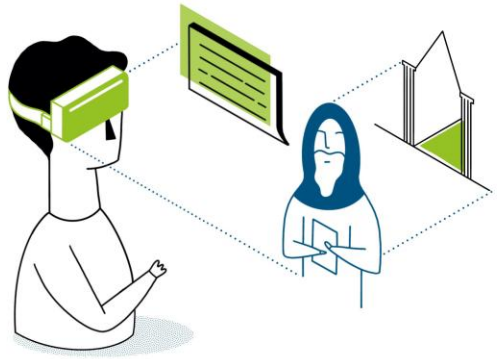
EUreka3D-XR toolbox

Reusable datasets and guidelines for creating virtual human characters in cultural heritage experiences



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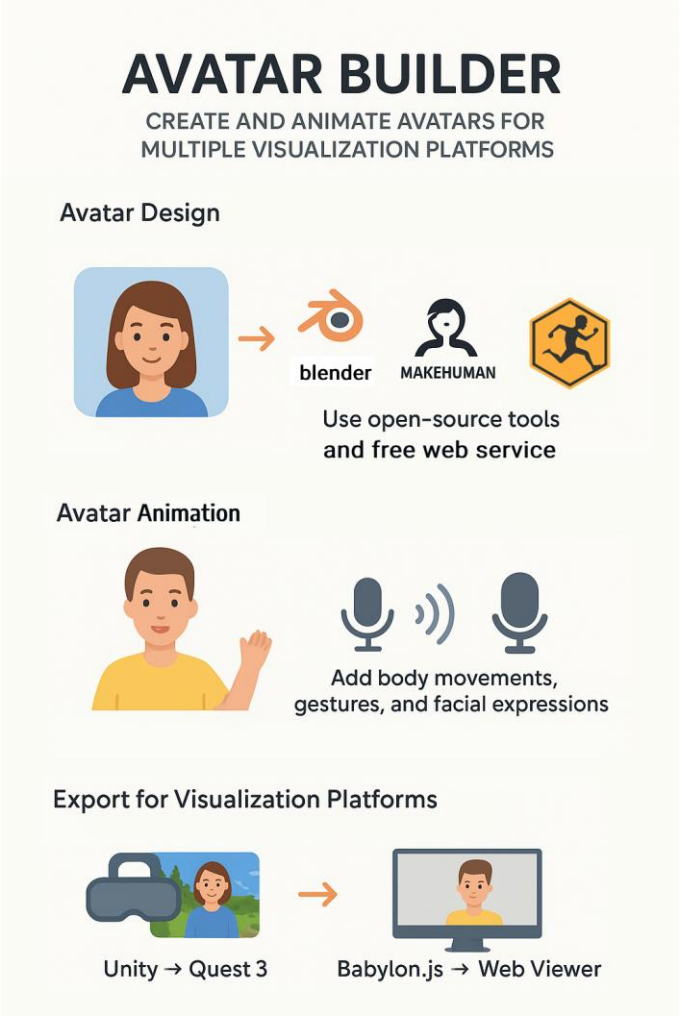
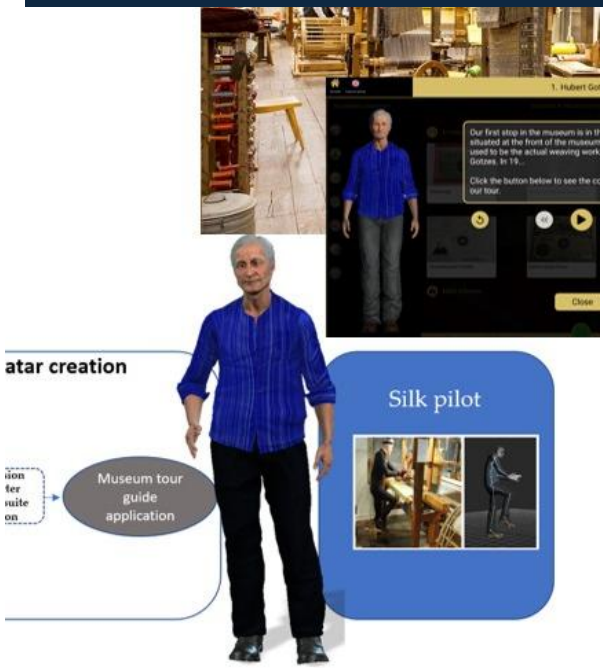
What is Avatar Builder?

