Co-funded by the European Union

D3.5 EUreka3D-XR Toolbox final release

Due date: 30/04/2026

Dissemination level: Public

Type: Demo

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HISTORY OF CHANGES			
Version	Date	Author or Reviewer	Comments
0.1	20/03/2026	Eirini Kaldeli	Template with instructions
0.2	12/04/2026	All WP3 contributors	First complete draft
1.0	19/04/2026	All WP3 contributors	Complete version ready for review
1.1	25/04/2026	Ignacio Lamata Martinez (EGI), Valentina Bachi (PHC)	Peer review
1.2	29/04/2026	All WP3 contributors	Final version
1.3	30/04/2026	Valentina Bachi (PHC)	Submitted version

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EXECUTIVE SUMMARY

This document accompanies the Deliverable 3.5 “Toolbox final version“ in order to describe the final version capabilities and provide documentation for all tools that make up the EUreka3D-XR Toolbox. The Toolbox consists of the components, while dedicated User Manuals are provided as an Annex 1 to this document:

Tool name	Main purpose	Updated links to demonstration and documentation material
AR Tour Builder	Create AR tours where cultural heritage objects can be located on the map Pilot scenario: Bibracte	Access to tool: a) Demo version: https://eureka.ails.ece.ntua.gr/ b) Production version: artourbuilder.eureka3dxr.fedcloud.eu Documentation: a) User Manual b) API (documented in Swagger): https://eureka.ails.ece.ntua.gr/api/docs/
AR Tour Experience	Allow site visitors to access the AR tour Pilot scenario: Bibracte	The mobile app can be downloaded from Google Play: Link Demo video v1 (Sep 2025) Demo video v2 (Jan 2026) A more up-to-date demo video is under preparation and will be published on Europeana for dissemination purposes.
AI 3D Builder	Reconstruct 3D models of lost heritage from archival materials Pilot scenario: Girona	Access to tool (April 2026): https://www.swing-it.net/eureka3dxr/ai3dbuilder/ Demo Video (April 2026): https://www.youtube.com/watch?v=5KF2Q62mn2I Demo Video (September 2025): https://www.youtube.com/watch?v=BqZFpM2HX0s
3D XR Studio	Position and share the 3D models on an AR experience Pilot scenario: Girona	Access to tool (April 2026): https://www.swing-it.net/eureka3dxr/3dxrstudio/ Demo Video (April 2026): https://www.youtube.com/watch?v=QJhAAihlyxI Demo video (September 2025): https://www.youtube.com/watch?v=ZALxLJtmbAI
Avatar Builder	Create animated and speaking 3D models of human characters Pilot scenario: Cyprus	Video Tutorial (April 2026): https://www.youtube.com/watch?v=uEn4bzfusDA Also available for download: Link

For each tool, an overview is provided by the responsible technical partner, enriched with screenshots or videos to offer a glimpse of how the tools appear to users and demonstrate how they function. The production versions of all tools are openly available online as a service - either on the EUreka Data Hub for web platforms or on GooglePlay for mobile apps. The source code is also open and published on GitHub. Lastly, a step-by-step user guide is provided for each tool. It should be mentioned that the links to the documentation, services, and demonstration videos have been updated to reflect the latest developments conducted in the period since the release of D3.4 Toolset beta version[1].

The five tools have been tested in three pilot scenarios, set in different locations in Europe. The final version of the tools has incorporated, to the extent feasible, the feedback collected by project-internal and external stakeholders during the iterative evaluation.

This deliverable is means of verification for Milestone 12 “Tools final release”.

[1] https://eureka3d.eu/wp-content/uploads/2025/11/EUreka3D-XR-D3.4-Toolbox-beta.pdf

1. INTRODUCTION

This deliverable presents the final of the five tools that comprise the EUreka3D-XR Toolbox, namely (as presented in D3.4):

- **AR Tour Builder**: A web application for specifying AR tours by associating cultural heritage objects stored in online repositories, including 3D objects, with locations on a map (developed by NTUA)
- **AR Tour Experience**: A mobile app that allows visitors to experience AR tours by visualising 3D digital objects within the physical environment and accessing several types of information associated with certain locations (developed by NTUA)
- **AI 3D Builder**: A 3D Modelling software pipeline that uses AI and digital photo archives (developed by Swing:It)
- **3D XR Studio**: A web tool for creating AR experiences, using a range of predefined layouts for UX and UI (developed by Swing:It)
- **Avatar Builder**: A framework that guides users in creating, animating, and preparing avatars for multiple visualisation platforms (developed by MIRALab)

The final version of the tools is a revised version of *D3.4 Toolbox Beta version*, which incorporates all new functionalities and improvements developed from Nov 2025 to Apr 2026. The tools are aligned with the technical requirements defined in *D3.1 Technical requirements*[2]; the scenarios' needs as specified in *D2.1 Pilot Specification and planning*[3]; and quality strategies outlined in *D3.6 Quality Assessment Report*[4] and *D3.7 Formats and quality guidelines report* on M15 (April 2026). The tools have been evaluated in various ways and occasions, with more information about the latest evaluation results included in *D2.5, D2.6 ,* and *D2.7* regarding the *Pilot Prototypes v1.1* and *D4.3 Impact assessment report,* all due on M18 (July 2026). This deliverable also complements the *D3.3 Cloud Infrastructure final release* on M15, and is means of verification for *Milestone 12 Tools final release.*

To facilitate readability and provide a comprehensive overview of the tools' capabilities, this deliverable includes part of the content presented in D3.4 Toolset Beta Version (e.g. general tool descriptions and capabilities implemented during the beta phase). It expands this material to include all newly developed functionalities and the key activities carried out between November 2025 and April 2026. In addition, it provides links to updated resources—such as production services and demonstration videos—along with the developed step-by-step guidelines for each tool (provided as Annex) and further insights and an outline of the planned next steps.

While each tool is tested in a specific pilot scenario within the project lifetime, all tools are designed in a generic way in order to allow reuse across various application scenarios. The tools' functionalities have been co-designed through the collaboration between technical partners and partners from the cultural heritage sector, taking the needs of the pilot scenarios as the starting point. The tools have been developed iteratively based on the outcome of extensive testing, feedback collection and evaluation, including:

[2] https://eureka3d.eu/wp-content/uploads/2025/07/EUreka3D-XR-D3.1-Technical-Requirements.pdf
[3] https://eureka3d.eu/wp-content/uploads/2025/07/EUreka3D-XR-D2.1-Pilot-specification-and-planning.pdf
[4] https://eureka3d.eu/wp-content/uploads/2026/03/EUreka3D-XR-D3.6-Quality-assessment-report-v1.pdf

- initial feedback from the EUreka3D-XR Advisory Board of experts[5] provided during a dedicated meeting held on 8 July 2025, as well as further insights during a focus group on tool assessment organized on 31 October 2025.
- feedback collected by attendees during presentations/demonstrations at events, including the Europeana Aggregators Forums in Spring and Autumn 2025, the "Reimagining cultural heritage in 3D and XR" capacity building event held in Brussels on 26/9/2025; and the demo event in Girona on 29/1/2026.
- feedback by the pilot partners (in Bibracte, Girona, and Cyprus) who extensively tested the tools and provided valuable insights, including recommendations for improvements, new functionalities and bug reports.
- feedback from participants (including cultural heritage professionals, educators, tourist agents, etc) involved in evaluation sessions organised on-site by pilot partners in the period from late January to late April.

The document is structured as follows. Sections 2-6 provide an overview of each tool, including essential information about its license, development status, etc., as well as links to further material that demonstrate the functionalities of each tool. Section 7 concludes with some lessons learnt and next steps.
The diagram below depicts the overall schedule for the toolset releases and respective milestones.

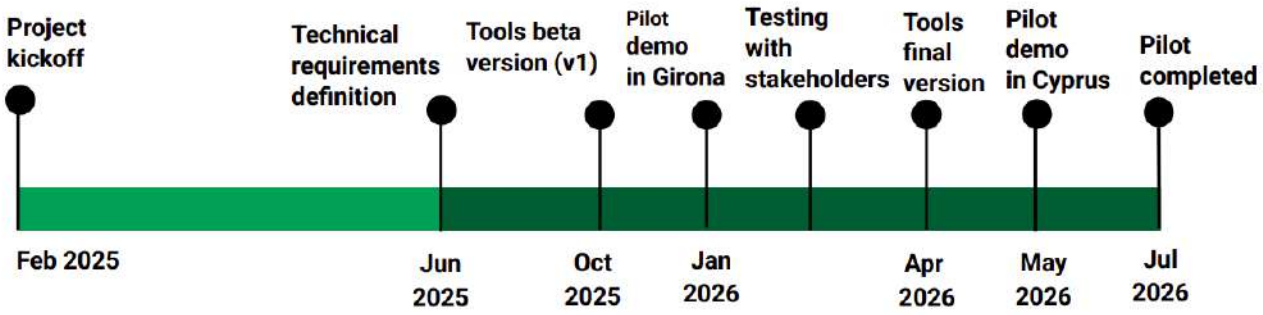


Fig. 1.1: Timeline for tools

[5] https://EUreka3d.eu/advisory-board/

2. AR TOUR BUILDER (NTUA)

2.1 OVERVIEW

AR Tour Builder	
Short Description	The AR Tour Builder is a web application that supports the design of AR tours by associating 3D objects and other types of content (e.g. images, audio, text) to specific locations on a map. The builder is intended for CH professionals and other stakeholders who wish to prepare engaging experiences for their on-site visitors. The platform offers asset management capabilities that allow users to add content selected from online platforms such as the EUreka3D Data Hub or CH organisations' own repositories. The user can specify multiple tours (e.g. short and longer tours, tours addressed to children, etc.) for the same geographical area, organised under Projects. Each tour consists of a set of georeferenced Points of Interests, each of which can encompass a set of various types of media assets as well as contextual information. The builder supports the creation of multilingual tours, where both the content and tour-specific information can come in multiple languages. The tours can then be accessed on-site via the companion AR Tour Experience mobile app, which presents the curated multimodal content based on the user's geolocation. The focus is on outdoor experiences, enabling rich engagement with cultural sites through AR overlays, images, videos, audio, and textual content.
Developed by:	NTUA
Supported functionalities	Features implemented as part of the beta version include: - API functionalities supporting: user and user group management (sign in, sign up, etc.); asset management (creation, editing, deletion); project, tour and Points Of Interest management - Setup of a Django web framework and a Postgres database - Partly functional User Interface: all pages designed but not integrated with the backend (ongoing implementation) Additional functionalities developed in the period Nov 2025 to Apr 2026 include: - Fully functional User Interface, integrated with the backend - Possibility for adding users as collaborators to a Project - Backend/API refinement (schema updates, fixes, etc.) - Integration with EGI Check-in - Support for PLY formats besides GLB - Support for ZIP files from the EUreka3D Data Hub that contain the 3D models and associated files - Support for adding georeferenced 3D models, by providing specific coordinates added as part of the POI asset metadata (see also AR Tour Experience app about how these are visualised) - Possibility to manually adjust the orientation of 3D models - Incorporation of visual elements (fonts, icons etc) provided by the designer appointed by the project

	- Support for uploading images that are then presented as thumbnails for POIs on the AR Tour Experience app - Integrated testing with the AR Tour Explorer and iterative improvements *Note*: Initially, it was planned to support searching and selection of Europeana assets and extract the 3D objects from the returned items. However, this was not feasible, since the link to the 3D file is not included in the current Europeana Data Model metadata record returned by the Europeana platform. Therefore, we leave this feature as a possible future improvement that may become possible when the extended version of the EDM, which encourages the incorporation of the download URL of a 3D model, is put in place. Instead of this feature, we decided to focus on implementing some alternative additional features, including the possibility to adjust the 3D models' orientation and the support for ZIP files.
Available on:	Latest version of source code on Github: https://github.com/EUreka3D-XR/AR-Tour-Builder API (documented in Swagger): https://EUreka.ails.ece.ntua.gr/api/docs/ Demo web tool version available on: https://EUreka.ails.ece.ntua.gr/ Production version available on: artourbuilder.EUreka3dxr.fedcloud.eu
Licence:	Apache 2.0
Accompanying material:	Step-by-step user instructions Fact sheet

2.2 BACKEND CAPABILITIES

The backend has been built using the Django web framework[6]. All capabilities offered by the AR Tour Builder are exposed via a well-defined API, accessible to any authorised third-party application. The following sets of functionalities have been implemented and are fully functional:

- User management: User authentication, account management, and user-related operations, including login, signup, and user listing.
- User groups: Manage user groups and group membership for collaborative projects.
- Project: Create and manage tours with group-based permissions and metadata.
- Assets: Manage media assets (images, videos, audio) with automatic thumbnail generation and metadata. Supports creation of projects or POIs with source asset selection.

[6] https://www.djangoproject.com/

- Tours: Build and manage interactive tours with customizable routes, content, and multilingual support.

- Points Of Interest: Manage Points of Interest (POIs) with rich metadata, coordinates, and multilingual content.

In the period of Nov 2025 to Apr 2025, the backend has undergone minor improvements and bug fixes. The main extension concerns the integration with the EGI Check-in authentication and authorization system.

2.2.1 Database schema

The database is set up using Postgres, which implements all structures representing the various elements (users, user groups, projects, tours, assets, maps, POIs and their sub-elements) The Entity Relational diagram of the database schema can be seen in the following Figures 2.1 and 2.2. No significant changes have occurred since Oct 2025.

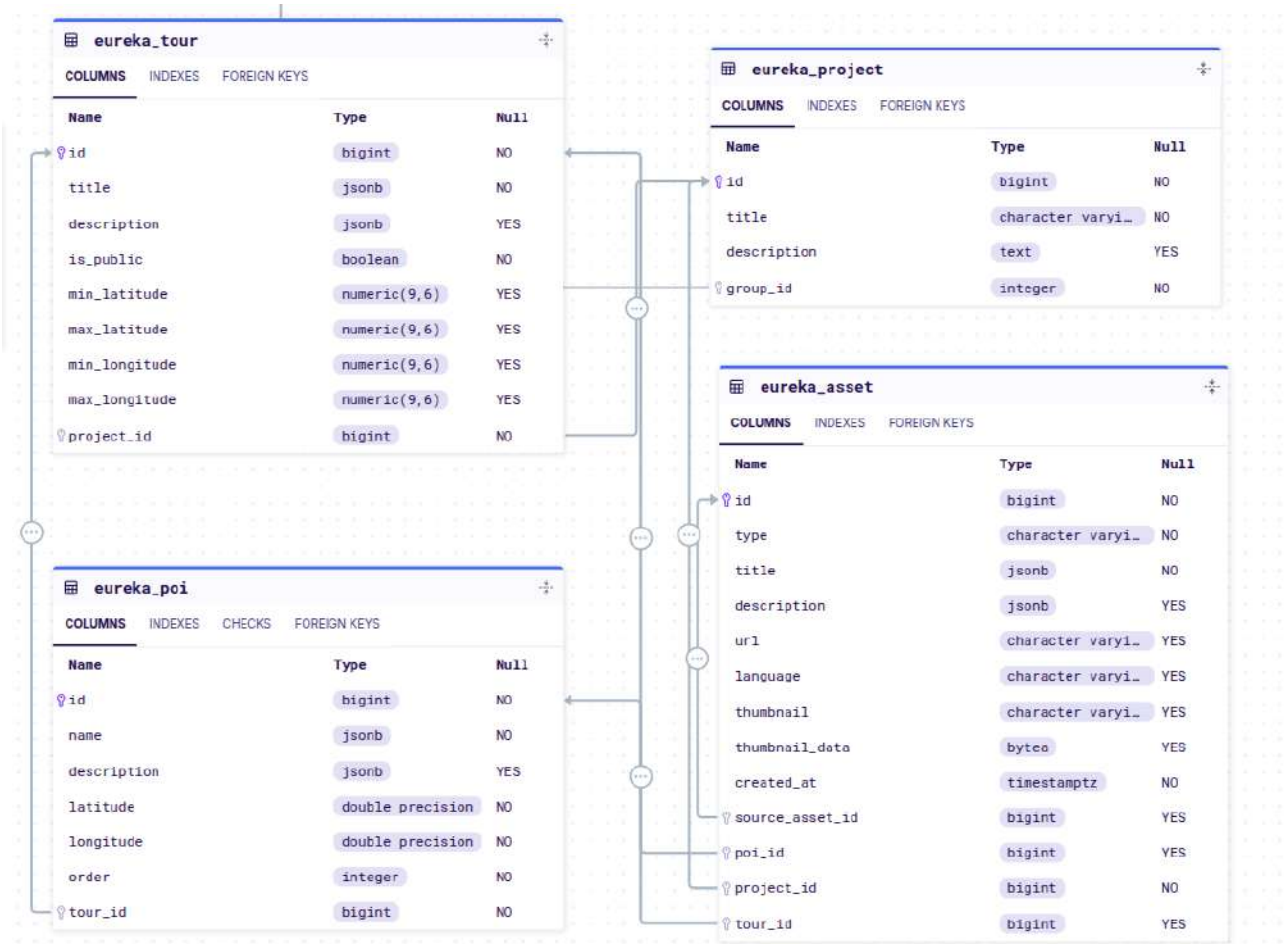


Figure 2.1: ER Diagram presenting the main elements of the AR Tour Builder database: Project, Tour, POI and Asset.

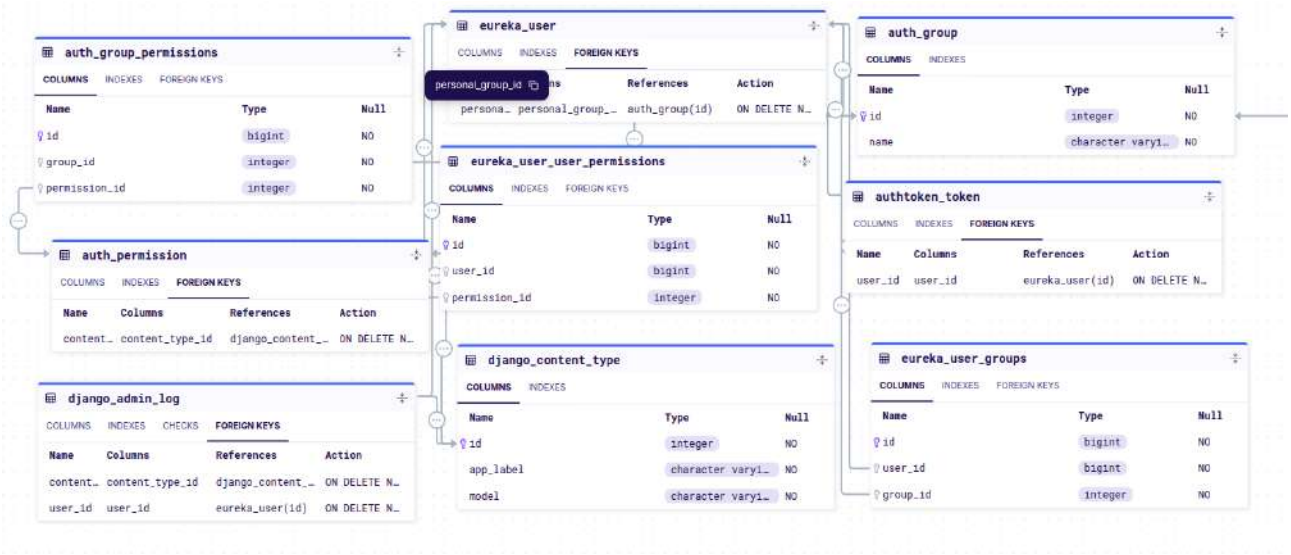


Figure 2.2: ER Diagram underpinning the elements of the user management system.

2.3 UI CAPABILITIES

The implementation of the User Interface of the AR Tour Builder has been the main focus since the beta version release. All envisioned functionalities as described in Section 2.1 are served to the end user via user-friendly web pages that support the entire workflow, from the library page and project/tour creation to assets population and POI editing. All pages are fully functional and integrated with the backend via API calls.

Below we provide some indicative screenshots of the AR Tour Builder's pages. A detailed overview of the complete workflow steps supported by the tool, along with the respective web pages, is available as Annex to this document.

