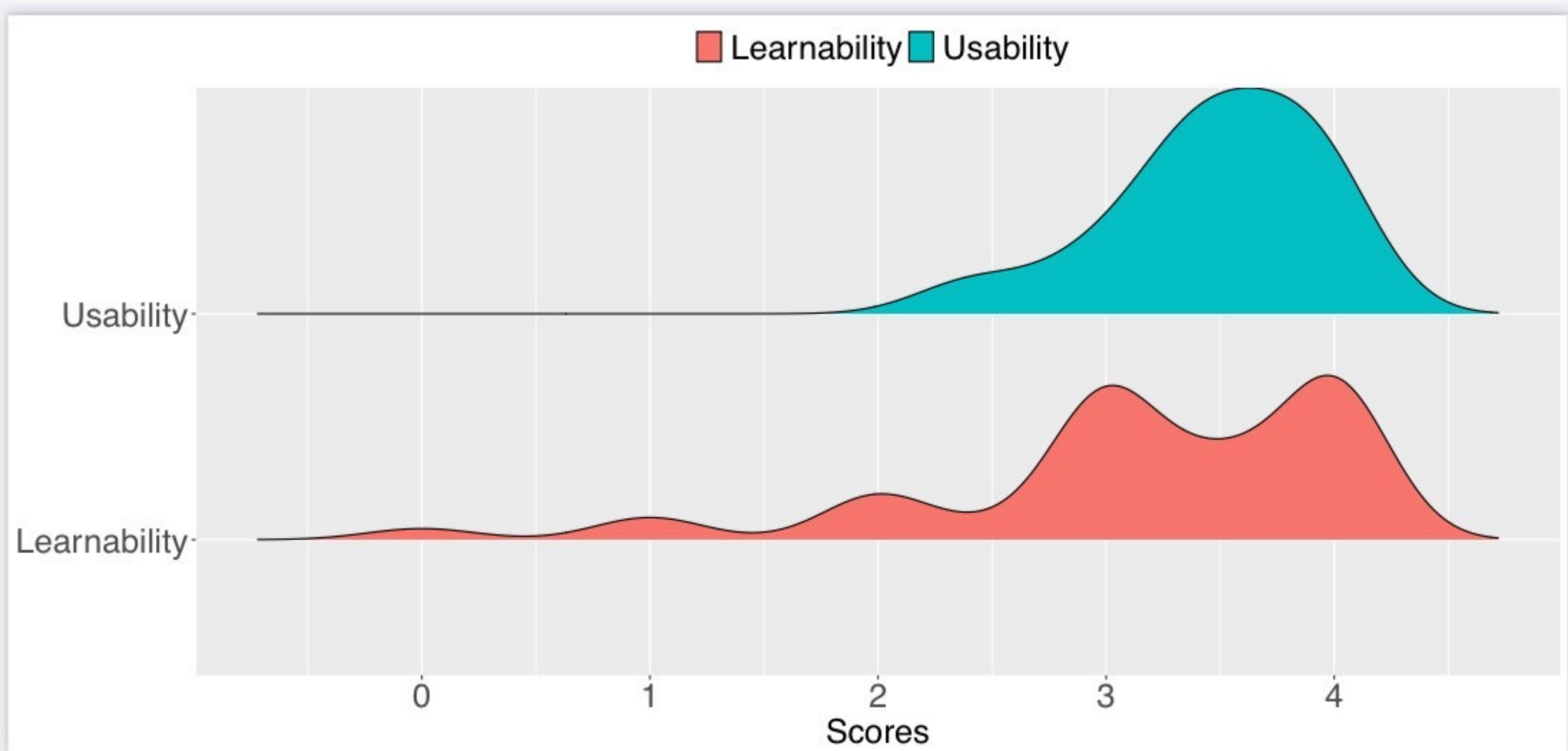
Unity

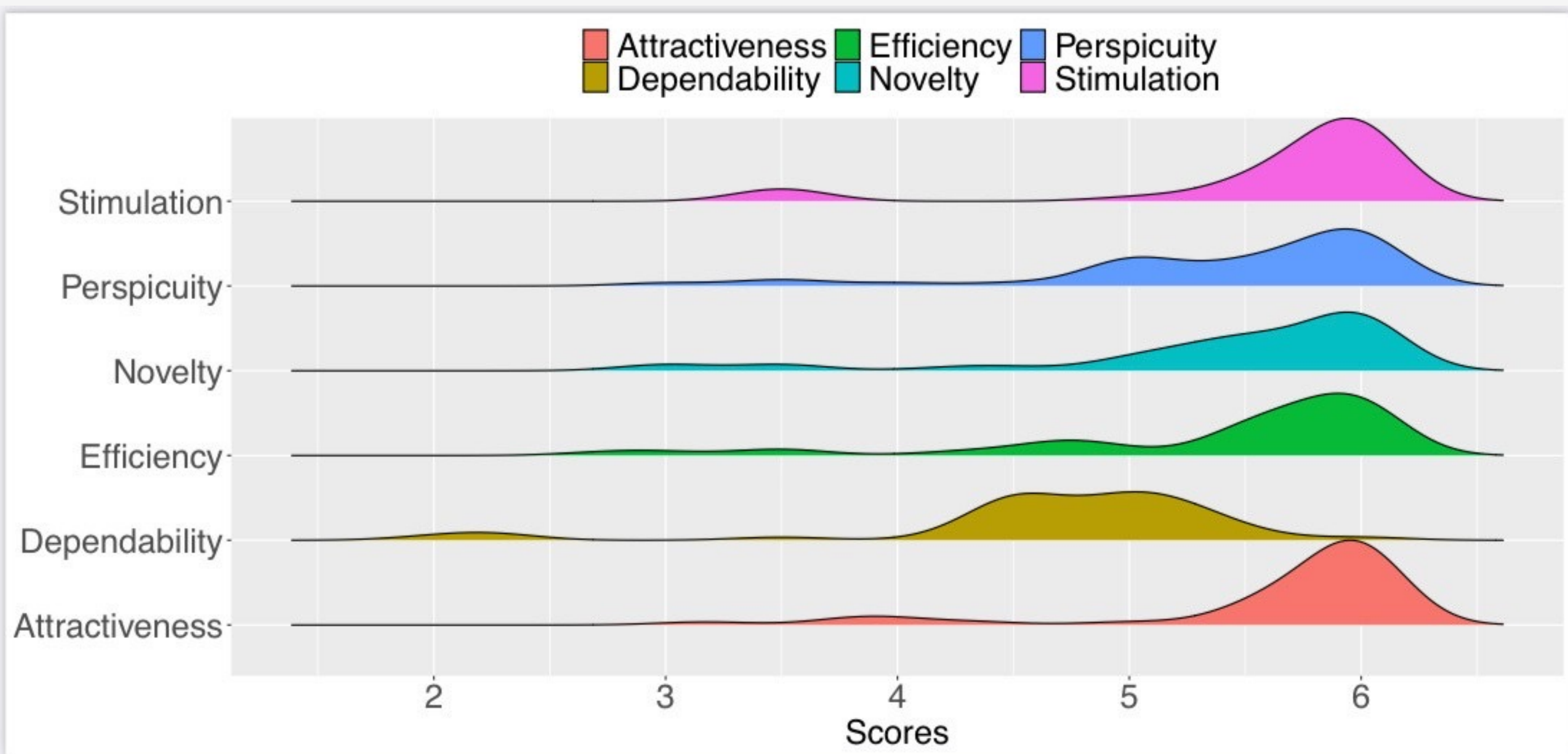
Multiplatform graphics engine that enables the development of video games and other interactive content.