Avatar Builder is a cross-platform toolset for creating, animating, and deploying 3D avatars. It enables immersive experiences on **Quest 3 (Unity)** and interactive visualization via the **web (Babylon.js)**. Avatars can be enriched with animations, voice, and metadata, making them suitable for training, simulation, presentation, and communication workflows.

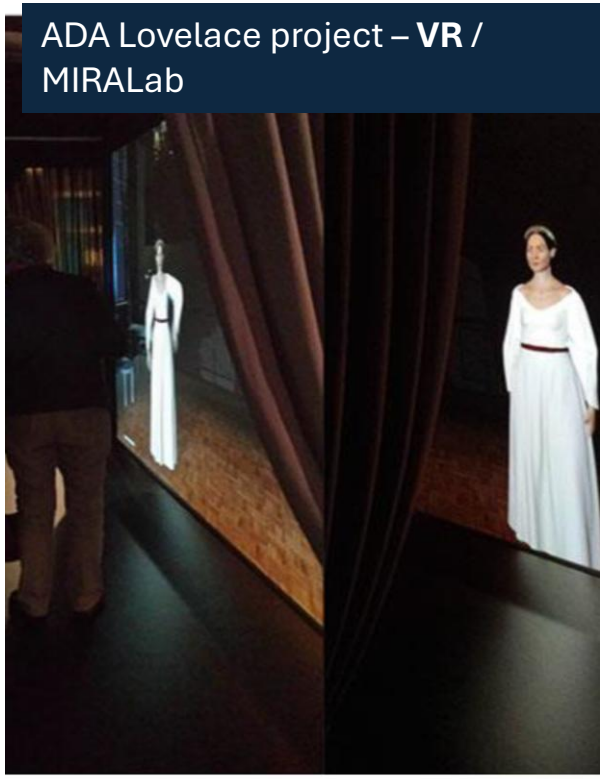


Calvin project – **VR** / MIRALab

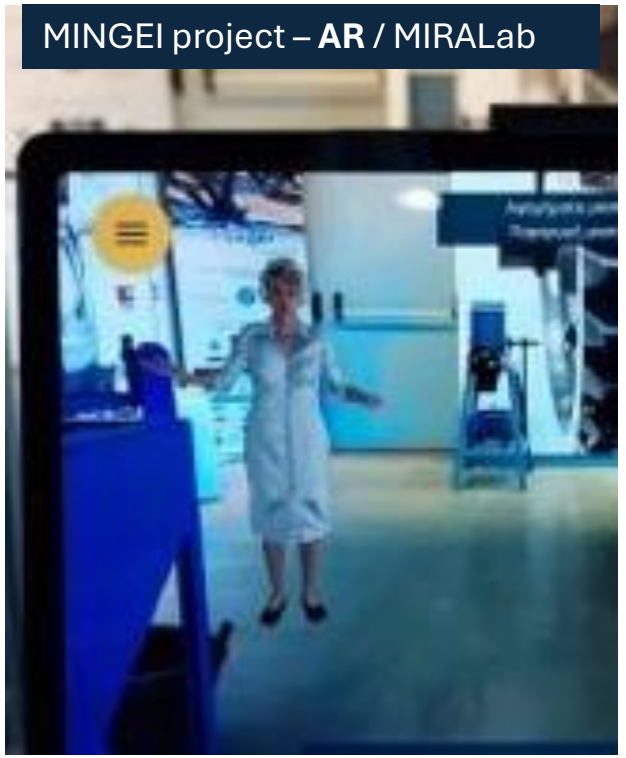
Calvin project – Web app /MIRALab



ADA Lovelace project – **VR** / MIRALab



MINGEI project – **AR** / MIRALab



Why virtual human characters in cultural heritage?

Enhance storytelling and visitor engagement

- **Guide**
- **Narrators**
- **Historical figures**

Current limitations

Platform-specific characters (VR-only, Web-only, etc.)