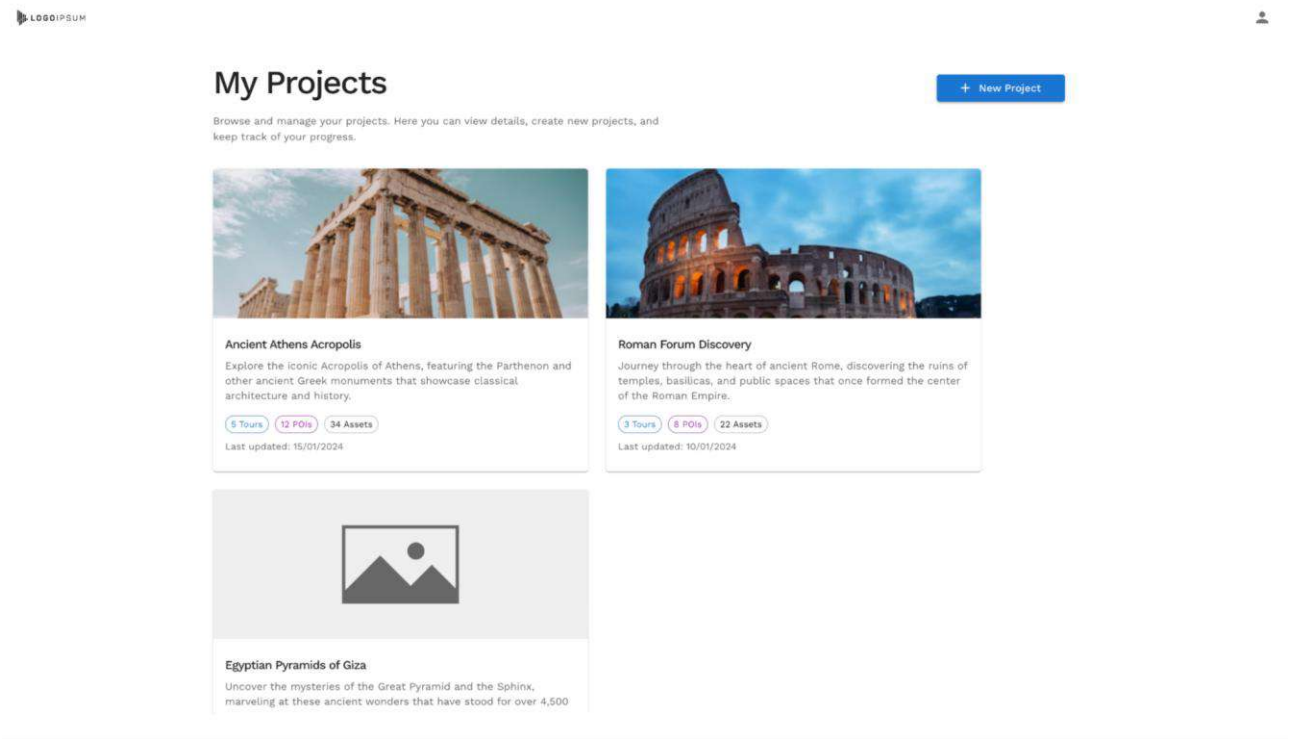


Figure 2.3:Screenshot of a Project Dashboard Overview page

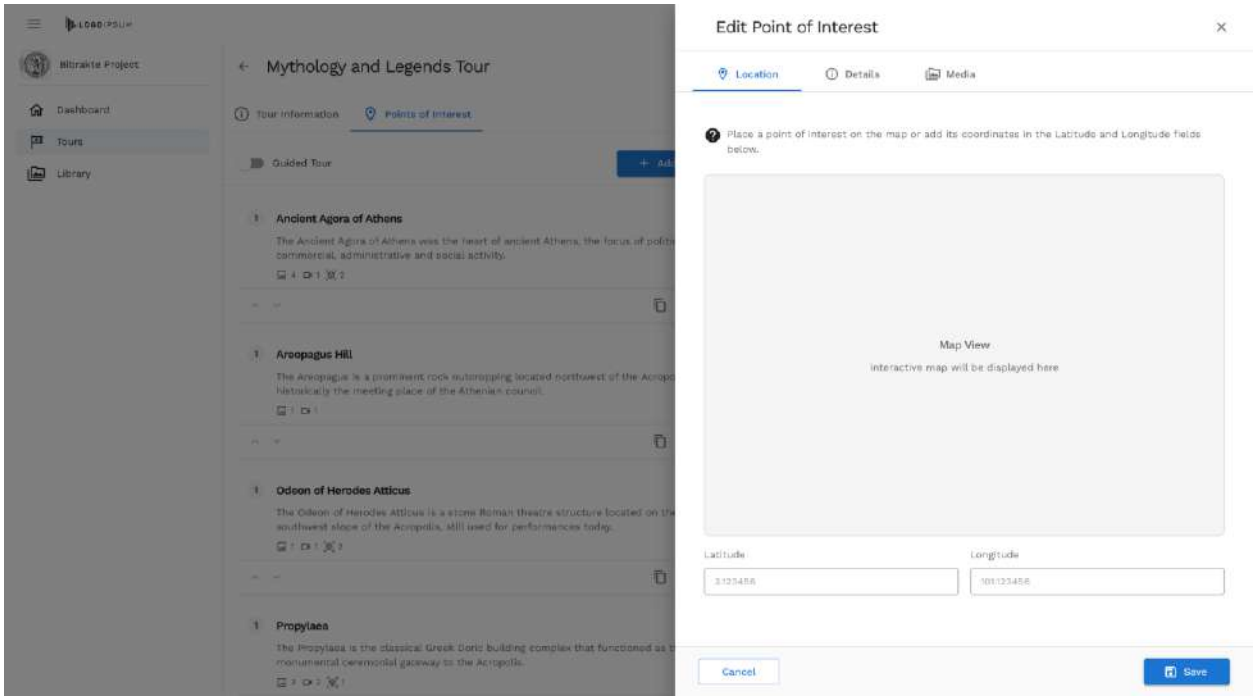


Figure 2.4. Screenshot from the Poi Editor Sidebar - Poi's location information

2.4 EVALUATION AT BIBRACTE

All functionalities of the AR Tour Builder have been extensively tested by the Bibracte team, leading to several bug fixes and improvements. The almost-final version of the AR Tour Builder (as in Mar 2025) was evaluated by a group of 18 stakeholders, including cultural heritage professionals, educators, tourist operators, and researchers, during dedicated evaluation sessions organised from Mar 30- Apr 4 2026.

The stakeholders responded positively to the overall workflow supported by the AR Tour Builder, noting that it is intuitive and easy to follow. They were able to successfully add Points of Interest (PoIs) on the map and particularly appreciated the support for multiple media types, multilingual assets, 3D model management, and the PoI radius configuration feature. Overall, they highlighted the tool's strong potential for professional use within their domain.

The main limitation identified relates to the reliance on external links for media assets. Stakeholders noted that finding suitable URLs -especially for 3D content- can be challenging, which in practice restricts the ability to enrich PoIs with 3D models. While the AR Tour Builder is not designed to host media content directly (and therefore this dependency on external URLs cannot be fully avoided), several enhancements—implemented following the evaluation—aim to mitigate these challenges, including: (a) support for additional 3D media formats (namely GLB and PLY), and (b) the ability to link to 3D models hosted on the EUreka3D Hub, through support for managing and visualising ZIP files, which constitute the standard file format on the hub. Moreover, participants stressed out the need for documentation and support, a need that has been addressed through the step-by-step guide provided in Annex. More detailed information about the evaluation and its findings will be provided in D2.6.

3. AR TOUR EXPERIENCE (NTUA)

3.1 OVERVIEW

AR Tour Experience	
Short Description	The AR Tour Experience is a mobile app that complements the AR Tour Builder tool and serves the tours designed via the AR Tour Builder to on-site visitors. Through a clean and intuitive interface, visitors can browse and select tours available in their location based on their preferences. The app uses GPS to provide real-time navigation, detecting when users approach certain points of interest and prompting them to visualise the various types of content (3D models, images, video, audio and text) associated with them. The 3D models can be displayed either in a dedicated 3D viewer or overlaid on the physical environment, as captured by the mobile camera. These AR views can be used to enhance on-site points of interest with elements that are no longer visible or present on the location, such as backfilled excavations, virtual reconstructions, or artefacts currently exhibited in a museum. The app also supports tour progression tracking and offers practical features such as pre-downloadable content for low-connectivity environments. The application is implemented for Android devices.
Developed by:	NTUA
Main functionalities	Features implemented as part of v1 (beta version) include: - Navigation pages for browsing projects and tours - Tour navigation on a map - Prompting based on GPS tracking - PoI page with various multimedia content - Dedicated visualisation pages for different types of assets (images, documents, links et) - 3D viewer for exploring 3D objects along with supporting audio - AR view for visualising 3D objects either anchored on a specific position based on georeferencing information or freely positioned - Multilingual support Functionalities implemented in the period Nov 2025 to Apr 2026 include: - Exact anchoring of georeferenced 3D models in the AR experience mode: the user is provided with hints to rotate their camera so that the models are visualised at the exact intended location and with accurate orientation. - Improvements in file management (smart caching) - Incorporation of visual elements (fonts, icons etc) provided by the designer appointed by the project - Support for the visualisation of OBJ 3D model formats (besides GLB) - Support for orienting 3D models relative to actual cardinal directions - Support for unzipping and visualisation of 3D models in ZIP files hosted on

	the EUreka3D Data Hub
Available on	Latest version of source code on Github: https://github.com/EUreka3D-XR/AR-Tour-Experience https://github.com/EUreka3D-XR/AR-Tour-Builder-backend The mobile app can be downloaded from Google Play: Link
Licence	Apache 2.0
Accompanying material	Demo video v1 (Sep 2025) Demo video v2 (Jan 2026) A more up-to-date demo video is under preparation and will be published on Europeana for dissemination purposes. Step-by-step user instructions Fact sheet

3.2 BASIC CAPABILITIES AND TESTING OUTCOMES

All important functionalities of the AR Tour Experience mobile app as prescribed in *D3.1 Technical Requirements* document have been implemented and tested. Below, we provide some indicative screenshots and photographs of the Bibracte tour, taken at the evaluation of the mobile app at the archaeological site. More shots from the Bibracte tour can also be found in the demo video (see link above). A detailed overview of the basic workflow steps the app supports and the respective screens presented to the user is available and published on the project's website, as linked in the table above.

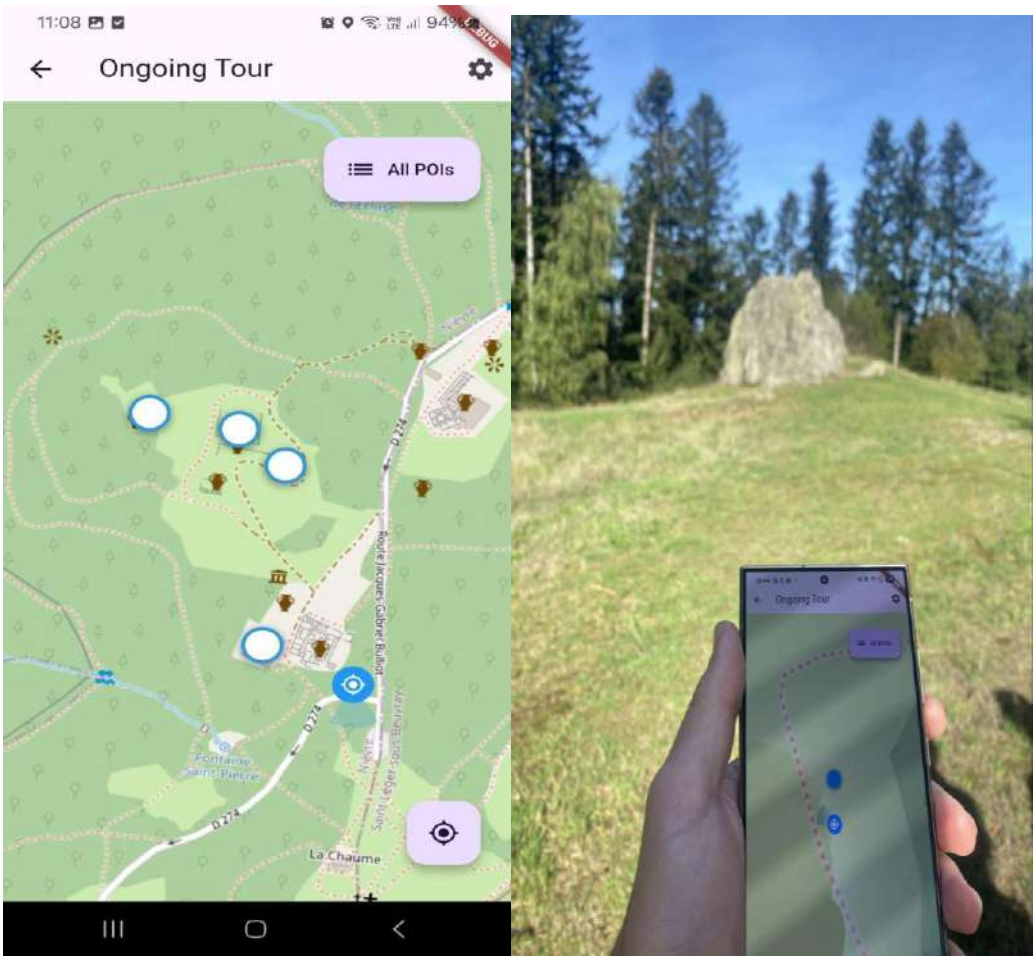


Figure 3.1: Starting a tour: a) map view with POIs b) photograph from testing session at the Bibracte archaeological site.

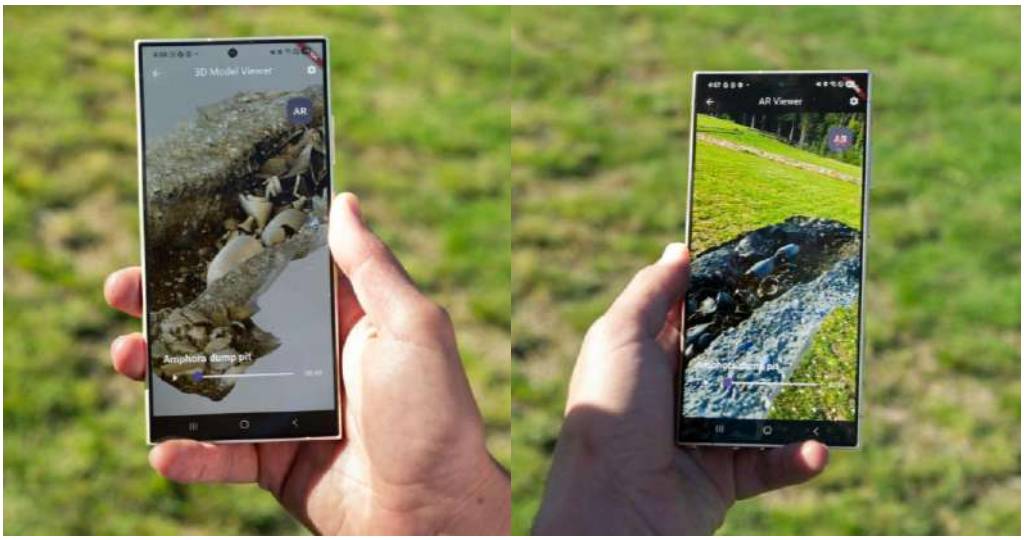


Figure 3.2: Example of 3D models as they appear in Bibracte: a) 3D model with associated audio presented in 3D viewer. The possibility to switch to AR mode appears on the top left; b) 3D model in AR view.

3.3 TESTING AT THE BIBRACTE ARCHAEOLOGICAL SITE

A first prototype of the mobile app was tested during a dedicated visit at the Bibracte archaeological site in September 17–18, 2025 as described in the previous version of this deliverable. The recommendations resulting from this initial testing (including support for more 3D formats, georeferenced models, and dealing with underground structures) have been implemented as part of the final version.

The Tour Experience app was also evaluated at the Bibracte site in Apr 2026 by the same group of stakeholders who assessed the AR Tour Builder (see Section 2.4). However, the session was adversely affected by poor weather conditions, which resulted in limited connectivity on the day. As a result, the evaluation was confined to a small number of Points of Interest (PoIs) located within a restricted area around the archaeological centre. Despite these constraints, participants confirmed the app's strong relevance for a wide range of audiences, including independent visitors, tour groups, students, and school pupils. They particularly valued the easy access to rich multimedia content and expressed strong interest in the 3D models, both through the 3D viewer and in AR mode.

Some challenges were also identified. Several participants encountered difficulties with downloading the app due to compatibility issues with their mobile devices. In addition, there was some lack of clarity regarding the precise positioning of 3D models at certain locations.

To address the deployment difficulties and compatibility issues, a number of improvements have been implemented: (a) the app is now available via Google Play, replacing the previously more complex installation process; and (b) it can now be deployed on devices that do not support AR functionality, allowing users to benefit from all other features of the Tour Experience. Furthermore, a step-by-step user guide has been developed and is included in Annex to support users in navigating and making the most of the application.

4. AI 3D BUILDER (SWING:IT)

4.1 OVERVIEW

AI 3D Builder	
Short Description	The AI 3D Builder is designed to transform two-dimensional images into complete, usable three-dimensional models. Its main goal is to drastically reduce the time required to create 3D assets by automating a process that traditionally demands expertise in modelling, texturing, and rendering. At the heart of this pipeline lies **Trellis**, a system based on an AI architecture that employs **Structured Latents (SLAT)** representation, enabling the system to capture visual characteristics and implicit spatial relationships to reconstruct three-dimensional shapes coherently and realistically. While artificial intelligence handles automatic reconstruction, human intervention ensures final quality. This is particularly useful when the images are few, lack detail, or contain distracting elements. Human intervention is also needed for the creation or enhancement of textures, by using photo editing softwares, which are applied to the final model. Since the tool was the first real prototype to be used for the development of the Girona scenario, it was also the first tool to be completed on time compared to the scheduled deadline. The tool has also been advertised during the "AI for 3D Digital Twins in Cultural Heritage" event, which took place online on March 23rd.
Developed by:	Swing:IT
Main achievements so far	Features implemented as part of v1 (beta version) include: • Image upload via web interface • Configuration of generation and optimisation parameters • Execution of Trellis AI engine • Export of generated models in **GLB format**, compatible with most 3D viewers and rendering engines • Refinement through manual post-processing steps involving mesh simplification and texture cleanup • Dedicated **GPU backend** with a communication API system • **Functional user interface** and temporary storage for data during processing • Integration with **DataHub** for storage and content distribution Additional functionalities developed in the period Nov 2025 to Apr 2026: • Tool brought to production stage • Optimization of the pipeline based on the feedbacks received during the Workshop in Girona • User authentication via JWT, supporting both local credentials and EGI OAuth.

	• Image upload (PNG, JPEG, WEBP, up to 10MB) via drag & drop, clipboard, or file selection. • Configuration of advanced parameters (seed, guidance strength, sampling steps, mesh simplification, texture size, output format). • Support for single-image and multi-image modes to improve geometric reconstruction. • Single-tenant FIFO queue system with real-time monitoring, optional preview, and process control. • 3D model visualization and download, generation history; React frontend (IT/EN) and backend with automatic retry and recovery.
Available on	Source code on Git Repository: https://github.com/EUreka3D-XR/AI-3D-Builder Web Service: https://www.swing-it.net/EUreka3dxr/ai3dbuilder/ URL provided by the project (ai3dbuilder.EUreka3dxr.fedcloud.eu) redirects to Swing:It server/domain
Accompanying material	Video showcasing the AI 3D Builder workflow: https://www.youtube.com/watch?v=BqZFpM2HX0s User Manual Factsheet

4.2 BASIC CAPABILITIES AND WORKFLOWS

Technologies and Framework: The AI pipeline is built around **Trellis**, using Structured Latents (SLAT) representation. Trellis runs on **GPUs** with at least **16 GB of VRAM** for optimal performance. The backend architecture includes: REST API layer, job orchestration module, temporary storage for intermediate files, and data encryption system.

User Interface: Web-based interface allowing users to upload images and configure generation parameters including Quality/Detail, Guidance Strength, and Simplification Parameters. Communication with the backend via REST API calls.

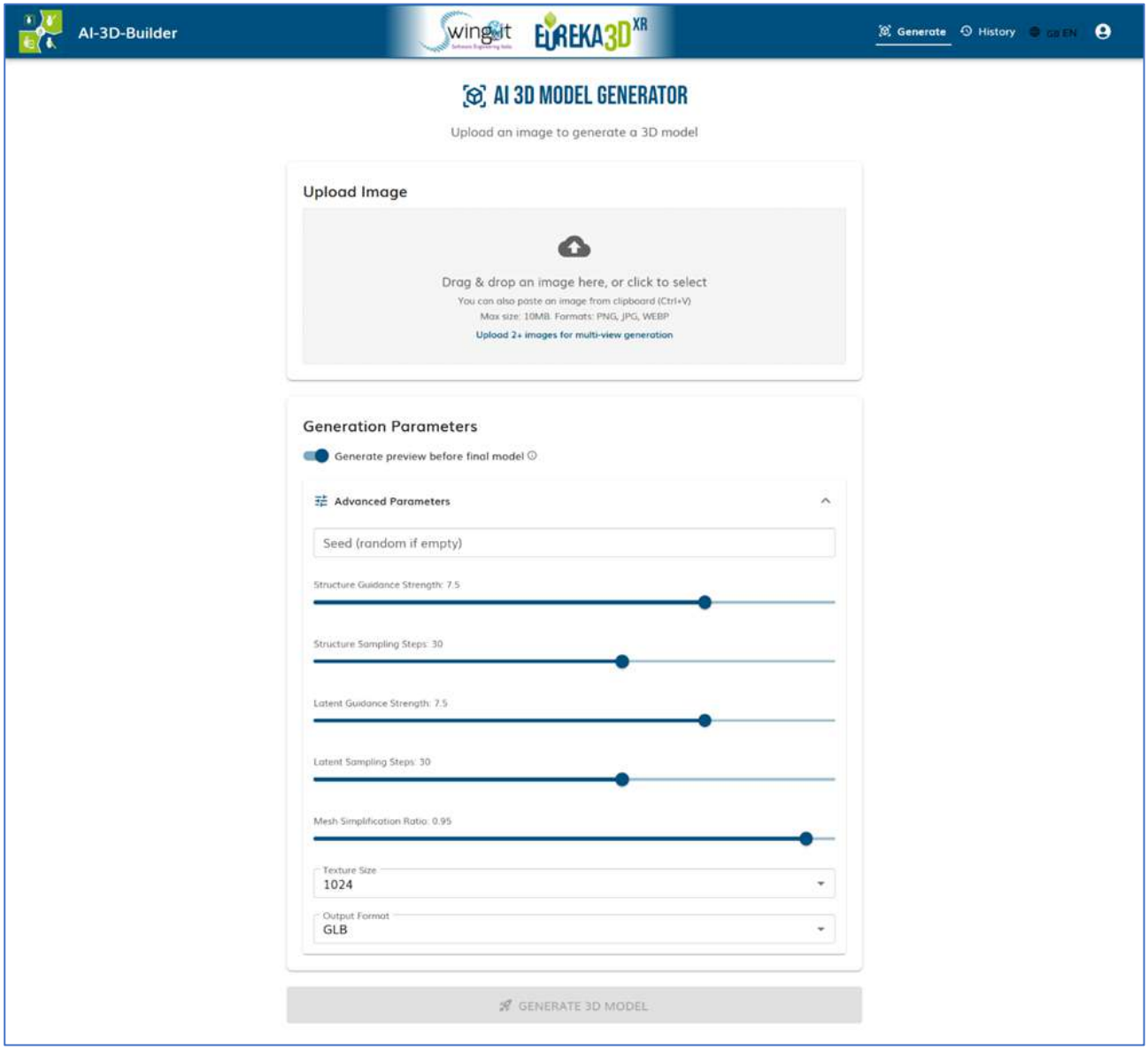


Fig. 4.1: User interface

Output: Primary output is **GLB file** (glTF family format), designed for web and augmented reality. Also supports Radiance Fields and Gaussian Representations for research contexts.