Tests









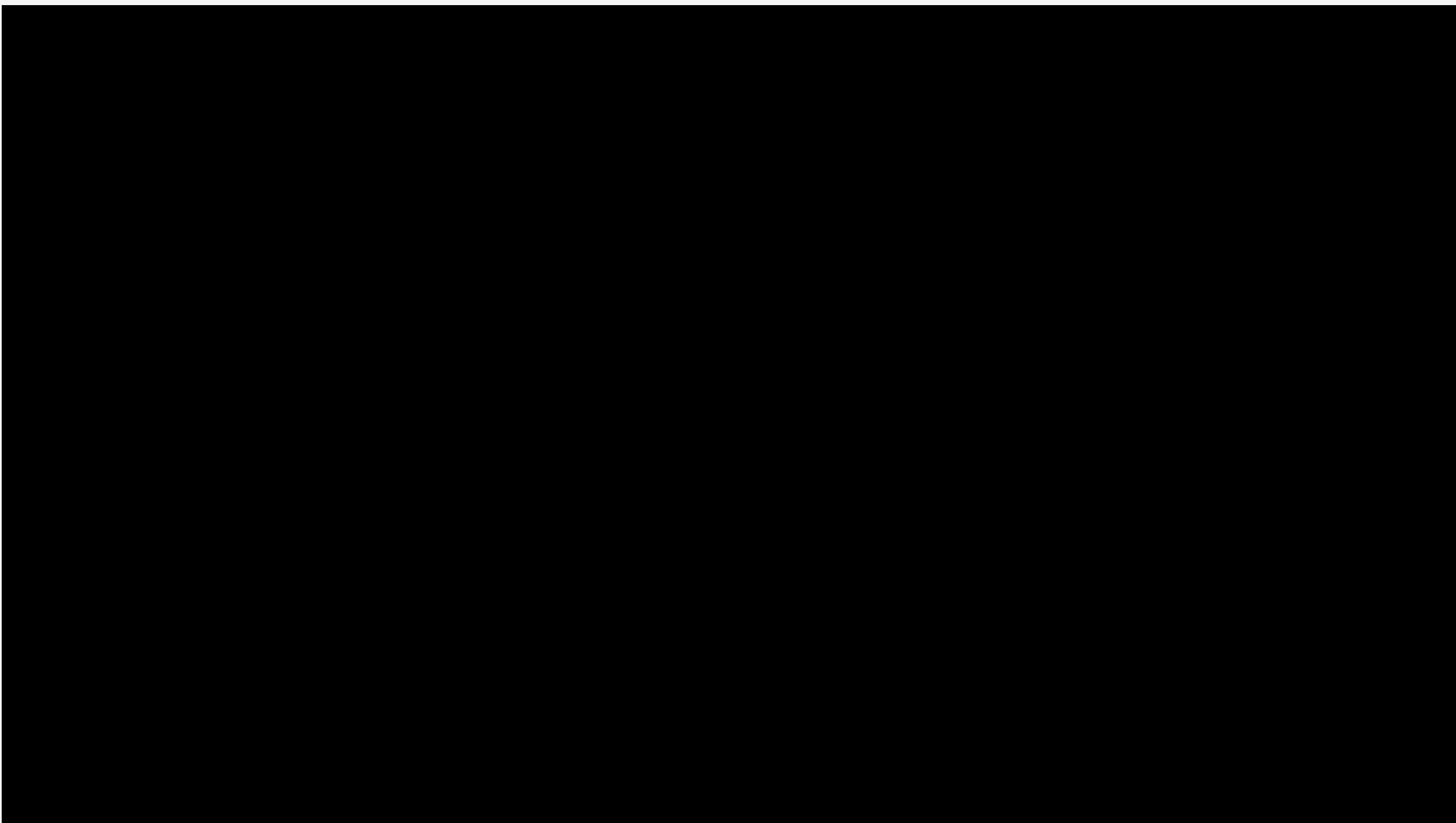
Conclusions

Critical Issues

- Difficulty for users to keep their arms raised in order to enjoy the contents
- No access to the area of the presbytery where the Stories of Saint Catherine are frescoed
- Need for adequate lighting
- Need for tablets and headphones in the Basilica

Future developments

- Improved graphical interface and usability
- Development of new thematic paths





DEPARTMENT OF
ENGINEERING FOR INNOVATION
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