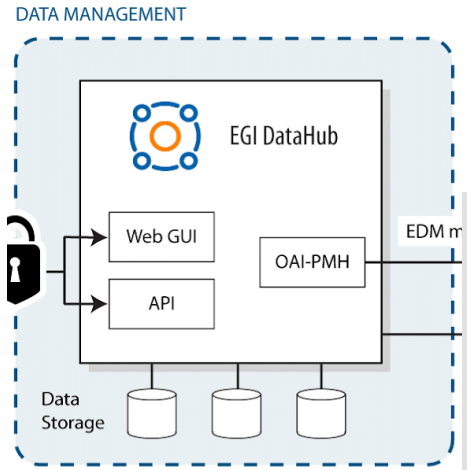
Technical barriers for non-experts

Limited reusability of assets

Fragmented workflows and tools

How can we create **reusable, sustainable, and accessible virtual human assets** for cultural heritage?

Objectives



open source

This project aims to:

- Define **reusable datasets** for virtual human characters
- Provide **practical guidelines** for cultural heritage contexts and for Support **non-technical users**
- Use **open-source and free tools**
- Enable reuse across **VR**, **MR**, and web platforms

Tools and Open Ecosystem

Tools used in the workflow:

- **MakeHuman** – character creation
- **Blender** – refinement and preparation
- **Mixamo** – automatic animation
- Standard formats (FBX, OBJ, GLTF)

Why open-source & free tools?

- No licensing barriers
- Transparent and sustainable
- Large communities and documentation

Create once → reuse across multiple experiences

A single virtual human can be reused across platforms and experiences.

FBX format
For VR/AR

GLB format
For Web

Reusable datasets include:

- 3D character models
- Textures and materials
- Skeletons (rigs)
- Animations (walking, gesturing, talking)
- Metadata and documentation