Integrations: Compatible with **DataHub** and **EUreka3D** platforms. Generated models can be transferred to **3D XR Studio** for building immersive experiences.

Human Intervention: Required for refining the models output from Trellis. The first step involves modifying the images input to Trellis to isolate the subject. After the AI has processed the object, image manipulation software (such as Adobe Photoshop or similar) is used to create the texture to be associated with the object, and modeling software (such as Blender) is used to refine and optimize the mesh, as well as to associate the texture and export the final 3D model.

4.3 EVALUATION AT THE DEMO EVENT IN GIRONA

The tool was used to create models of the tower, a portion of the wall, and the bastion of Saint Francis in the walls of Girona. It was subsequently used in the workshop held on January 29, 2026. The workshop was aimed at archivists and curators who wished to apply the tool to create 3D models from images of CH objects of their own collections that are not existing anymore. Before the workshop, materials (images, files, and a guide) were distributed to guide participants step-by-step. The guide also includes video tutorials to provide additional support to participants and, in general, anyone who wants to experiment with the tool. Overall, participants were interested in the entire process, although they encountered some difficulties, mainly due to their lack of experience with image manipulation and 3D modelling software. From a technical point of view, all participants managed to easily access all the software needed to carry out the exercise, with minor time losses. Despite this, participants were able to reproduce the results of the test material provided for the workshop, expressing their enthusiasm and curiosity (as well as some doubts due to the use of AI) towards this new approach. All the outcomes from the Girona Workshop are reported in the Impact Assessment report.

5. 3D XR STUDIO (SWING:IT)

5.1 OVERVIEW

3D XR Studio	
Short Description	The 3D XR Studio is a **web-based authoring tool** that allows users to create immersive experiences in **Extended Reality (XR)** and **Augmented Reality (AR)**. It enables users to combine different types of multimedia content (3D models, images, videos, audio, and text) into interactive scenes, creating narrative paths and virtual environments that can be explored via mobile devices or AR/XR headsets. Specifically designed for **cultural heritage professionals** with an intuitive, **no-code interface**.
Developed by:	Swing:IT
Main achievements so far	Features implemented as part of v1 (beta version) include: ● **Web editor** for area selection, 3D model upload, and scene positioning (rotation, scaling) ● Creation of **guided tours** with multiple stages ● **POIs (Points of Interest)** enriched with audio, video, images, and text ● **RESTful APIs** (NodeJS and MariaDB) managing projects, geographic areas, models, and media ● **Mobile module** with **Placement Without Anchors** functionality ● **Occlusion planes** for realistic virtual-real environment interactions ● Administrative tools for object transformation and manipulation ● Mini-map for orientation and guided tour visualisation ● Interactive POIs with multimedia content ● Multilingual content support Additional functionalities developed in the period Nov 2025 to Apr 2026: ● SSO Integration (EGI Check-in) for authentication and access management ● User Experience (UX) Improvement in web editor ● User Interface (UI) Improvement in mobile component ● Improvements about light management for the mobile component based on feedback gathered during the experience in Girona ● Performance and stability optimisations for APIs

Available on	Source code on Git Repository: https://github.com/EUreka3D-XR/3D-XR-Studio Web Service: https://www.swing-it.net/EUreka3dxr/3dxrstudio/ URL provided by the project (3dstudioxr.EUreka3dxr.fedcloud.eu) redirects to Swing:It server/domain
Accompanying material	Video showcasing 3D XR Studio operation: https://www.youtube.com/watch?v=QJhAAihlyxI User Manual Factsheet

5.2 Basic capabilities and workflows

Technologies: Hybrid architecture with a Web component for editing/design and a Mobile component for in-situ visualisation. Backend based on RESTful API (NodeJS and MariaDB). Innovative Placement Without Anchors approach using coordinates and virtual geometric references.

Application Type: Hybrid web and mobile system providing a cohesive workflow: design on web, validate on-site, refine online, and distribute for public access.

Integrations: Fully integrated into **EUreka3D-XR project workflow**. Curators access via **EGI Check-in**. Compatible with EUreka3D Data Hub for asset management. Part of an interoperable chain supporting the complete life cycle of digital cultural assets.

5.3 Evaluation at the demo event in Girona

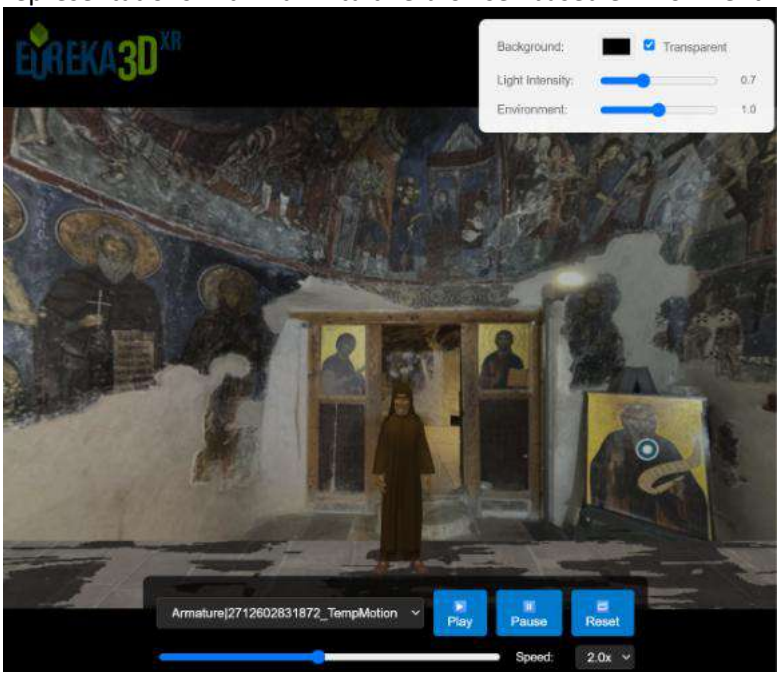
At the event held in Girona in the last week of January, for the first time the models of the walls, tower and bastions of Girona have been tested in the real scenario.

The archivists at CRDI gave valuable feedback about suggestions in order to improve the user interface as well as providing a better light management affecting the mobile component of the 3D XR Studio. The evaluation stage took into account also the creation from scratch of a tour by creating path points and points of interests, checking the correct vertical alignment of the dots created during the process, that was adjusted in the latest deployment builds.

6. AVATAR BUILDER (MIRALAB)

6.1 OVERVIEW

Avatar Builder	
Short Description	The use of virtual humans in cultural heritage offers significant advantages for interpretation, education, and audience engagement. By embodying historical or fictional personas, virtual humans can serve as interactive mediators bridging the gap between visitors and cultural content. They provide a humanised interface through which complex historical, archaeological, or artistic information can be conveyed in an engaging way. In museum settings, such avatars can act as virtual guides or storytellers, presenting narratives, answering predefined questions, and adapting communication to different audiences. Beyond museums, virtual humans have potential applications in education, tourism, and heritage preservation, supporting remote accessibility and inclusive experiences. To effectively support the creation and deployment of virtual humans in cultural heritage contexts, a structured and accessible production process is essential. Developing expressive and platform-compatible avatars typically requires technical expertise in 3D modelling, animation, and software integration, skills that are often beyond the reach of curators or heritage professionals. To address this challenge, we have designed the Avatar Builder (Figure 6.1): a process framework that guides users in creating, animating, and preparing avatars for multiple visualisation platforms. By leveraging open-source, accessible software, it makes avatar production possible for non-experts while ensuring compatibility with immersive VR/MR environments and web-based 3D viewers.  *Figure 6. 1 - Visual process guide* Complementing this framework, we have also developed the EUreka3D-XR Web Viewer. This web-based application enables the visualisation and sharing of 3D content, ranging from static objects to fully animated avatars with synchronised

	audio. The viewer provides a lightweight and accessible way to explore these creations directly through the Eureka3D-XR Data Hub: once a 3D file or animation is uploaded, users can visualise it online simply by providing its file ID. This seamless integration facilitates easy deployment, collaborative review, and public dissemination, allowing researchers, museum professionals, and other stakeholders to interact with cultural heritage assets and their digital representations within an intuitive browser-based environment.  *Figure 6.2 - Web Viewer with different controllers for animation*.
Developed by:	MIRALab
Main achievements so far	● Defined an open pipeline for avatar creation with free and easy tools. ● Enabled avatars to be cross-platform compatible (Unity + WebGL/Babylon.js). ● Developed the first version of the EUreka3D-XR Web Viewer. To date, we have conducted a series of evaluations and comparative tests among existing open-source tools to identify the most effective workflow for creating and deploying 3D avatars. The primary objective was to establish a fully open-source, user-friendly, and accessible pipeline. Through these tests, we developed and validated a process that guides users from avatar creation and animation to export and integration within visualisation platforms such as Unity (for Quest 3 immersive applications) and Babylon.js (for web-based visualisation). This workflow ensures that individuals without advanced technical expertise can efficiently produce, animate, and deploy interactive avatars across multiple platforms using freely available tools. In parallel, we have developed the EUreka3D-XR Web Viewer, a lightweight browser-based application for visualising a wide range of 3D assets, from static

	cultural heritage objects to fully animated avatars with synchronised audio. The development of this version of the viewer includes several key functionalities: ● Animation controls for play, pause, and reset; ● Speed adjustment to slow down or accelerate the animation; ● Timeline slider to navigate to specific moments in the animation; ● Audio synchronisation ensuring alignment between motion and sound; ● Background customisation with different colour options; ● Lighting and environment controls to adapt the scene's ambience. **Additional functionalities developed in the period Nov 2025 to Apr 2026:** **1/ Facial Animation – Simplified and Robust Approach** During the reporting period (November 2025 – April 2026), additional investigations were carried out to identify a facial animation solution that aligns with the project's core principles: accessibility, ease of use, and reliance on open-source tools. However, due to the rapid evolution of Blender and the limited compatibility of several existing add-ons with recent versions, implementing advanced facial animation features, such as automated lip synchronization, remains challenging. Many available solutions are not yet fully stable within current Blender environments, often resulting in technical errors, complex configuration procedures, or inconsistent outputs. To address these limitations, a simplified and reliable approach to facial animation has been developed and integrated into the Avatar Builder workflow. This approach prioritizes robustness and usability, ensuring that non-technical users can easily follow the process without requiring advanced expertise. The proposed method maintains full compatibility with recent Blender versions while still enabling users to experiment with essential facial animation techniques. A dedicated user guide has been produced to document this workflow in a clear, step-by-step manner and a link to the updated user guide, including the facial animation section, **is provided below.** **2/ Extension of the EUreka3D-XR Web Viewer** During the reporting period, the EUreka3D-XR Web Viewer was further extended with enhanced navigation, content management, and visualisation capabilities. These improvements focus on increasing usability, flexibility, and compatibility with diverse types of 3D content. The following features have been implemented: ● **Scene switching:** Users can seamlessly navigate between multiple 3D scenes (GLB files), each containing distinct animations, via an intuitive dropdown menu. This enables the integration of multiple narrative or visual states within a single experience. ● **Narration-only mode:** The viewer now supports audio playback independently of animation. This allows narration or descriptive content

	to be delivered even when 3D objects remain static, broadening accessibility and use cases. ● **Extended format compatibility:** Support has been expanded to include additional 3D file formats, such as *.ply*, increasing interoperability with a wider range of 3D data sources. ● **Multi-file package support:** The system can now handle multiple animation files bundled within a single *.zip* package stored in the Data Hub. This facilitates more efficient content organisation and deployment. ● **Improved data management and visualisation:** Integration with the EUreka3D Data Hub has been enhanced to ensure smoother interaction, improved asset organisation, and better handling of associated metadata. ● **oEmbed integration with Europeana:** The viewer now supports oEmbed functionality to enable seamless embedding of Europeana-hosted CH assets directly within their environment. This integration allows their content (e.g., 3D models, images, multimedia records) to be dynamically retrieved and displayed. This enhances interoperability with European cultural data infrastructures. All these functionalities are now thoroughly documented, with detailed guidance and examples available in the EUreka3D XR Github. This ensures that users can easily access, understand, and reuse the developed features within their own workflows. These developments contribute to a more robust and user-friendly web-based visualisation environment, supporting a wider range of content scenarios and user needs.
Licence	● The process itself → Open / Creative Commons methodology ● Avatars and assets → depend on the open-source tools and models used ● Web Viewer Source Code: Released under the MIT License and publicly available for reuse and adaptation. It can be accessed here.
Available on	**MIRALab 3D Animation Viewer:** https://github.com/EUreka3D-XR/WebAnimationViewer **Avatar Builder video user Guide** Video Tutorial (April 2026): https://www.youtube.com/watch?v=uEn4bzfusDA Also available from Download: Link
Accompanying material	● Complete user guide document about creation/customisation and animation of Virtual Humans ● Sample avatars (with animations + metadata) ● Best practices for exporting avatars on different visualisation platforms (Unity, Babylon.js).

6.2 BASIC CAPABILITIES AND TESTING OUTCOMES

Basic capabilities

- Avatar Creation
  - Use open-source tools (Blender, MakeHuman).
  - Customise appearance, clothing, and features.
- Animation & Voice
  - Add body movements, gestures (Mlxamo)
  - Creating facial animation (Blender)
  - Integrate voice (recorded audio or AI generated text to speech).
- Export for Visualisation Platforms
  - Export to GLTF/GLB (for Babylon.js Web Viewer).
  - Export to FBX/Unity package (for Quest 3/Unity).

Testing outcomes

Updated Avatar of Saint Neophytos – Integration of Refined Historical Data

Following the initial testing outcomes presented in the previous reporting period, a new and significantly enhanced version of the avatar of Saint Neophytos has been developed.

While the first version successfully demonstrated the feasibility of integrating avatars into immersive VR and web-based environments for cultural heritage storytelling, it was based on preliminary historical references. In the current reporting period, newly provided and validated historical data have been incorporated, substantially improving the accuracy and credibility of the simulation.

These updated inputs include detailed information on the saint's physical appearance, clothing, hairstyle, posture, and overall presence. Each of these aspects has been carefully translated into the 3D modelling and animation process to achieve a more historically faithful representation.

In parallel, historically grounded narrative texts were produced and recorded by a professional voice actor. This has resulted in high-quality audio narration that aligns with the latest historical research, reinforcing both the authenticity and the narrative depth of the experience. All these refinements have been fully implemented in the latest version of the avatar, leading to a more coherent, credible, and immersive user experience compared to the initial prototype.

The updated avatar will be demonstrated across three complementary visualisation setups during the final project meeting in Paphos. This final iteration illustrates the evolution of the workflow from a proof of concept to a historically grounded and production-ready solution for cultural heritage applications.

Web Version (tests performed):

- **3D asset formats**: Verified loading and visualisation of GLB (with and without animation) and OBJ (with texture files) models. Examples in Figures 6.3, 6.4, 6.5, and 6.6.

- **Content types:** Confirmed correct handling of static objects and animated scenes (single-file GLB with embedded animations).
- **Audio assets:** Tested MP3 narration files linked to animated avatars; validated user-triggered playback to comply with browser autoplay policies.
- **Data access & integration:** Deployed a local Node.js server to proxy requests and integrate with the EUreka Data Hub. Using file IDs, the viewer successfully fetched and rendered GLB/OBJ models and retrieved MP3 audio from the Data Hub.
- **Packaging scenarios:** Tested both single-file uploads (e.g., single GLB) and ZIP packages containing multiple files stored in the Data Hub; confirmed retrieval via the Node proxy.
- **Scene switching:** Validated navigation across multiple 3D scenes within a single session using the dropdown interface. Confirmed correct loading of distinct animations and state transitions.
- **Narration-only mode:** Verified audio playback (MP3) independently of 3D animation. Confirmed correct triggering of narration for static scenes and compliance with browser autoplay restrictions.
- **Extended format compatibility:** Tested successful loading and visualisation of additional 3D formats, including .ply, alongside existing GLB and OBJ support.
- **Multi-file package support:** Evaluated ZIP-based deployments containing multiple animation files; confirmed correct extraction, indexing, and selective loading of assets from packaged content stored in the Data Hub.

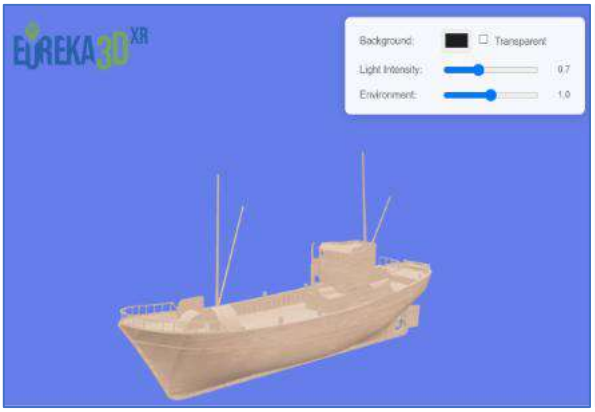


Figure 6.3 - Static object (.glb) extracted from .zip file.

Figure 6.4 - Static object (.obj) with texture files.

Figure 6.5 - Static object (.glb) obtained from the data hub directly in the original format.

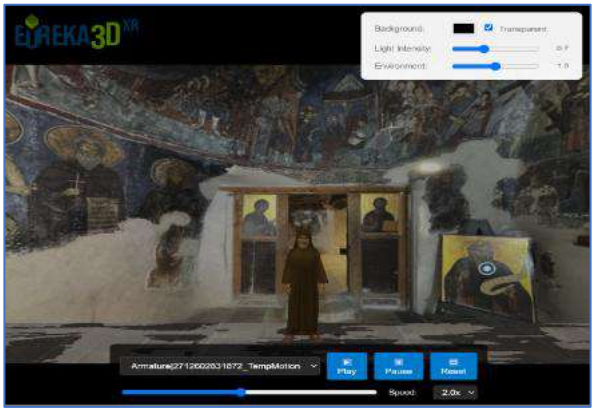


Figure 6.6 - Animation in the viewer with synchronised audio and playback controls.

7. CONCLUSIONS, NEXT STEPS, AND DIRECTIONS FOR FUTURE WORK

This document accompanies the *D3.5 Toolbox final version (DEM)*, providing a comprehensive overview of the five tools developed within the project, along with access to their respective services and supporting resources. The final versions of all tools have now been successfully released, marking a significant milestone. In addition, detailed demonstration videos and user manuals have been produced to guide users through the core functionalities and showcase the full range of capabilities offered by each tool, ensuring accessibility for both technical and non-technical audiences. The evaluation process, which drew on feedback from diverse stakeholders through multiple channels (see D4.3 Impact Assessment Report for further details), yielded particularly positive outcomes. Respondents consistently highlighted the strong relevance of the Toolbox to current sector needs, especially the growing demand for open and interoperable XR solutions. Importantly, the evaluation confirmed the high level of usability and maturity of the developed solutions. The tools were widely perceived as innovative and well-aligned with real-world use cases, demonstrating clear potential to support content creation and visitor engagement workflows.

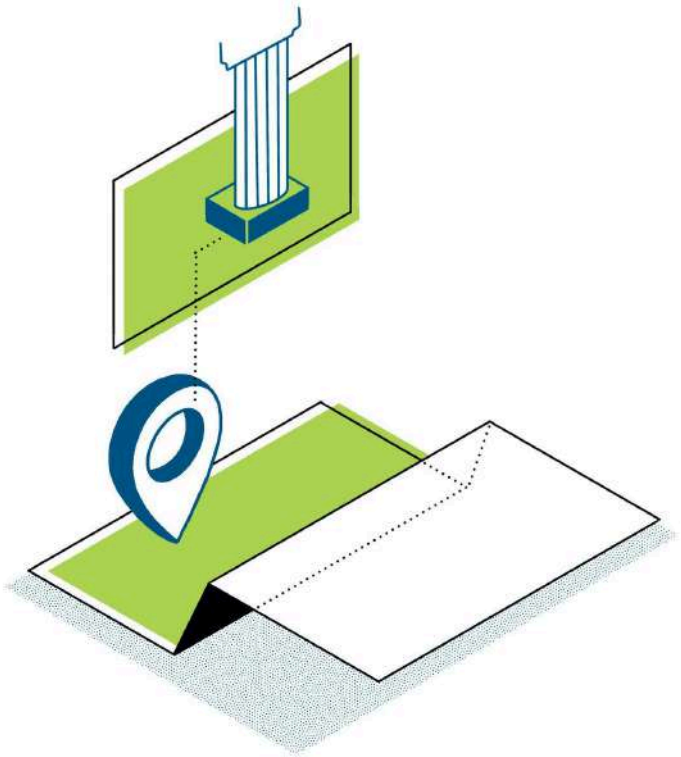
Overall, the feedback reaffirms not only the high level of interest in open XR tools within the sector, but also the tangible usefulness and impact potential of the EUreka3D-XR Toolbox. The final versions of the tools will be showcased to a wider audience during a public event to be held in Cyprus on 26 May 2026, providing an opportunity to further demonstrate their capabilities and engage with prospective users and stakeholders. Further minor improvements to the tools are also foreseen to take place until the end of the project, in light of the feedback to be received by end users during the remaining period.

Several directions for future extensions and improvements of the toolset have been identified through feedback from end users, evaluation participants, and consortium partners. These include, for example, a tighter integration with Europeana, enabling the search and selection of 3D models directly within the Europeana environment (potentially facilitated by the inclusion of model links in the EDM) as well as support for additional file formats and enhanced functionalities. Integration of sharing features for visited augmented reality tourist attractions via social media or gamification in tools can also improve user engagement. Moreover, the integration of social media could also spread outcomes of the project in a wider manner. While these ideas reflect clear user needs and promising avenues for further development, they fall beyond the scope and resources of the current project and are therefore considered as opportunities for future work.

ANNEX 1: USER MANUALS

- AR Tour Builder
- AR Tour Experience
- AI 3D Builder
- 3D XR Studio
- Avatar Builder

Co-funded by the European Union



AR Tour Builder

Authors:

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Eirini Kaldeli (NTUA)

Version and date: v2.1, 30/4/2026

TABLE OF CONTENTS

INTRODUCTION

The AR Tour Builder is a web application that supports the design of AR tours by associating 3D objects and other types of content (e.g., images, audio, text) to specific locations on a map. The builder is intended for CH professionals and other stakeholders who wish to prepare engaging experiences for their on-site visitors. The platform offers asset management capabilities, allowing users to pin content hosted on online platforms such as Europeana, the EUreka3D Data Hub or the CHI's own repository. The user can specify multiple tours for the same geographical area, organised as individual projects (e.g., short or longer tours, tours addressed to children, etc.). Each tour consists of a set of georeferenced points of interest, each of which can be associated with a set of various media assets and contextual information. The builder supports the creation of multilingual tours, where both the content and tour-specific information can be provided in multiple languages. Tours can be accessed on-site via the companion AR Tour Experience mobile app, which presents the curated multimodal content based on the user's geolocation. The focus is on outdoor experiences, enabling rich engagement with cultural sites through AR overlays, images, videos, audio, and textual content.

BY FOLLOWING THIS GUIDE, YOU WILL BE ABLE TO

- Create and manage custom AR tours using a browser.
- Define POIs for the tour on a map.
- Attach 3D models, images, audio, video and documents to POIs.
- Add multilingual explanatory text and audio associated with the POI and its connected assets.
- Preview tours before deployment.
- Test the tour you prepared on-site by using the accompanying AR Tour Experience app

THIS GUIDE IS INTENDED FOR

This guide is intended fo:

- Curators and cultural heritage professionals of heritage sites
- Archives working with urban or landscape heritage
- Educators
- Tourism and local heritage stakeholders

BEFORE YOU START, YOU NEED

- A computer with a web browser
- Internet connection
- Access to open content assets hosted on an online platform (3D models, images, audio, texts)
- Optional: a draft or idea for a site or a route you want to tell a story about in AR

Overview of the workflow

The overall workflow involves the following steps:

1. The user creates a new project in AR Tour Builder.
2. They add Points of Interest (POIs) on a map.
3. A set of items of various formats, including 3D models, images, textual documents, and links can be added to each POI.
4. Short textual and audio explanations can be added as metadata in the desired language(s).
5. The tour can be tested on-site via the accompanying AR Tour Experience mobile app.

Step-by-step guidelines

How to access the AR Tour Builder?

The AR Tour Builder is available via these links:

- Demo web tool version available on: https://eureka.ails.ece.ntua.gr/
- Production version available on: artourbuilder.eureka3dxr.fedcloud.eu

How to login?

The first step to get access to the AR Tour Builder is to **register in EGI Check-in**. The process to register your account is as simple as performing a log in with your usual account. Check-in allows users to authenticate with any organisation adhered to eduGAIN, including Universities, academic federations and research institutions, as well as with the so-called “social” identity providers such as Google, LinkedIn or ORCID, as shown in the image below.

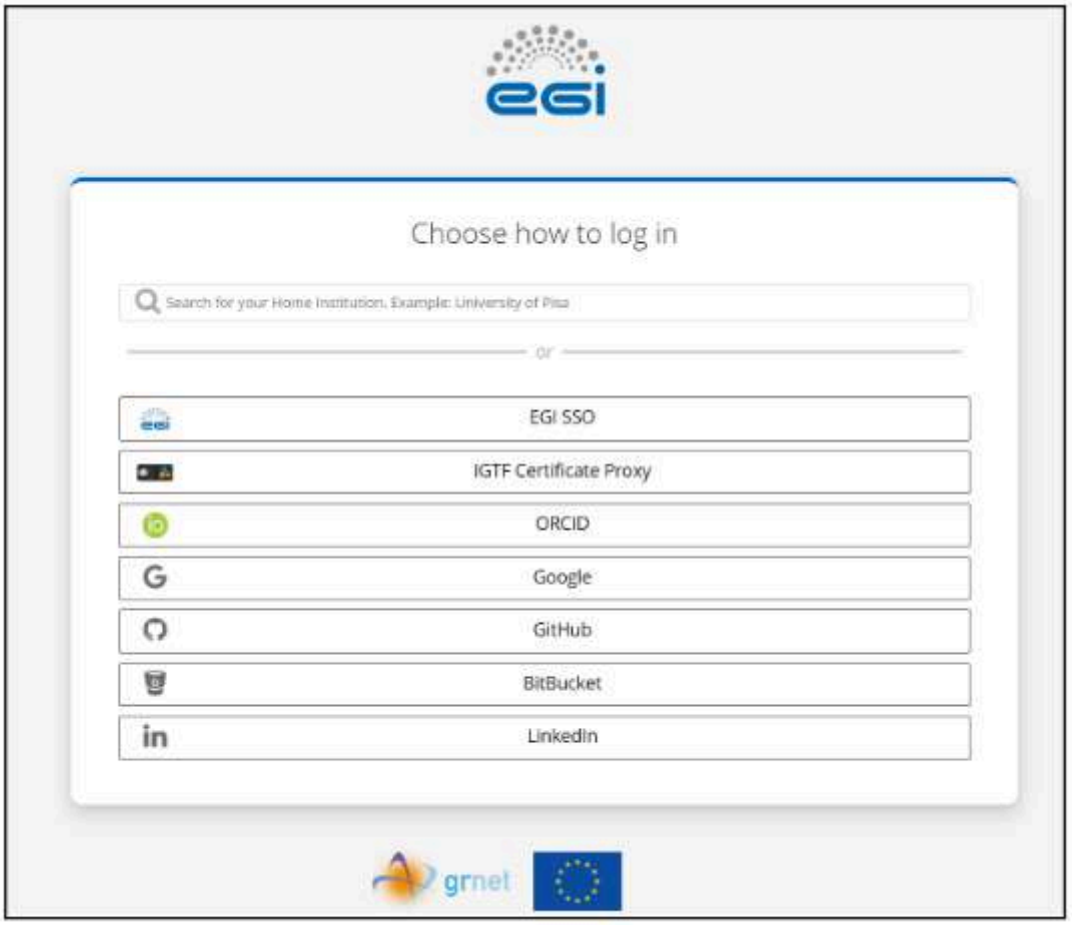


Figure 1 EGI check-in

The second step is to **join the EUreka3D Community**. For this, you need to send a request for approval by visiting the following link: https://go.egi.eu/join_eureka3d

Both processes, the registration in Check-in and the request to join the community, are documented in Section 2 of the Content Provider Handbook, available at: https://go.egi.eu/eureka3d_handbook

Once you have completed the aforementioned process with your preferred account, you will be redirected to the My Projects page of the AR Tour Builder.

How to create a new project?

Once you log in you will be redirected to **My projects** page, where you can see all the projects you are part of.

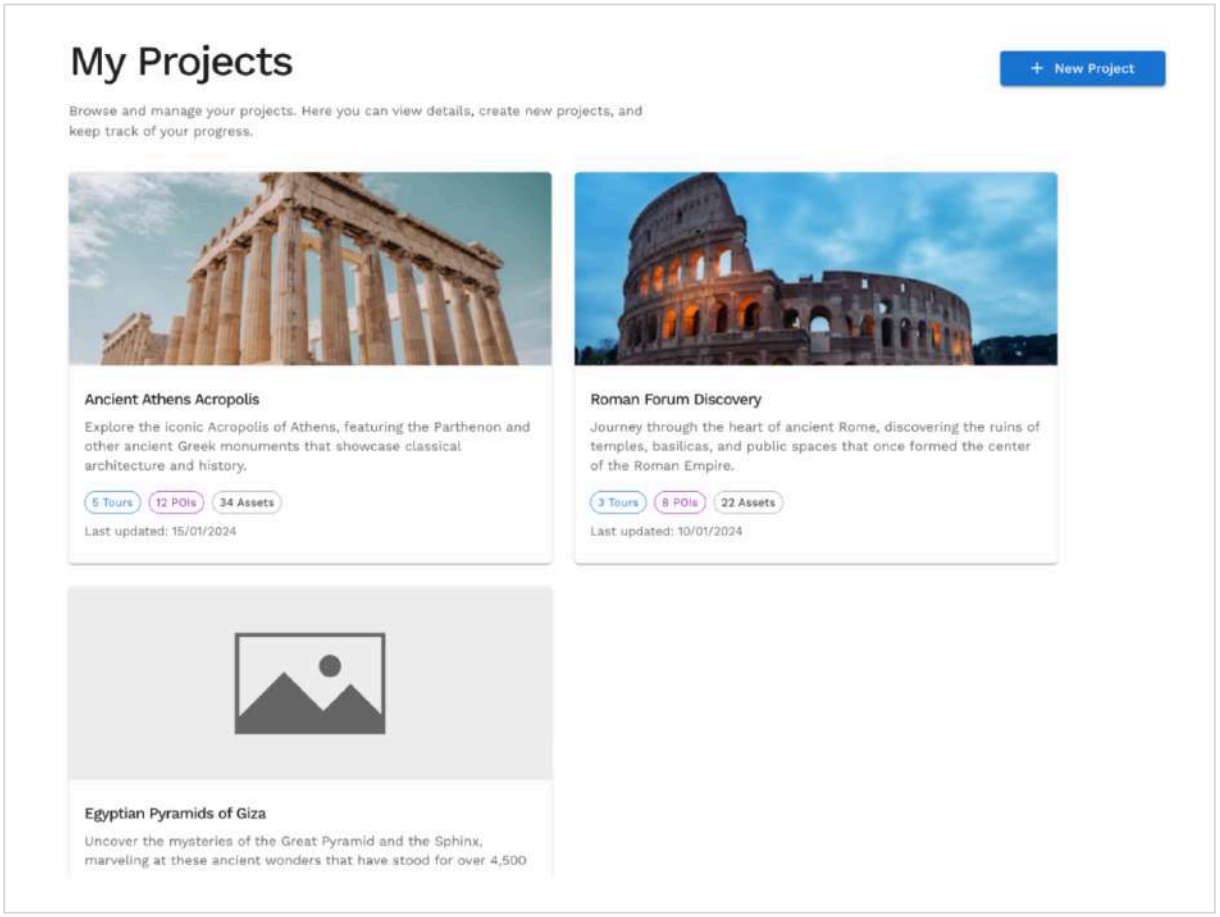


Figure 2 My projects page

What do you see on the My Projects page?

The My Projects page shows all your projects. On this page you get an overview of the projects, the associated data, such as the tours, number of POIs and assets, etc.

By clicking on a project, you get redirected to the project's dashboard, displaying project associated data like its tours and members.

In order to create a new project, select **New Project.** A stepper form will open in order to fill in the necessary information.

First you need to specify the languages the project will support, which are basically the available languages the curators will be able to add content.

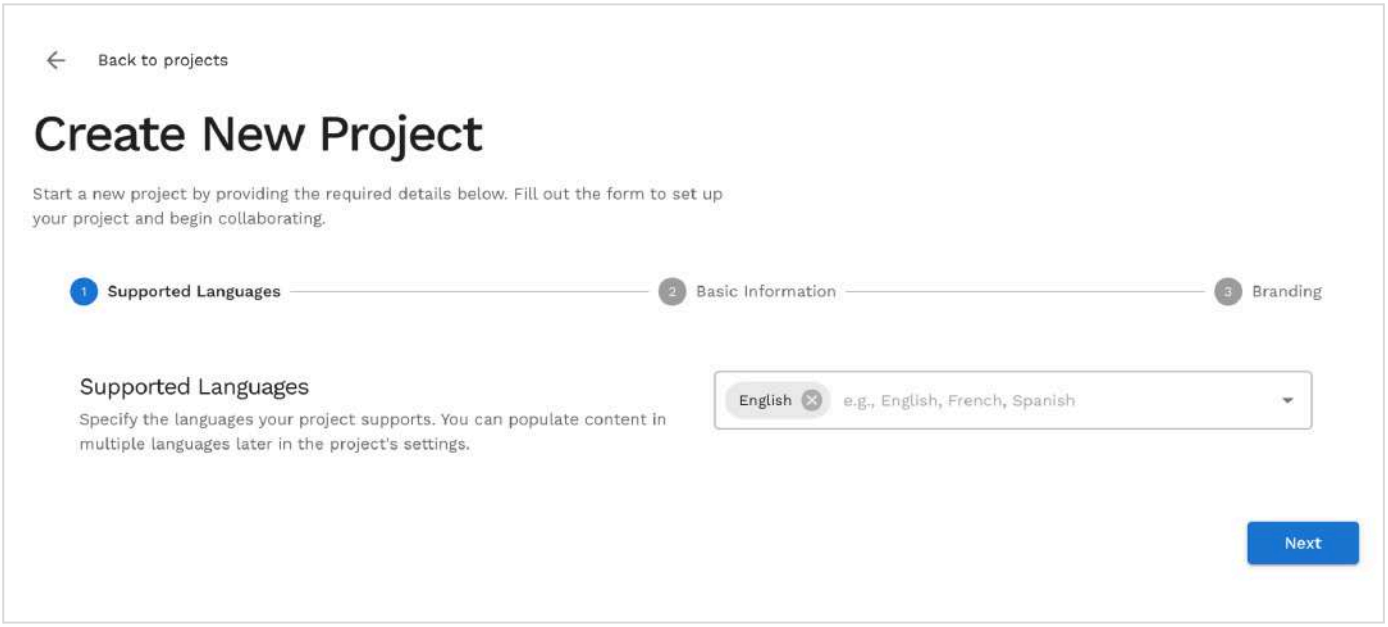


Figure 3 Create a new project; select language

In the next steps you will be prompted to enter the project name and a description, ideally in the languages you selected in the previous step, as well as some branding like a logo and cover photo.

Branding is optional, but will help a lot with the visual representation of the project when presented in the AR Tour Experience mobile app.

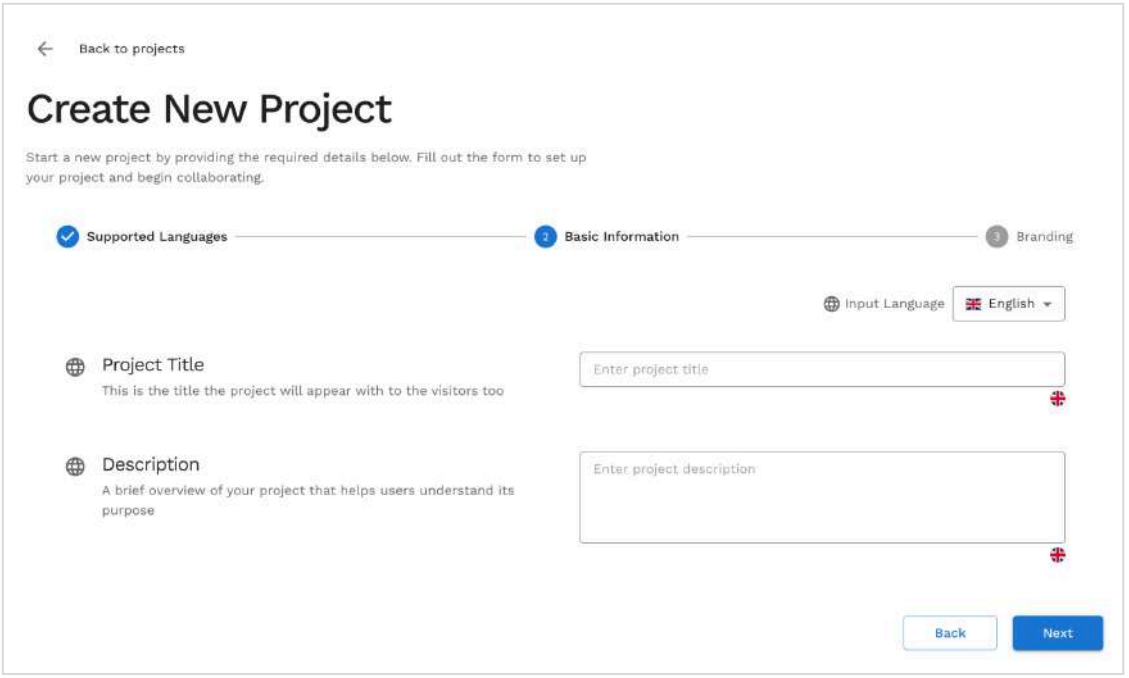


Figure 4 Create a new project; Add basic information

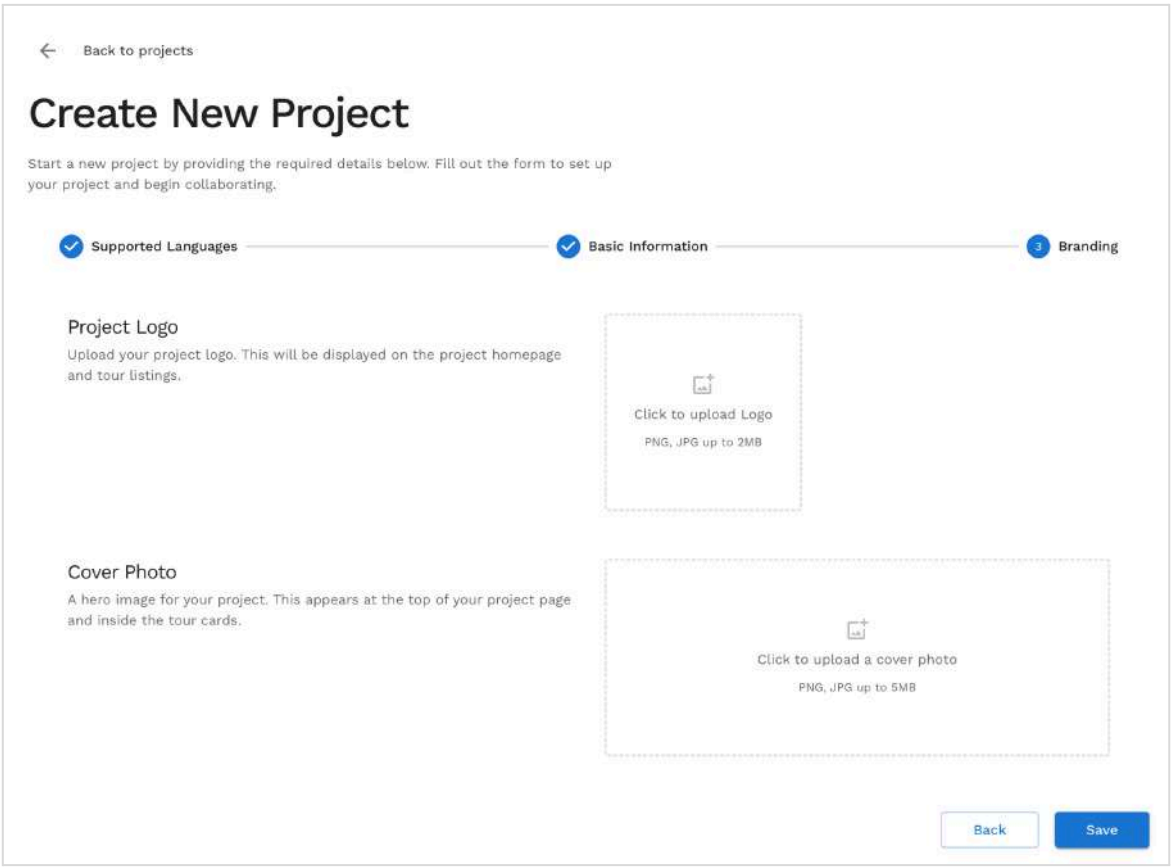


Figure 5 Create a new project; Branding

Once you fill in the form and click **Save**, your project is created and you will be redirected to the project's **Dashboard**.

What do you see on a project's Dashboard page?

The Dashboard page shows basic project information, as well as the tours and members contained in it.

The dashboard page acts as the main navigation hub, giving access to the project's **Tours**, **Settings**, and **Members** sections, allowing you to manage tour content, update project information, and handle team collaboration all from one place.

***Tip** - you can create multiple tours under one project*

How to create a new tour?