AVATAR BUILDER

The workflow

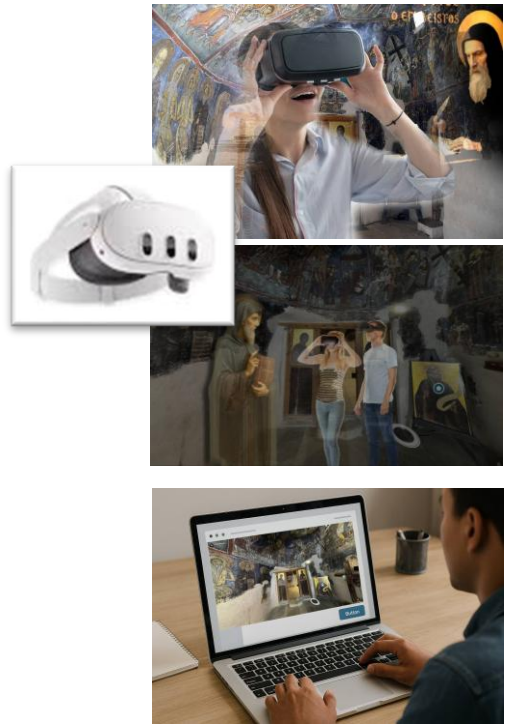
The static 3D avatar

3D geometry and textures

Body and facial animation

Body and facial animation, voice and storytelling

The viewers



In Virtual reality/Mixed reality on the web

Creating

Digital representation of Saint Neophytos

Animating

Movements, gestures, and expressions

Deploying

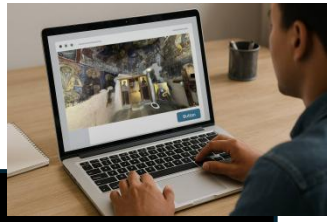
From Creation to Experience

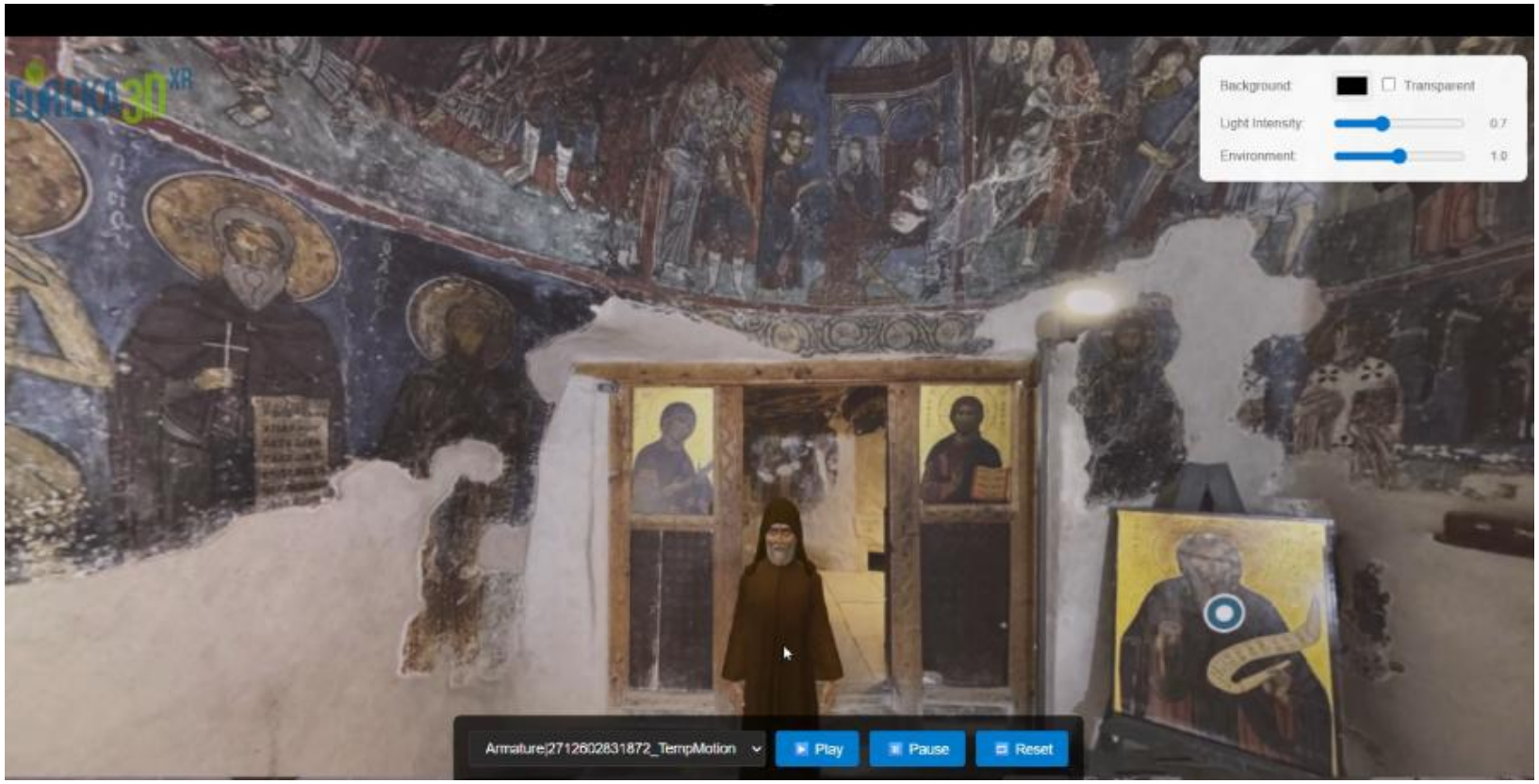
Deployment
From Creation to Experience

- *All digital assets are stored in a shared data hub ready to be reused for different experiences*

Web Deployment

- *Accessible from any browser*
  - *Different scenes, different stories*





One shared digital archive
All 3D models and scenes are stored once and reused

Multiple visual narratives
Each file presents a different moment or story

Contextual storytelling
Textual explanations help visitors understand each scene

From web-based access to full immersion

- Immersive Experience in Virtual Reality

Full spatial experience
Users feel present inside the Enklestra

Guided interaction
Simple interface to explore themes and stories

Same digital model
Reused from the shared archive

Next step

AR visualization
On-site (Cyprus May 2026)

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MR Experience with headset

what the audience will see ?

- **Technology:** Unity (Mixed Reality for Android)
- **Format:** MR application with Saint Neophytos appearing in the user's physical space
- **Features:**
  - **3D animated Saint Neophytos** integrated into the **real Enklestra**, using passthrough
  - **Live interaction** between the physical and virtual world
  - **Interactive UI** enabling user control over dialogues and actions

Thank you for your attention!

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