1. Open the **My Projects** page and select the project
2. Go to Tours, by either selecting **Tours Editor** from the sidebar on the left or **See all** from the tours table inside the dashboard

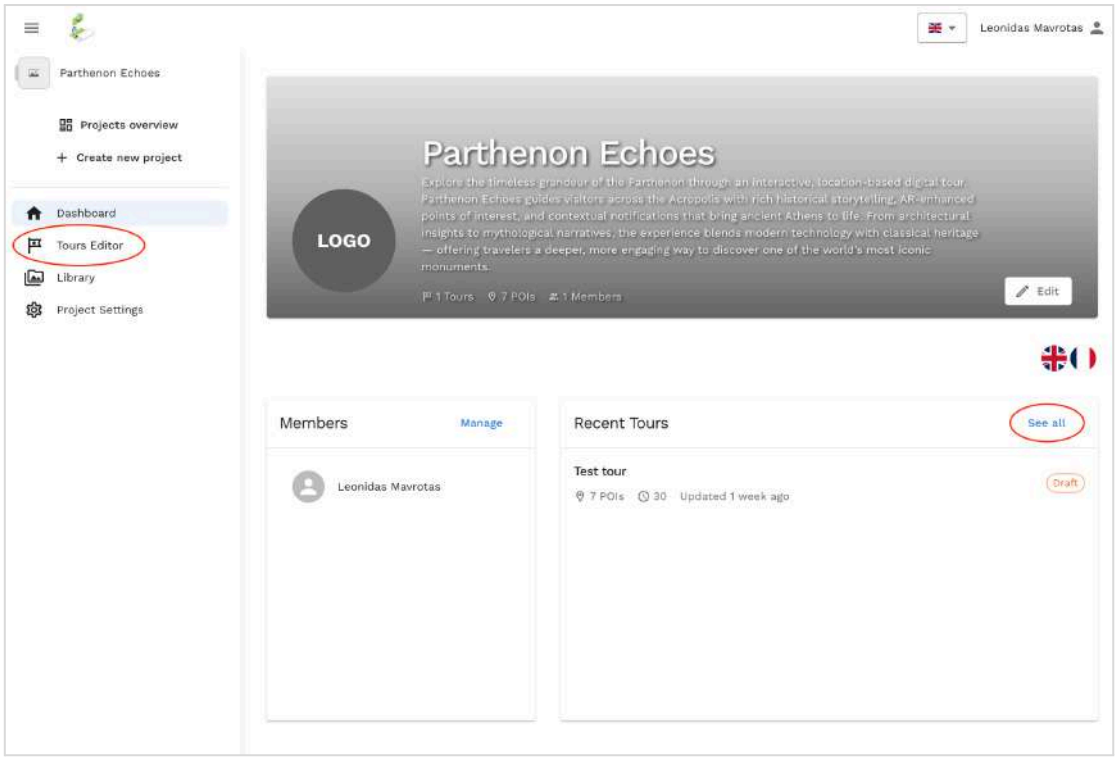


Figure 6 Tour overview

3. Choose 'Create new tour'

Figure 7 Create a new tour

4. Fill in the form with the tour's basic information:
    a. Tour name (multilingual)
    b. Description (multilingual)
    c. Estimated duration
    d. Estimated distance

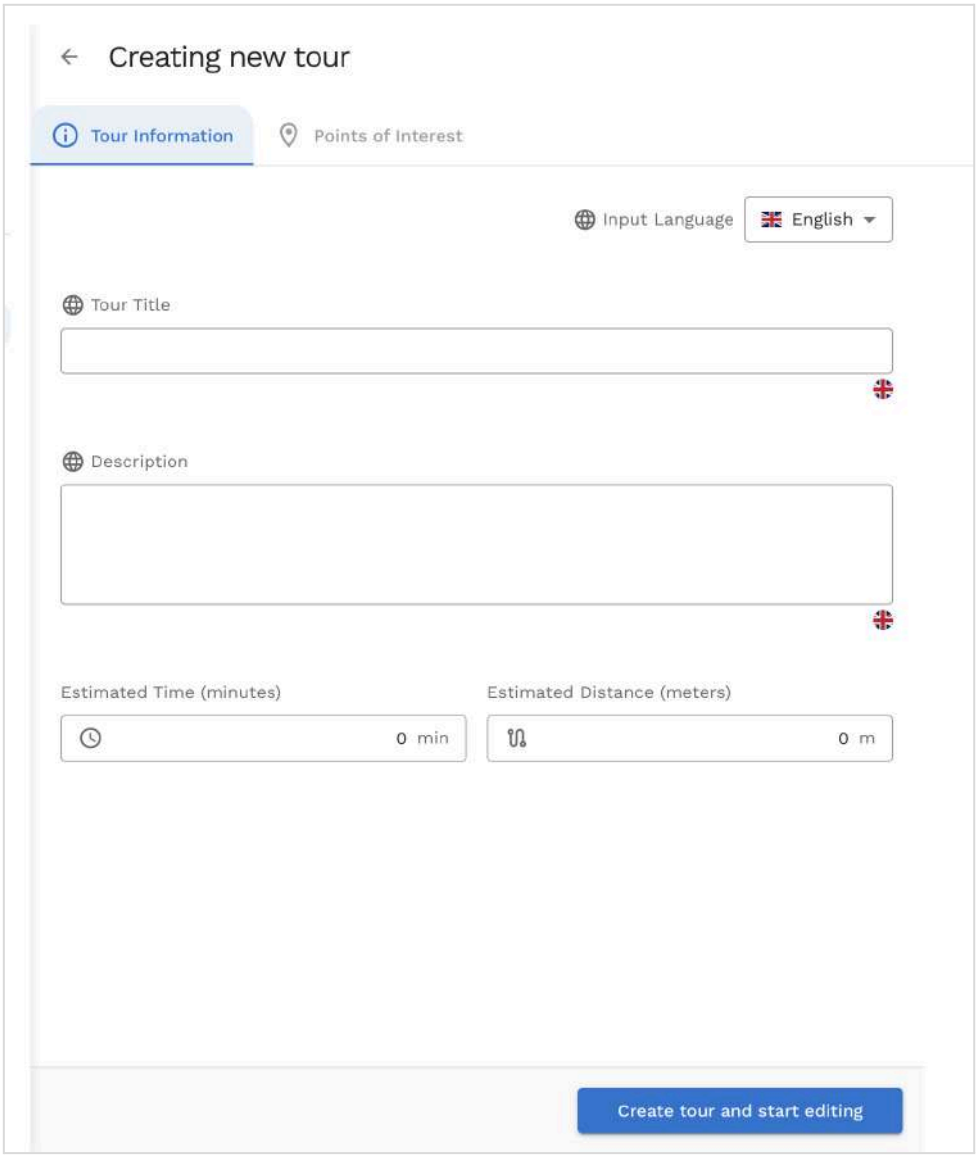


Figure 8 Input screen for a new tour

After creating the tour, you will be prompted to start adding **points of interest** to the tour.

What do you see on a Tour page?

The Tours page consists of two navigation sections:

1. **Tour Information** displaying the basic Tour info (description, time estimation etc.) and
2. **Points of interest**. In case of guided tours, the POIs are sorted.

How to add Point of Interest (POI) to a tour and assign content?

1. **Open the POI form**
    a. Open the tour from the Tours Editor page
    b. Enter the Points of Interest tab
    c. Click 'Add POI'
    d. A sidebar with the POI's form will appear from the right containing tabs to enter different categories of POI's information

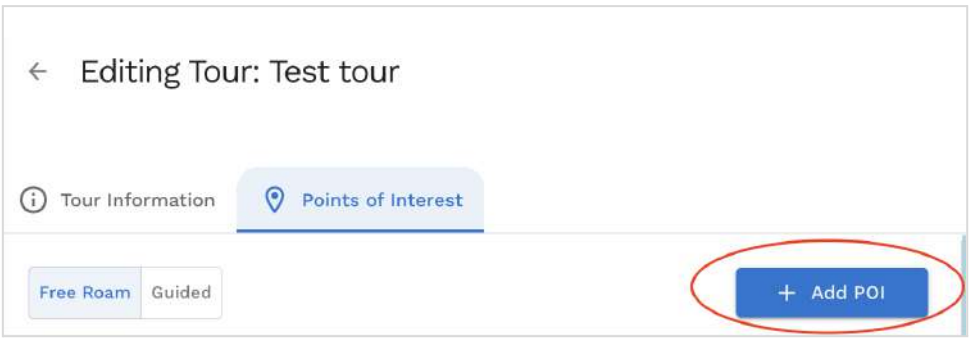


Figure 9 Add POI

2. **Enter the POI location**
    a. Click on the map to place a pin or add the coordinates directly on the inputs below the map
    b. Drag the pin in order to update the POI's location, you will see the coordinates updating at the same time below.
    c. When ready, click **Next Step**

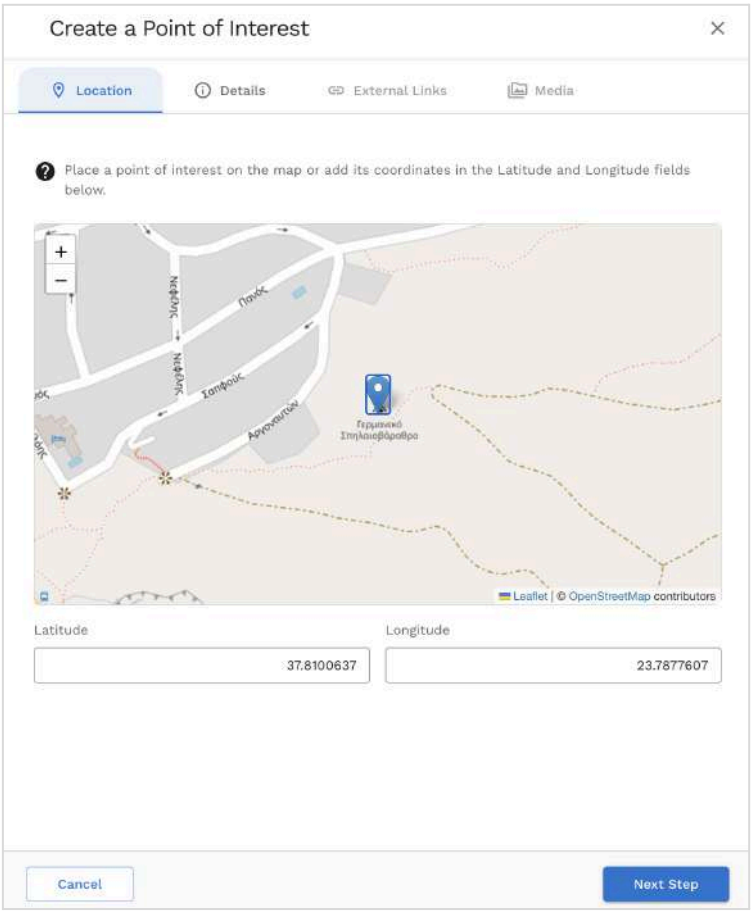


Figure 10 Add POI Location

3. **Describe the POI**
    a. **Add details**
        - Title (multilingual)
        - Description (multilingual)
        - Radius, the distance where the visitor gets an indication of reaching the POI.
        - Cover photo (optional but recommended)
    b. Click **Next step**

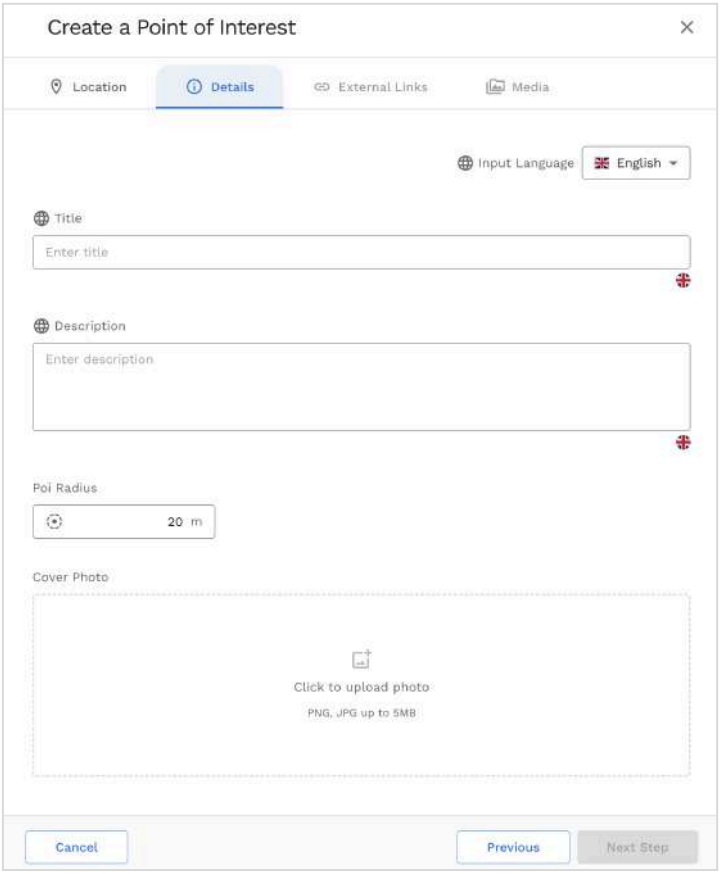


Figure 10 Add POI Information

4. **Add external links**
    a. You can add external links like **Quiz** or **Blog posts**
    b. You can also define different links per language, since each quiz/blog post link will probably be written in specific language
    c. When ready click **Create and add media**. This saves the POI and redirects to the Media step to start adding media assets to the POI.

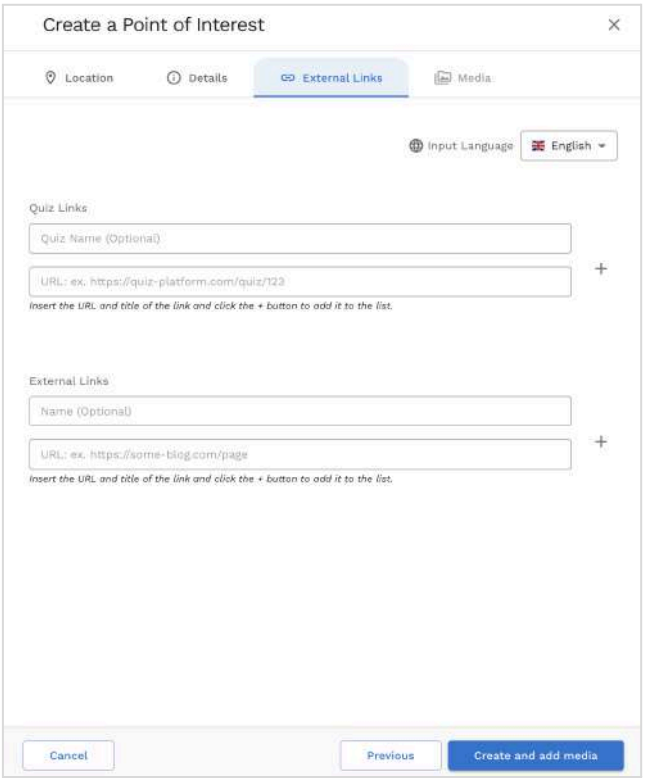


Figure 11 Add external links and media to the POI

5. **Attach assets to the POI**
    - **a.** Go to **Media** tab
    - **b.** Click **Add**
    - **c.** Select between creating a new asset or selecting one from your library

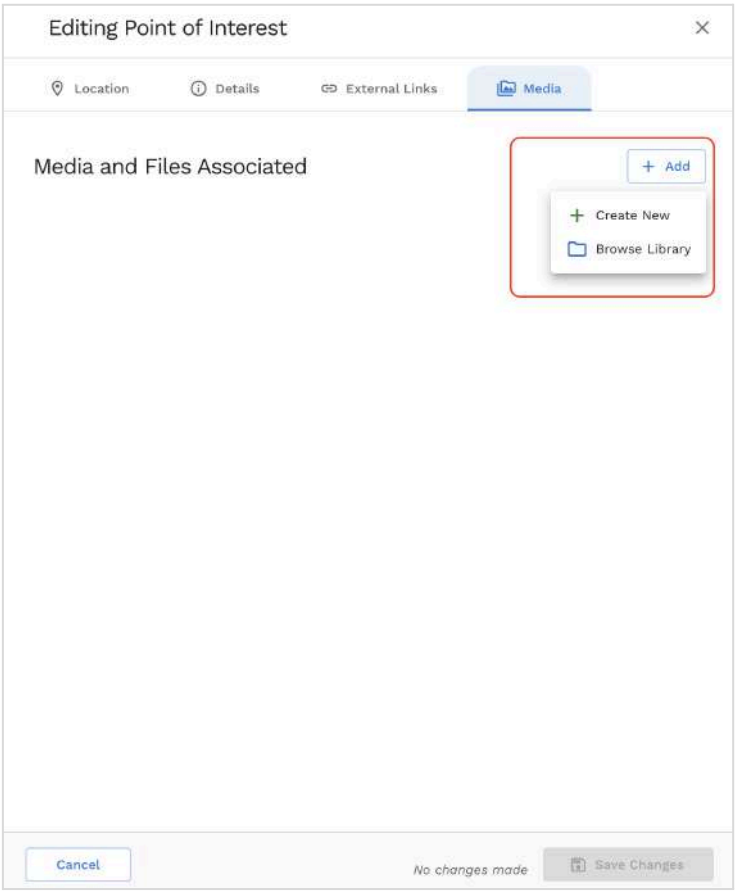


Figure 12 Attach asset to POI

6. **Select and import an asset from your library**
    - **a.** Select an asset from your library
    - **b.** The form will be prepopulated with this asset's information
    - **c.** Continue editing the form and click Save

7. **Create an asset from scratch**
    - **a.** Fill in basic information like
        - **i.** Title
        - **ii.** Description
        - **iii.** Set the asset as the primary asset of the POI. By toggling this option the asset will be showcased prominently in the mobile app when the visitor views the POI's information.
        - **iv.** Select Media Type
        - **v.** Add the media url
    - **b.** In case of a 3D media asset, fill in additional information

What is the library?

The library offers an overview of all the assets that a user manages in the tool. Assets include 3D models, images, videos, etc. For each asset you find information on the name, type, size etc.

In this view you can preview, edit and delete assets.

How to manage 3D content?

Adding 3D content requires the following:

1. Find a POI where you want to associate the 3D content
2. Create an asset of type 3D and assign it to the POI

Then you can choose the 3D content:

1. Availability in AR mode
2. Georeference, whether to appear in AR at a specific real-world location
3. Rotation, scale and positioning using our 3D editor
4. Optional linked audio

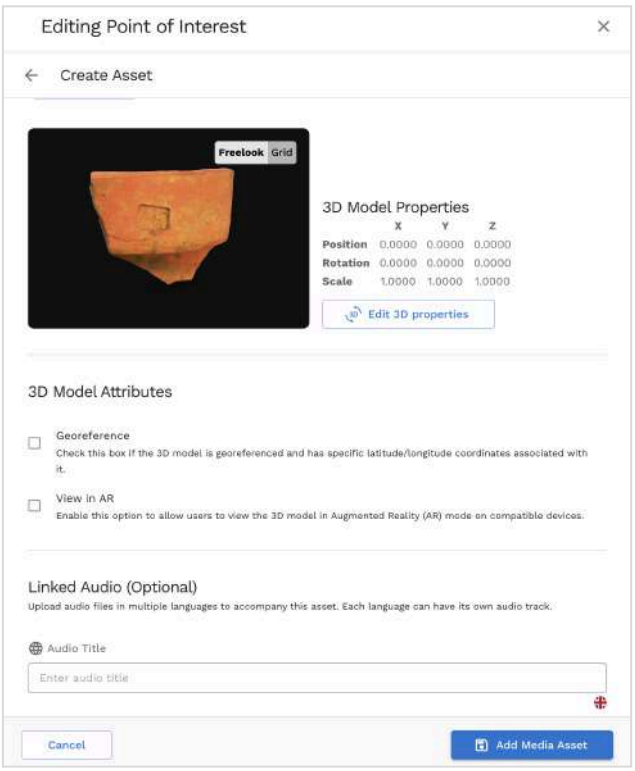


Figure 13 Detail asset page

Clicking **Edit 3D Properties** opens a dedicated 3D editor where you can precisely manipulate the model's position, rotation, and scale in real-world coordinates.

The editor provides the following tools and references:

- **Gizmo controls** — Use the on-screen gizmo to **Translate** or **Rotate** the model interactively by dragging along the colored axes (X, Y, Z).
- **Ground grid** — A reference grid is displayed beneath the model, where each cell represents **1×1 meters**, giving you an accurate sense of real-world scale.
- **Compass indicator** — A compass bar at the top of the viewport helps you orient the model relative to true cardinal directions (N, NW, etc.).
- **Properties panel** — A panel on the right displays the current numeric values for **Position**, **Rotation**, **Scale**, and **Dimensions (in meters)**, updating in real time as you manipulate the model.

Once you are satisfied with the placement and orientation, click **Save Transform** to apply the changes, or **Cancel** to discard them.

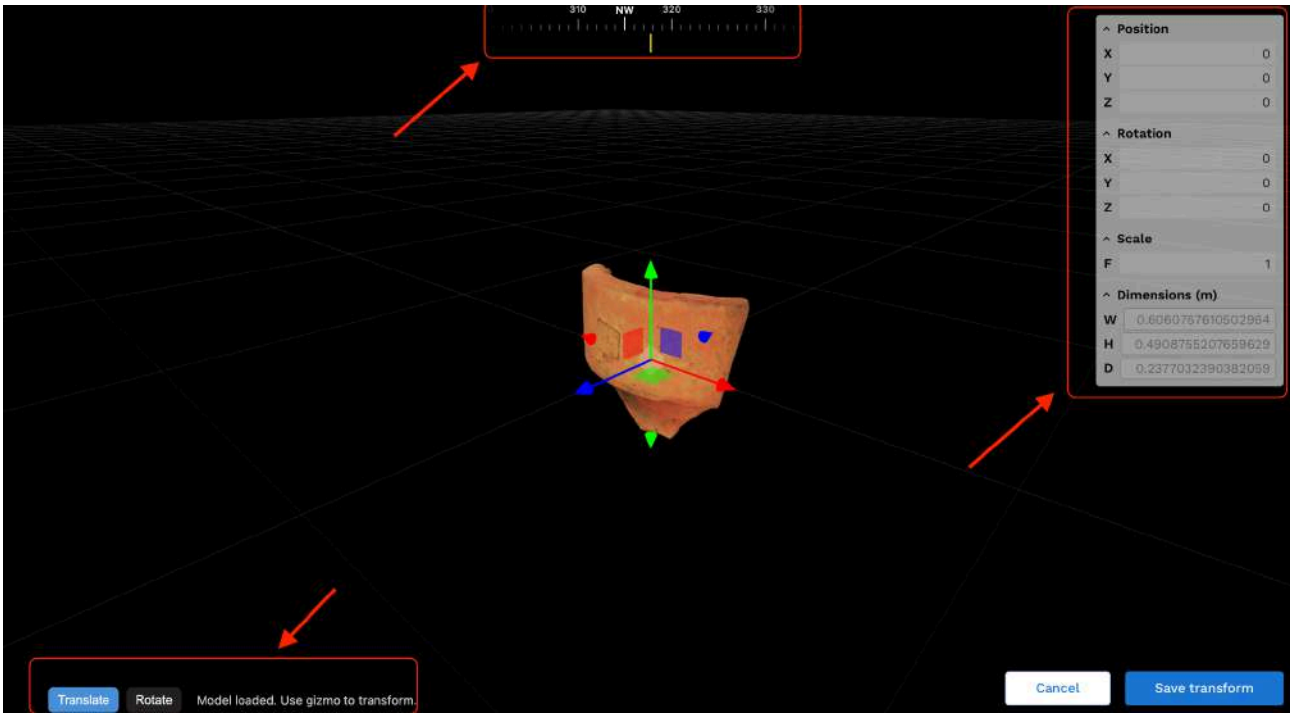


Figure 14 3D editor

How to publish a tour in the AR Tour Experience?

1. Open a tour's page
2. Click Publish, top right of the page

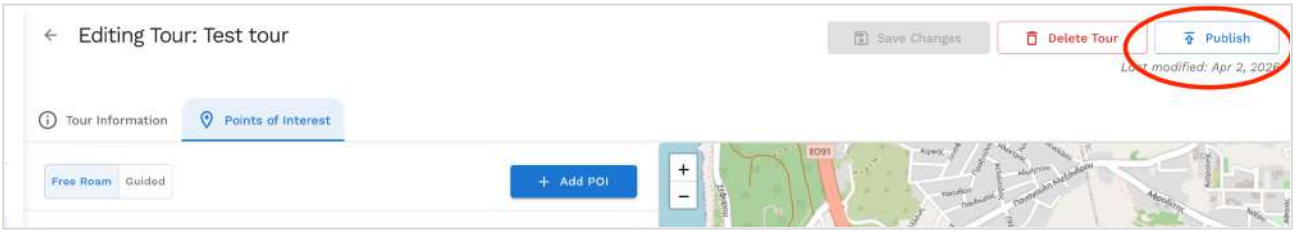


Figure 15 Publish the tour

How to update a tour?

1. Open a tour's page
2. Modify the tour's information or POIs and click **Save Changes**

How to manage a project's assets library?

1. Select a project
2. From the sidebar on the left, select **Library**
3. In the library page you can:
    a. See all your assets
    b. Filter assets by type
    c. Create new assets, able to reuse them when adding content to a tour's POI.

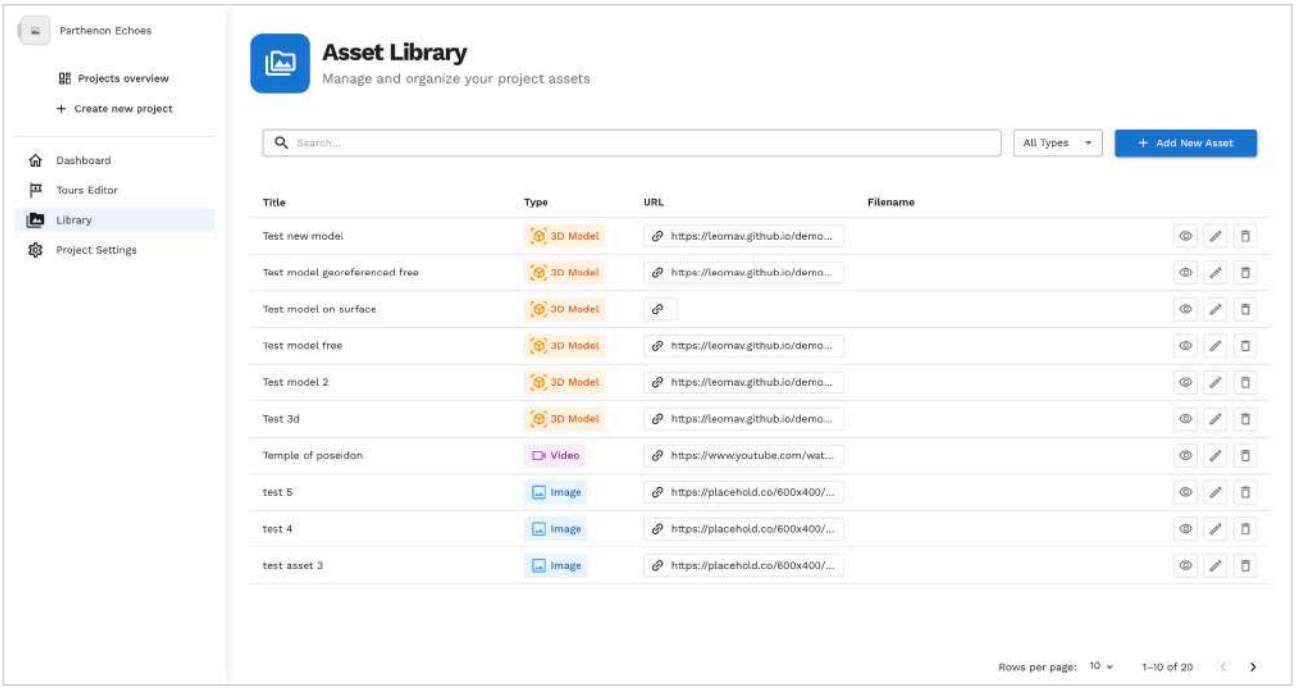
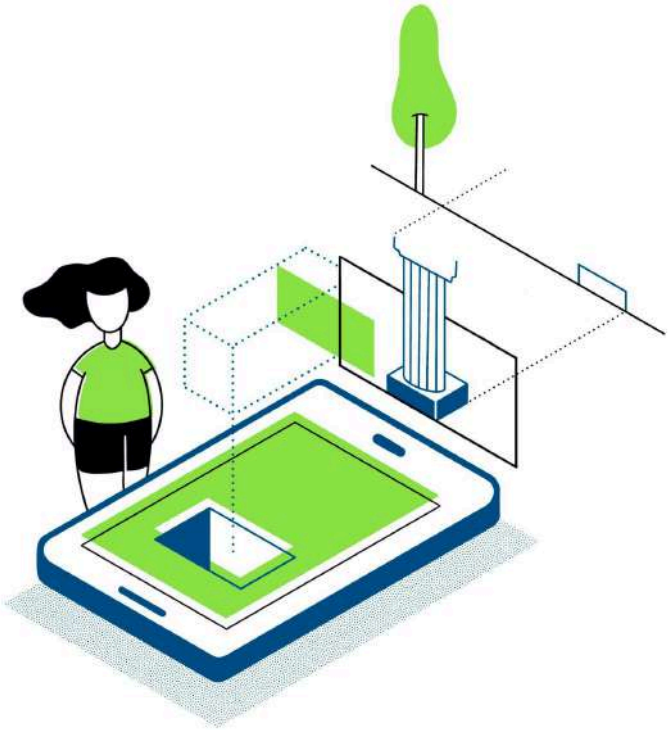


Figure 16 Asset library

More information

- Source code on Github: https://github.com/EUreka3D-XR/AR-Tour-Builder
- API (documented in Swagger): https://eureka.ails.ece.ntua.gr/api/docs/
- Demo version: https://eureka.ails.ece.ntua.gr/
- Production version: artourbuilder.eureka3dxr.fedcloud.eu

Co-funded by
the European Union



AR Tour Experience

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Eirini Kaldeli (NTUA)

Version and date: v1.2, 30/4/2026

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Introduction

This step-by-step guideline provides an overview of the main capabilities provided by the AR Tour Experience mobile app.

By following this guide, you will be able to:

- Load custom AR tours in outdoor heritage contexts created via the AR Tour Builder on a mobile device
- Learn about the main Points Of Interests associated with the tour, based on your GPS location
- Gain access via a multilingual user interface to various assets associated with a POI (including 3D objects, images, text etc)
- View 3D models in overlay AR using the mobile device's camera

This guide is intended for

- Visitors interested in exploring a location at their own pace
- Pupils, students, and other guided groups
- Site mediators and tour guides

Before you start you will need

- Smartphone with camera (Android) and AR capabilities
- GPS access
- Sufficient internet connectivity (depending on content setup)

You can find more about the supported Android devices with AR capabilities along with a list of devices here: https://developers.google.com/ar/devices.

Overview of the workflow

The overall workflow involves the following steps:

1. The visitor opens the AR Tour Experience app and selects their desired AR tour.
2. As the visitor explores the site, they are prompted about nearby POIs.
3. Moving to a POI, the app presents to the visitor a selection of relevant objects associated with the respective location.
4. The visitor can choose to visualise a 3D object in overlay AR mode, thus being able to inspect hidden or missing elements at the location.
5. The app provides additional rich content (including images, textual documents, links to external resources such as a quiz), allowing the visitor to explore the location context more deeply.

Figure 1 The AR Tour Experience in action in the Bibracte archaeological site.

Step-by-step guidelines

How to download the app?

You can download and install the app from Google Play: link

How to select a tour?

Upon opening the app, you will see a list of available **archaeological projects**.

1. Tap **the arrow button** on a project card to enter it. You will then see the project's description along with its available tours.
2. Tap **See More** on any tour card to open its detail page, where you can read the full description and browse its Points of Interest (POIs).

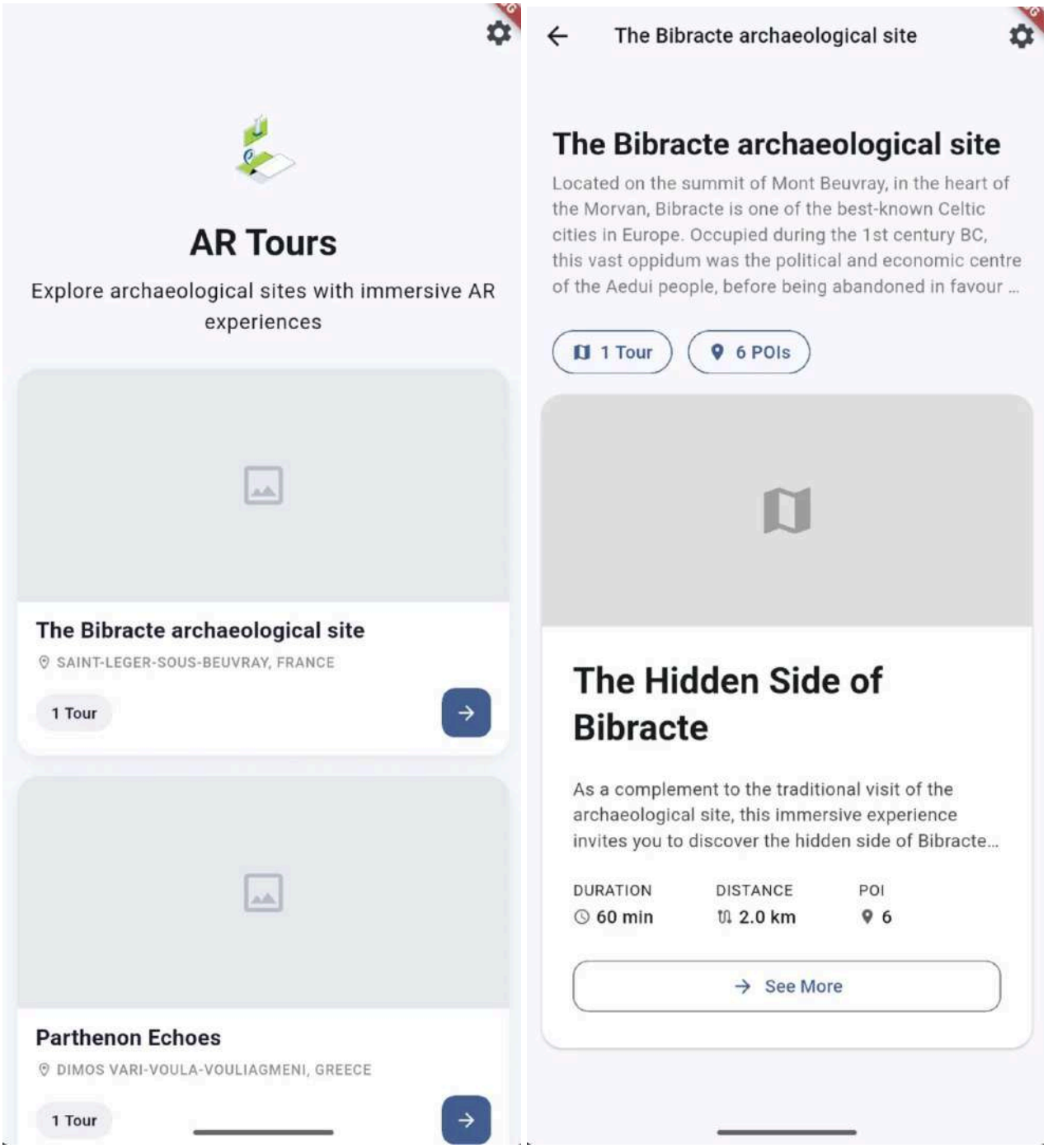


Figure 2 Project cards in the AR Tour Experience

How to download tour's content for offline use?

On the tour detail page, tap the **Download Tour** button to save the tour's content to your device. This allows you to access all tour information, media, and POIs without an internet connection while on-site.

Figure 3 Tour detail page

How to select a language?

1. At any point during an ongoing tour, tap the **Settings** icon (⚙️) in the top-right corner of the screen.
2. A Settings panel will appear where you can select your preferred **language** from the dropdown menu.
3. The app content will update accordingly.

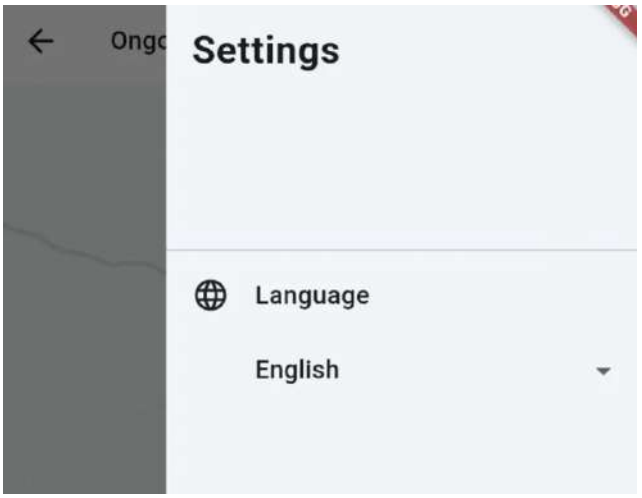


Figure 4 Settings

How to enter a tour and navigate?

On the tour detail page, tap **Start Tour** to begin. You will be taken to an interactive **map view** showing the tour area with all POIs marked as icons on the map. You can:

1. **Tap a POI icon** on the map to select and open it.
2. Tap **All POIs** in the top-right corner to open a full list of all Points of Interest, and tap the location icon next to any entry to center the map on it.
3. Use the **location button** in the bottom-right corner to re-center the map on your current position.

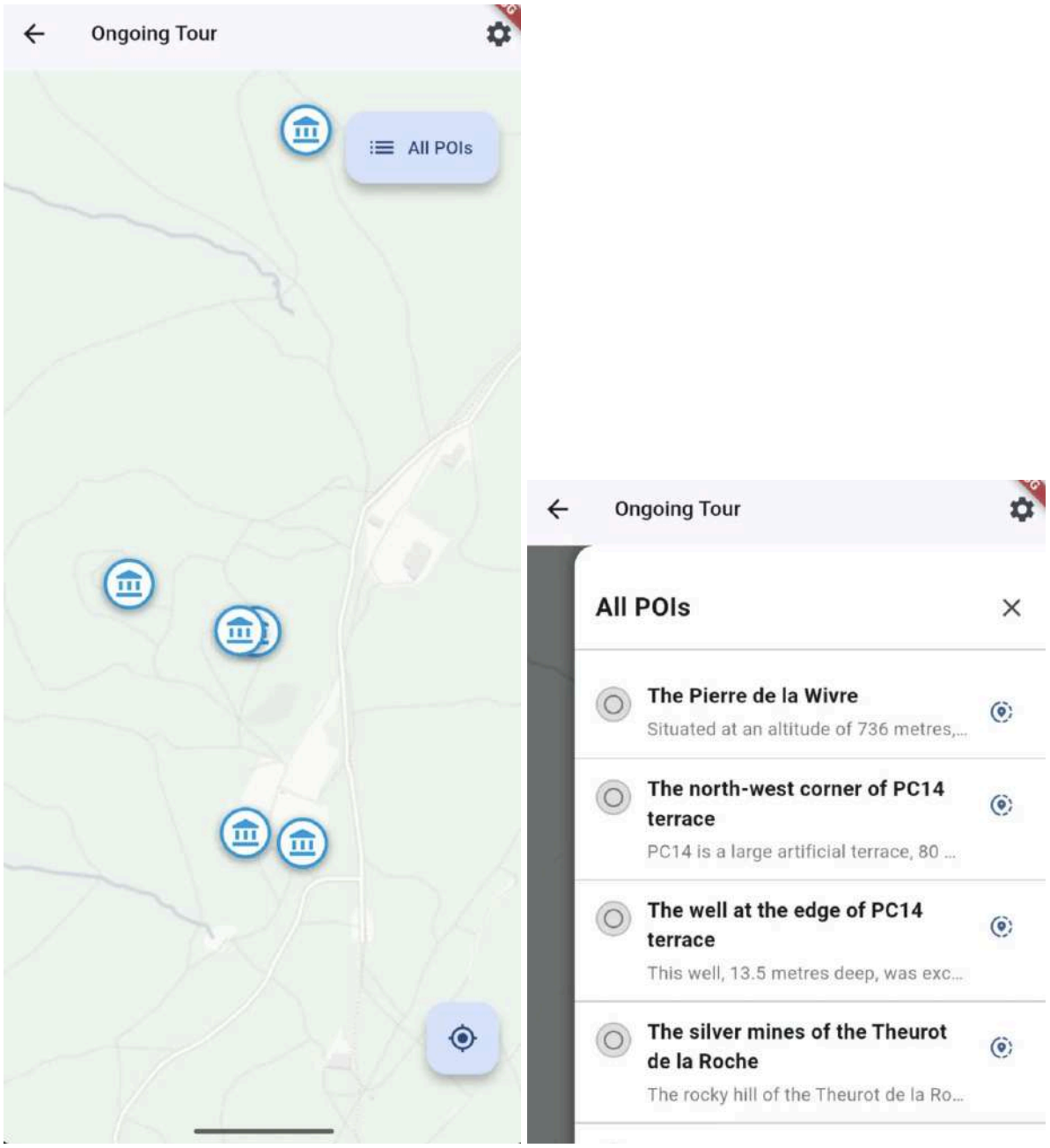


Figure 5 Left: map view. Right: Overview list of POIs

How to view a POI and its content?

Tapping on a POI opens its dedicated page, where you can read its historical description and explore all associated media, organised by type:

- **Photos** — Archaeological photographs and artefact images.
- **Videos** — Documentary or contextual video clips.
- **3D Models** — Interactive 3D reconstructions viewable directly in the app.
- **Quiz** — An optional quiz to test your knowledge about the site.

Scroll down to browse all available content, and tap any media item to open it in full view.

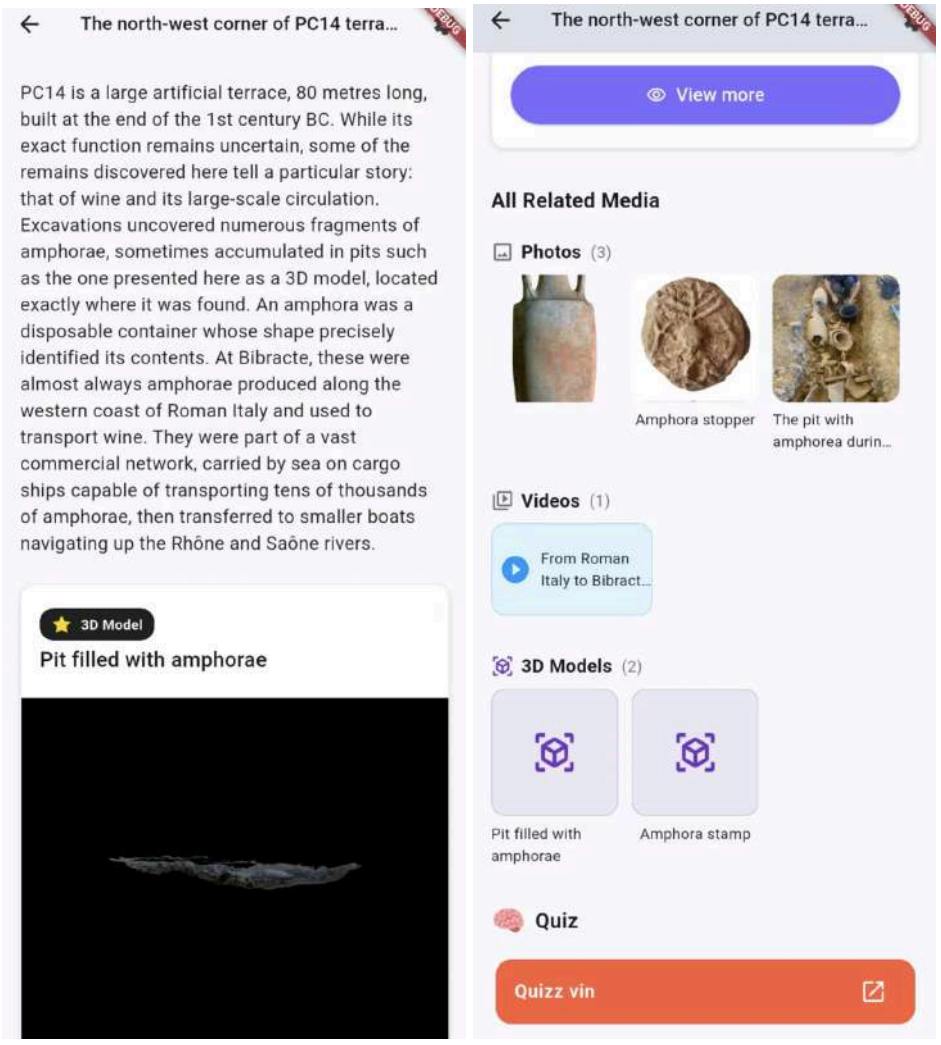


Figure 6 Associated media

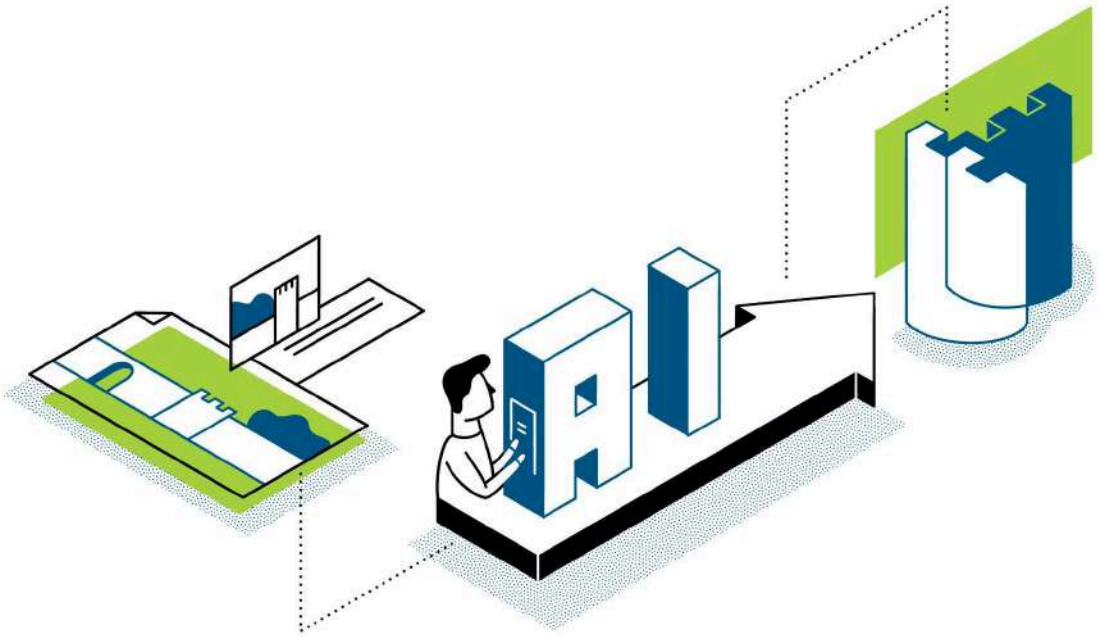
How to enter an AR Experience?

When viewing a **3D Model**, you will be taken to the **3D Model Viewer** screen, where you can rotate and inspect the model interactively. To place the model in the real world using Augmented Reality, tap the **AR** button in the top-right corner of the viewer. Your camera will activate and allow you to position the 3D model in your physical surroundings for an immersive, true-to-scale experience.

More information

- Source code on GitHub:
  https://github.com/EUreka3D-XR/AR-Tour-Experience
  https://github.com/EUreka3D-XR/AR-Tour-Builder-backend
- Demo video at the Bibracte archaeological site (Jan 2026): Link

Co-funded by
the European Union



AI 3D Builder

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Version and date:

V1.0, 17/04/2026

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INTRODUCTION

This step-by-step guideline introduces the AI 3D Builder, a workflow designed to help users generate 3D models from images using AI-based tools and refine them for use in XR, web, or research environments.

The guide focuses on accessible, practical steps, allowing Cultural Heritage professionals and content creators to transform 2D images into usable 3D assets without requiring advanced technical expertise.

By following this guide, you will be able to:

- Prepare images for AI-based 3D generation
- Generate a 3D model using an AI tool
- Clean and optimise the model in Blender
- Create and apply textures
- Export a final model ready for visualisation

THIS GUIDE IS INTENDED FOR

- Cultural Heritage professionals
- Archivists and researchers
- XR and creative professionals
- Anyone interested in AI-based 3D modelling

No programming skills are required. Basic familiarity with images and files is sufficient.

TOOLS AND SOFTWARE USED IN THIS GUIDE

For both 2D images and 3D models editing, any possible software can be used but this guideline will show the use of respectively Photopea and Blender for them, both accessible for free.

- Photopea (web-based) for image preparation and editing
  - Download link: https://www.photopea.com/?utm_source=homescreen
- Trellis (web-based AI tool) for generating 3D models from images
  - Download link: https://huggingface.co/spaces/Trellis-community/Trellis
- Blender (desktop application) for cleaning, editing, and exporting models
  - https://download.blender.org/release/Blender4.2/blender-4.2.2-windows-x64.msi

BEFORE YOU START, YOU WILL NEED

- A computer (Windows, macOS, or Linux)
- Internet access
- Basic image files of the object you want to model
- Optional materials
  - Multiple images of the object (recommended for better results)
  - High-resolution photos

Preparation of your materials and workspace

- Organise your project into folders:
  - Input images (original and cleaned)
  - AI-generated models
  - Blender project files
  - Final exported models
- Ensure that:
  - Images clearly show the object of interest
  - Background elements are minimised or removable
  - The object is visible from different angles (if possible)

Overview of the workflow

The AI 3D Builder workflow consists of four main stages:

1. Image preparation in Photopea: isolate and clean the object in images
2. 3D model generation in Trellis: use AI to create the model
3. Model correction in Blender: refine geometry and fix errors
4. Texture preparation in Photopea
5. Texturing and export in Blender: apply textures and prepare final output

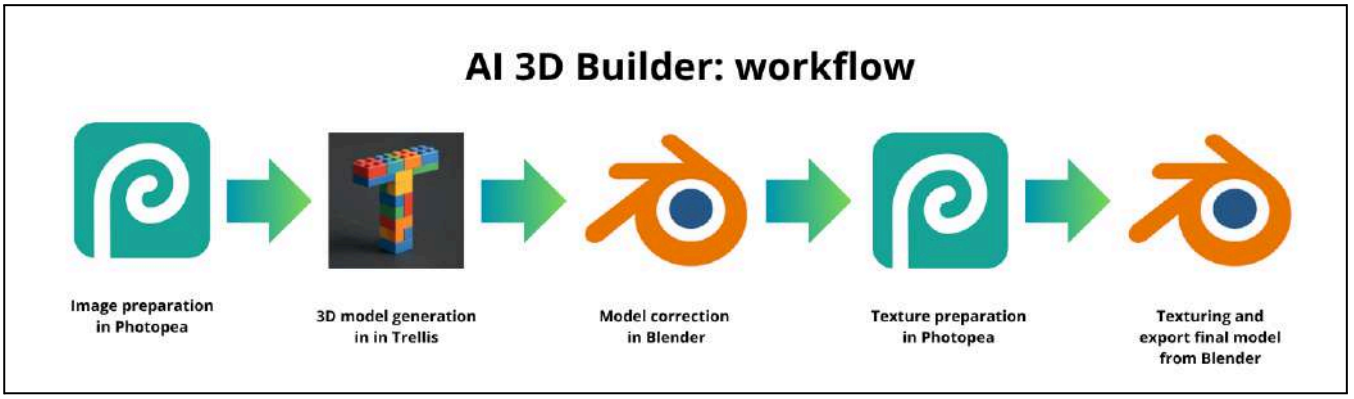


Figure 1 Overview of the workflow

STEP-BY-STEP GUIDELINES

STEP 1: IMAGE PREPARATION (PHOTOPEA)

The images to be provided as input to the AI Tool (Trellis) for modeling must first be specifically prepared. Therefore, it is necessary to ensure that the AI Tool focuses its attention exclusively on the object we wish to reproduce, leaving out anything superfluous or likely to generate errors (trees, vegetation, street furniture, etc.).

The background must be removed, leaving only the object of interest. The tool is able to perform this procedure automatically; however, the background removal algorithm is not so effective in the case of images with many details or with excessively uniform colors. It's important to remove as many unwanted elements as possible to obtain a final product that requires minimal manipulation. If this isn't possible, you should still try to correctly cut out the object of interest, so as to provide the AI tool with its general shape.

WHAT IS PHOTOPEA?

Photopea is a free, browser-based image editing tool used to prepare images before processing them with AI tools.

📺 **WATCH THE DEMO VIA THIS LINK:** [IMAGE PREPARATION (PHOTOPEA)]

HOW TO PREPARE YOUR IMAGES?

1. **Open Photopea**
2. **Upload your image** (File → Open)

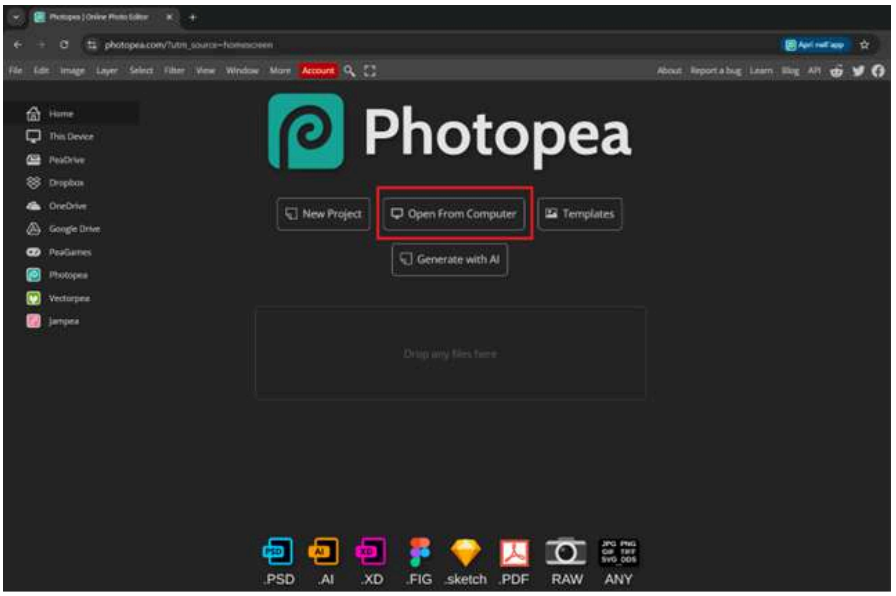


Figure 2 Uploads in Photopea

3. **Remove the background:**
    a. Use the Lasso tool
        i. The default option is Lasso Select. To be able to select the object, **the option Polygonal Lasso is recommended**; this option can be accessed by long-pressing the Lasso tool and selecting Polygonal Lasso Select.

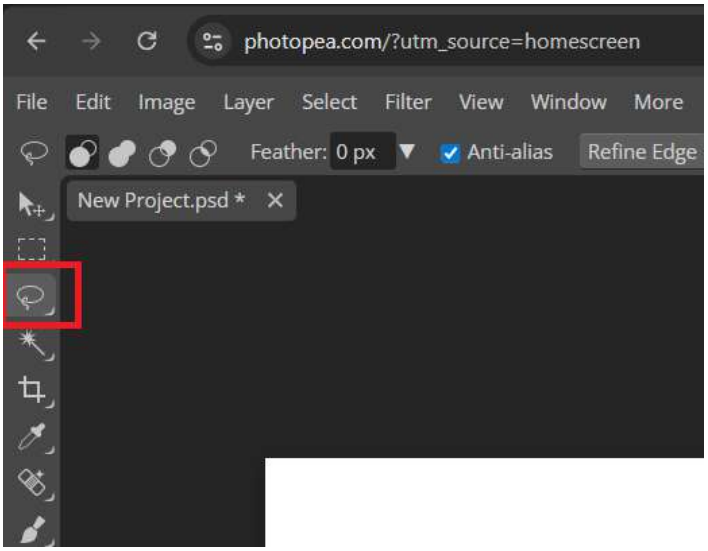


Figure 3 Lasso tool

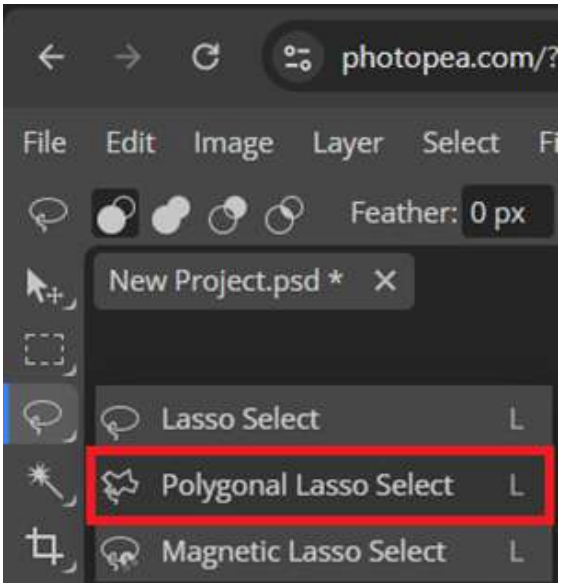


Figure 4 Polygonal Lasso Select

    b. Once the object's shape is defined, invert the selection: go to **Select → Inverse**
        i. The selection will now include all the objects to be deleted, except the object we're interested in.

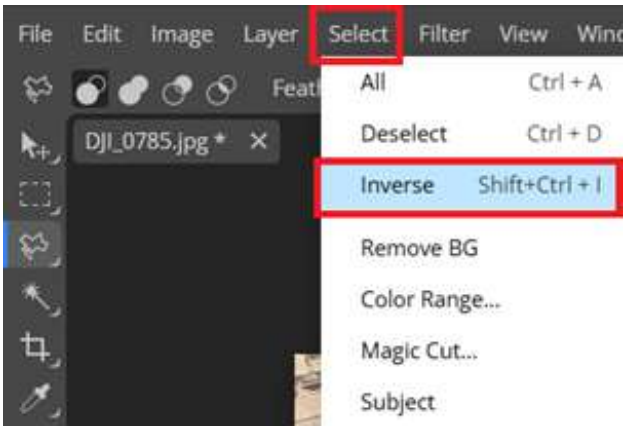


Figure 5 Inverse in Photopea

    c. To remove the unwanted items, **press the DELETE button** on your keyboard.

4. **Export the image:**
    a. **File → Export As … → PNG**

The resulting images must be saved in .PNG format to preserve the transparency of the removed image portions. Saving in .JPG format automatically fills the deleted portions with white, which could cause calculation errors in the AI Tool.

Important: Clean images significantly improve AI-generated results by reducing unwanted artefacts.

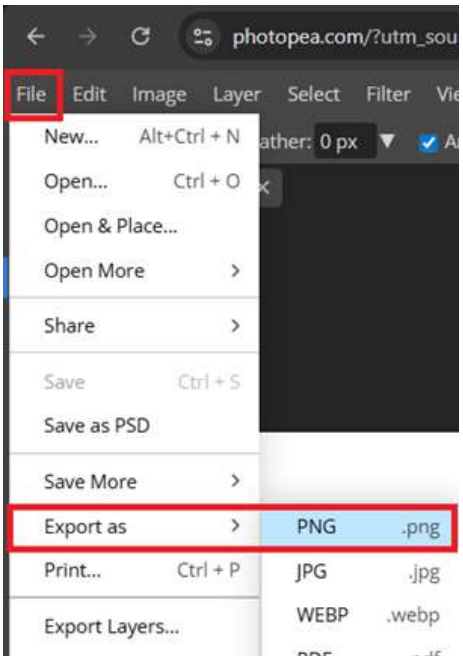


Figure 6 Export path in Photopea

STEP 2: 3D MODEL GENERATION (TRELLIS)

WHAT IS TRELLIS?

Trellis is **an AI-based web application that generates 3D models from one or more input images**. To use the 3D model generation tool, go to https://huggingface.co/spaces/Trellis-community/Trellis. The web app interface will open.

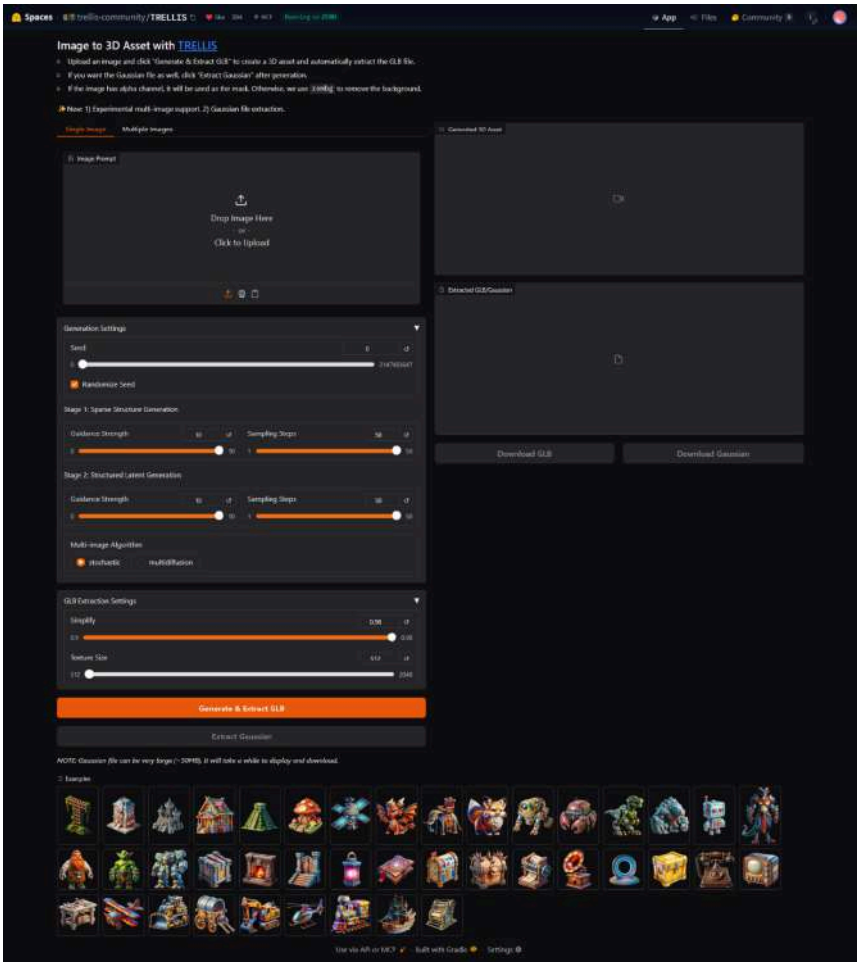


Figure 7 Trellis web interface

WATCH THE DEMO VIA THIS LINK: 3D MODEL GENERATION (TRELLIS)

UPLOADING YOUR IMAGE(S) AND CONFIGURATION

1. **Open Trellis** in your browser.

2. **Upload one or multiple images** that need to be computed for 3D model creation.
   - Do this in the left upper section 'Image prompt' of the interface. (figure 7)
   - You can drag and drop images, or by uploading them from your computer.
   - If you opt to compute multiple images, select the **Multiple images tab.** Keep in mind that this is an experimental feature and may not always provide the expected results.

Figure 8 Trellis upload screen

3. **Configure Generation settings**:
   - Do this in the middle section on the left. (figure 7)

GENERATION SETTINGS

- **Seed:** The "seed" value establishes a random configuration for the 3D model generation.

For the other parameters it is better to **stick to the following values,** so the model can be generated following the input images as faithfully as possible. The general guideline is that the higher the value set for each parameter, the less room for free interpretation by the A there will beI.

- **Stage 1: Sparse Structure Generation**
  - Guidance Strength: 10
  - Sampling Steps: 50
- **Stage 2: Structured Latent Generation**
  - Guidance Strength: 10
  - Sampling Steps: 50
- **Multi-image Algorithm:** Stochastic

4. **Configure GLB Extraction settings**
    - Do this in the bottom section on the left. (figure 7)
    - These settings allow you to set the parameters for saving the 3D model, with the option to save it in .GLB or Gaussian (.PLY) format. **The Gaussian PLY (Polygon File Format)** is a technology that uses points instead of traditional polygons to represent 3D models. It enables a lighter, more detailed, and dynamic representation of materials, textures, and reflections.

GLB EXTRACTION SETTINGS

- **Simplify: 0.98**
- **Texture Size: 512**

Important: Depending on the degree of fidelity desired compared to the input images, the parameters are set accordingly: if the goal is to obtain a model that adheres as closely as possible to the input images, the parameters should be set to the maximum; conversely, if the AI Tool is preferred to have greater freedom of interpretation, the parameters can be set to intermediate values or to the minimum.

3D Model creation and export

1. Click **Generate & Extract GLB** to start the model creation process. Wait for the mesh to calculate.
2. **The model is displayed** in the Generated 3D Asset section (as a panoramic video; upper right section, see figure 7) and in the Extracted GLB/Gaussian section (as a real-time view; lower right section, see figure 7).
3. **Click Download GLB** to export the resulting model.

Tip: Using multiple images improves accuracy but may produce inconsistent results depending on quality.

Step 3: Fixing the 3D model (Blender)

The model calculated by the AI Tool, in most cases, never turns out as expected: there are always imperfections resulting from an erroneous interpretation by the AI or objects that could not be eliminated during the cleaning phase of the images supplied as input to the Tool. It is therefore necessary to manipulate the generated object in order to eliminate everything that is not necessary and leave only the desired object. However, often eliminating these artifacts creates gaps that must be rebuilt from scratch, creating vertices, edges, and faces.

To fix the object, the 3D object manipulation software Blender is used.

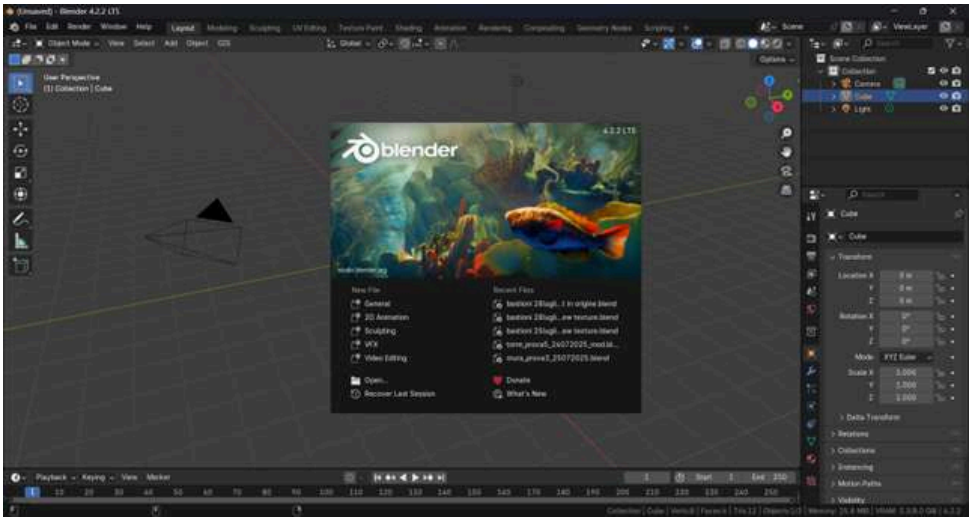


Figure 9 Blender web interface

What is Blender?

Blender is a free, open-source 3D software used for editing, cleaning, and optimising 3D models.

📺 Watch the demo via this link: FIXING 3D MODELS (BLENDER)

Basic commands in blender

Once installed, the software welcomes the user with an introductory screen that allows them to select the interface language, choose a tool preset, view recently opened files, and open the file browser to select an existing file.

Key	Function
Left Mouse Button (LMB)	Select an object in the scene
SHIFT and LMB	Select multiple objects
LMB and drawing a window from left to right	Select all the objects inside the selection window
Right Mouse Button (RMB)	Open the context menu
Middle Mouse Button (MMB)	Orbit View
SHIFT and MMB	Pan View
CTRL and MMB	Zoom View

Mouse Wheel	Zoom View In or Out
X	Delete the selected item with a confirmation dialog.
Del or Canc or Delete	Delete the selected item without a confirmation dialog.
M	Merge objects/vertices/edges/faces
TAB	Switch Object/Edit Mode
G	Grab the selected object

How to import the 3D model?

1. **Delete any preexisting models** in Blender before import.
    a. Select the existing objects while holding down SHIFT, or by clicking on the models or selecting them by dragging.
    b. Press DELETE on your keyboard.
    c. You are left with an empty scene with the Cartesian X (red) and Y (green) axes.

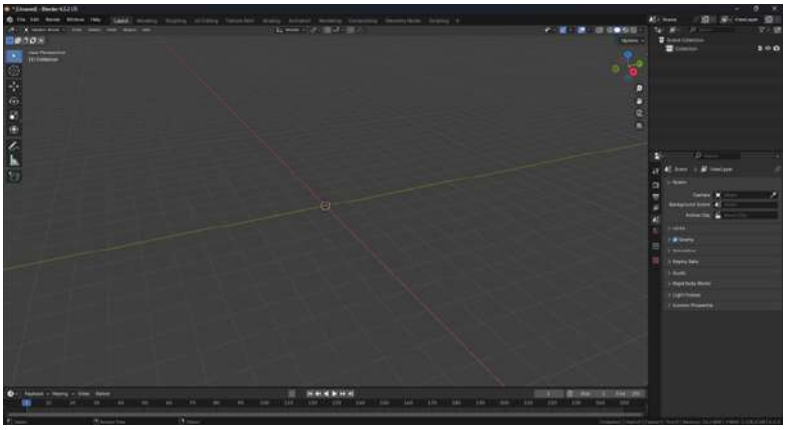


Figure 10 Empty scene in Blender

To import a model

1. **Click File → Import → select file type**
    a. Models from Trellis have a .GLB extension. **Choose glTF 2.0 (.glb/.gltf)**.
2. **Select** your generated model and **click** Import glTF 2.0.

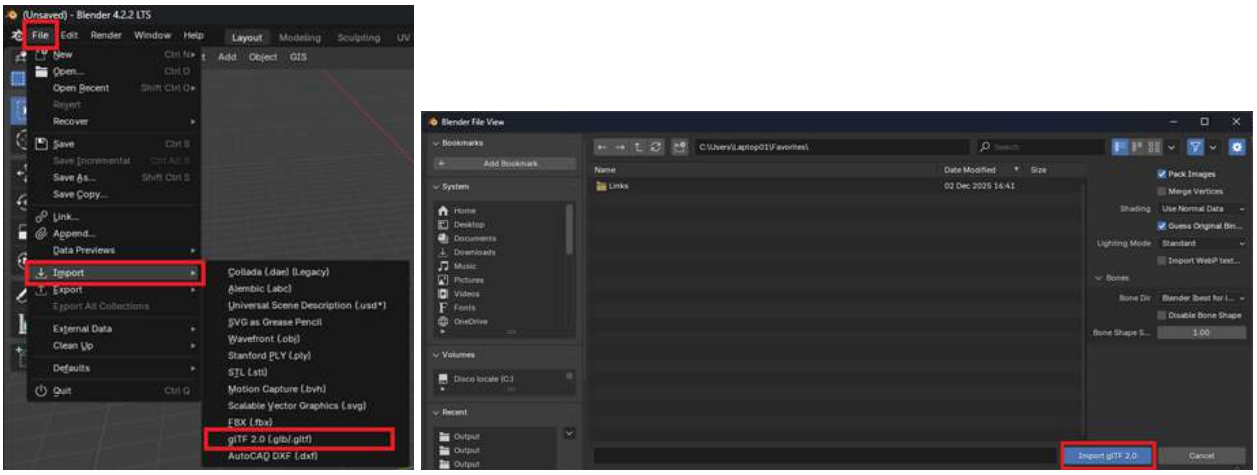


Figure 11 Import path in Blender

How to clean the mesh?

Remove unwanted geometry

1. **Select** the object.

2. Enter **Edit Mode** (press TAB on keyboard).
    a. In Edit Mode, to the right, there are 3 buttons: **the selection filter** with **Vertices, Edges and Faces respectively.**

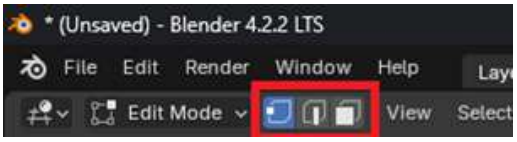


Figure 12 Filters in edit mode in Blender

    b. These allow you to manipulate, create, and delete vertices, edges, and faces.
3. Select the **filter 'vertices'.**
4. **Select the vertices in the 3D model that need to be deleted.**
    a. Hold down the **SHIFT** key on the keyboard for multiple selections.
5. Press the **DELETE** key on the keyboard.
    a. This will leave gaps that will be filled in during the next step. Figure 13 below is an example of error deletion.

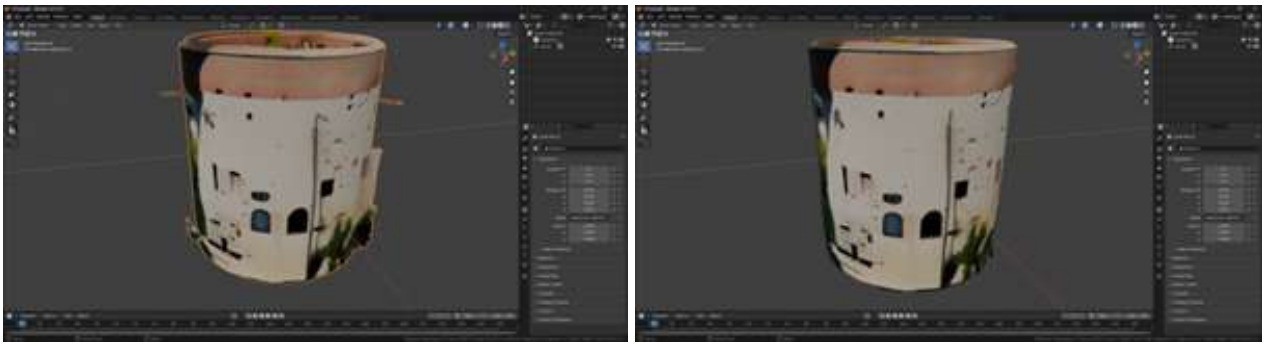


Figure 13 Example of error deletion

Close gaps

When eliminating errors resulting from the 3D generation process, it often happens that some of the eliminated faces belong to the surface of the object in question. **Removing the faces leaves gaps that can be restored without affecting the overall shape of the object.**

1. Select the 3D model
2. Enter **Edit mode**
3. Select **Vertices filter**

4. Select the three vertices of the gap
5. **Press F** on your keyboard to create a polygon
6. Repeat for the other gaps

Tip: When two or more vertices are too close to each other, you can merge them by pressing the M key on the keyboard. Pressing M opens a context menu that allows you to determine how the vertices are merged.

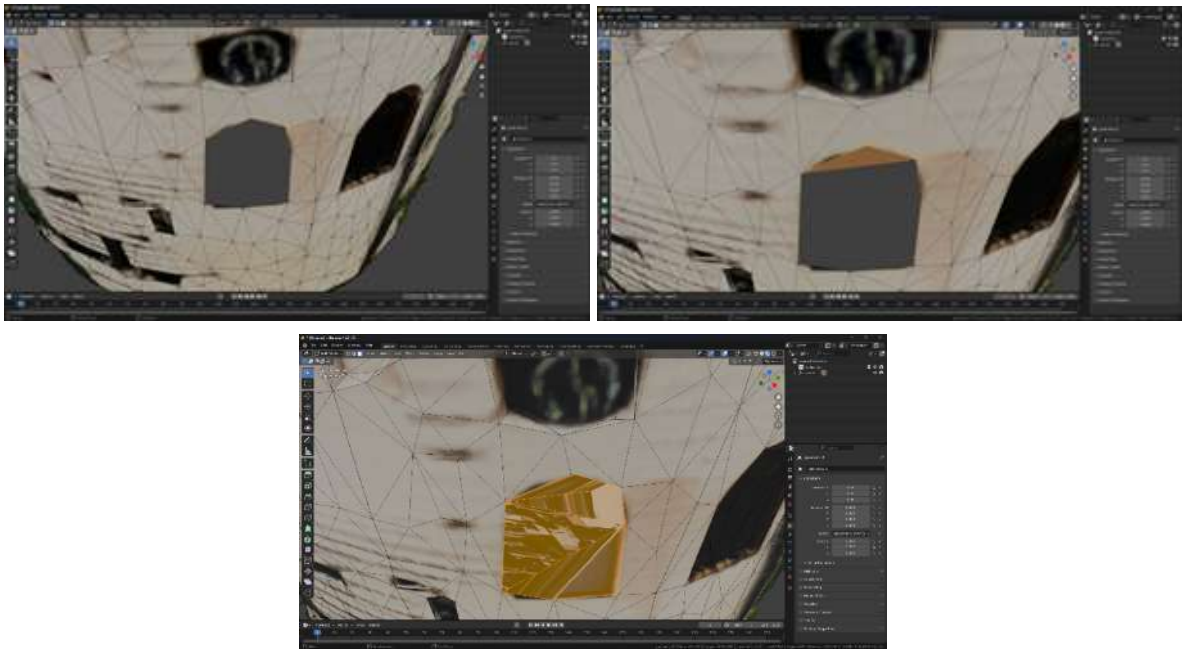


Figure 14 Example of closing gaps in Blender

Important: The texture will appear out of place; this is because the existing texture mapping is based on the mesh generated by Trellis. Once surface reconstructions are performed on the mesh, the reference to the existing mapping is lost. However, this isn't a problem, as the texture will be replaced later and the mapping will be done manually again.

Moving or merging vertices

Deleting a face may also leave vertices without any connection to other vertices. Furthermore, you may want to reduce the number of polygons of the generated model by eliminating excessively small ones and reconstructing them by joining their vertices to others belonging to other polygons. It is therefore necessary to intervene on individual vertices. Vertices are moved as with any other object in the scene, provided you first enter Edit Mode.

1. **Select Vertices filter**

2. **Move vertices**
    a. Select the vertex you want to move
    b. Press the G key on your keyboard to begin the movement
        i. You can constrain the movement along one or more axes after pressing the move key: click the X, Y, Z keys on the keyboard to move the elements along a single Cartesian axis or SHIFT+X, Y, or Z on the keyboard to move the elements on a plane.
3. **Merge vertices**
    a. Select the vertices you want to merge, by holding down SHIFT and clicking on the individual vertices.
    b. Press M (merge) on your keyboard.
    c. A context menu opens
        i. Choice a vertex merging mode

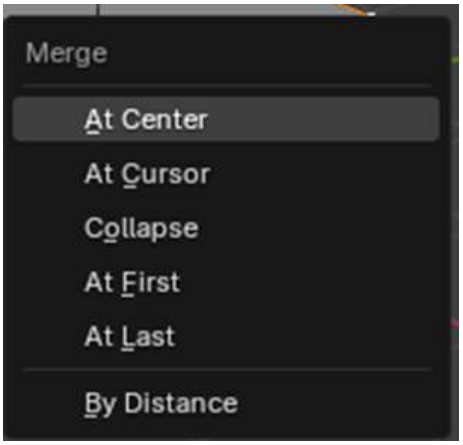


Figure 15 Context menu for merging vertices

Step 4: Texture preparation (Photopea)

During model generation, Trellis is able to create a texture from the photos it receives as input. If only a single photo is provided, Trellis interprets the missing information using the database of photos used for training. When multiple images are provided, the AI tool attempts to interpolate all the information to meet the reliability parameter settings set before generation. Sometimes, however, the texture content is generated arbitrarily, and the resolution is not high enough to be considered optimal in most cases. It is therefore necessary to create a texture manually from locally available images.

The main operations involved in creating the texture are:

- compositing multiple images,
- eliminating unnecessary details,
- straightening to correct perspective aberration,
- balancing brightness and contrast.

📺 **Watch the demo via this link: TEXTURES PREPARATION (PHOTOPEA)**

Import images for texture

1. Open Photopea
2. Import images into Photopea
    a. Select 'Open from computer'
    b. Select the image you want to modify

Tip: Use an image taken as close to the object as possible, so as not to lose details.

Image cleaning

1. Select the area you want to clean
    a. You can use Rectangular selection, Lasso selection (normal, polygonal, magnetic) or Magic Wand selection.
2. Press **DELETE** on your keyboard to delete the selected area
3. To fill in the empty area
    a. Option 1
        i. Right click on the selection
        ii. Choose 'Fill'. It will open a dialog window to select the filling method
        iii. Choose 'Content aware'

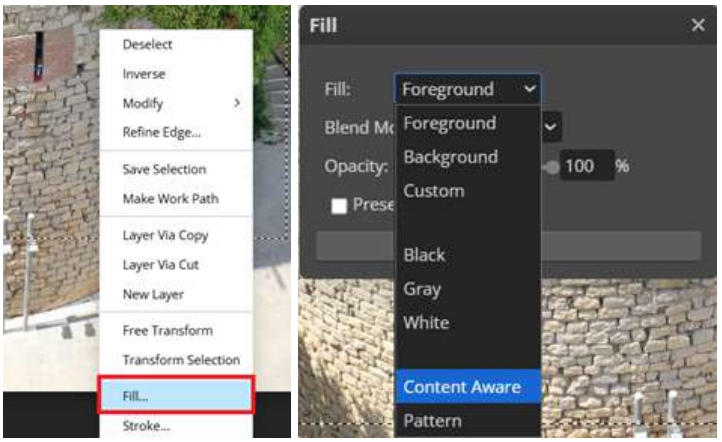


Figure 16 Filling method in Photopea

b. Option 2: the Clone tool

i. Select an existing part of the image you want to copy
ii. Select the Clone tool
iii. Copy the content to the empty area you first cleaned.

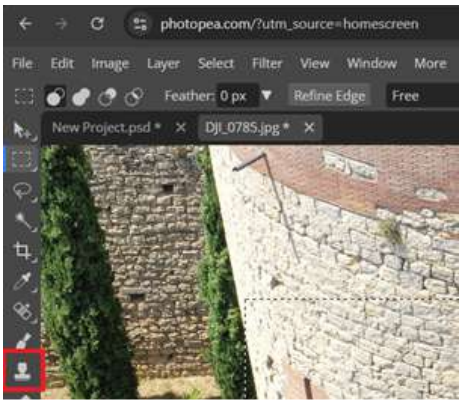


Figure 17 Clone tool in Photopea

Straightening for perspective aberration correction

In some cases, such as when taking a photo of a tower, the image appears distorted due to the curvature of the tower itself. Since it isn't a flat surface, it's not possible to use the photo as a basis for creating a texture. It's therefore necessary to straighten the image to obtain a "flat" image that can be used as a texture. The first step involves isolating a section of the photo where the shooting point is perpendicular to the surface of the tower.

1. Use **the Trim tool**.
2. **Crop the image**.
    a. The crop should result in an image with a 1:1 aspect ratio, preferably.
3. Isolate the section deemed suitable for creating the texture.

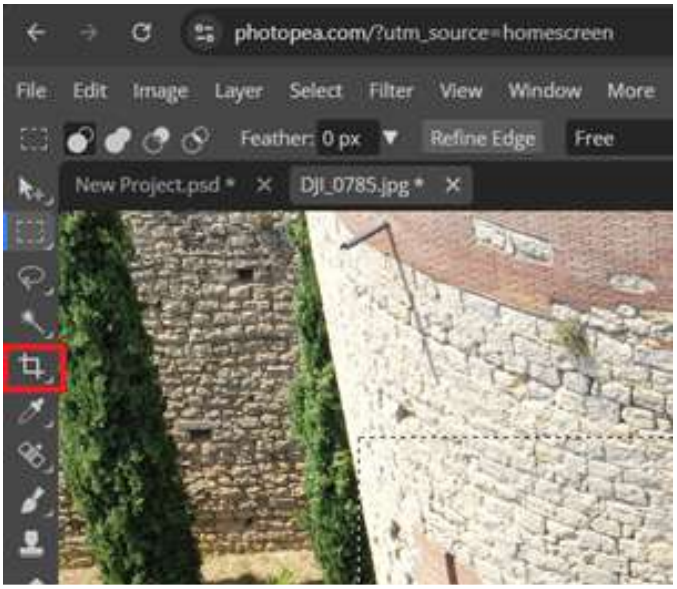


Figure 18 Trim tool in Photopea

Figure 19 Crop for texture with 1:1 ratio in Photopea

4. Now **straighten the photo** to obtain a flat texture
    a. Go to **Edit** → **Transform** → **Warp tool**.
        i. The image will be surrounded by squares and dots on the edges of the image
    b. **Drag the grips** to straighten the image

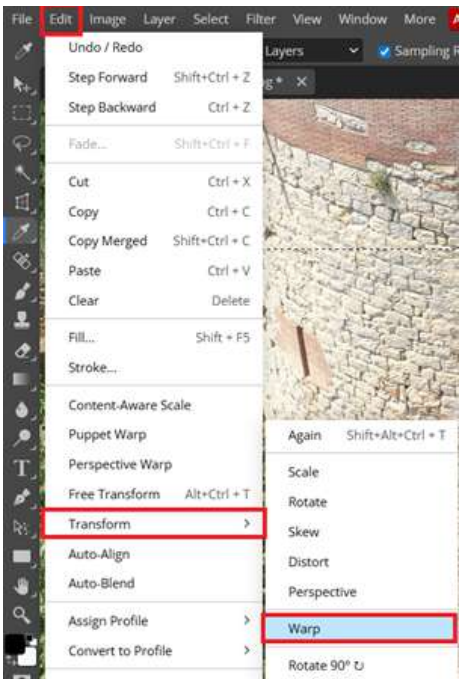


Figure 20 Warp tool in Photopea

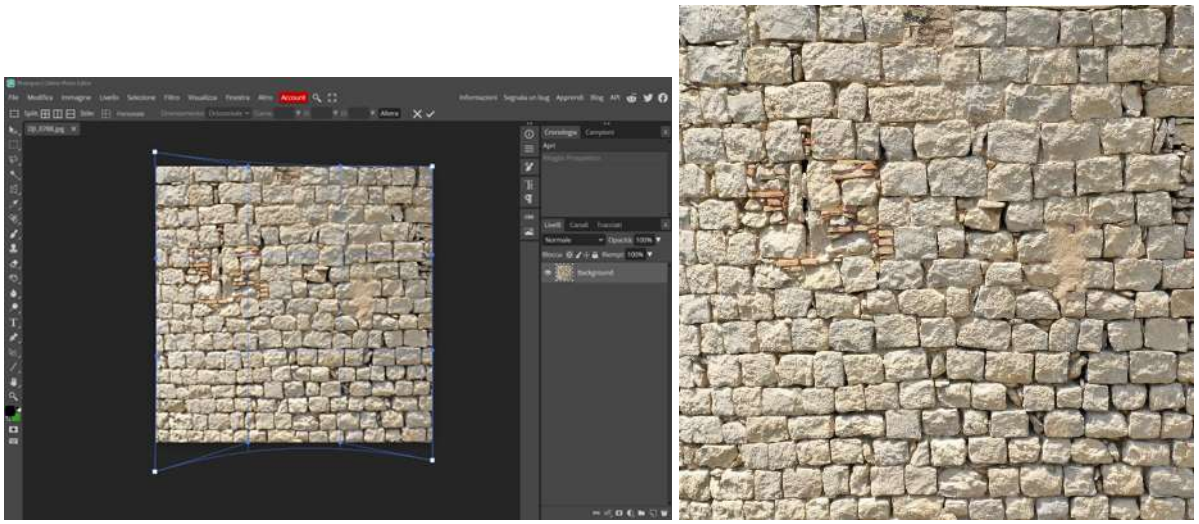


Figure 21 Left: before straightening. Right: result after straightening in Photopea

Brightness and contrast

The image you just obtained, may have lighter or darker areas due to shadows or uneven sunlight. This causes the appearance of cuts, even abrupt ones, when applying the texture to the final object. To prevent this behavior, the texture must be modified to make the brightness and contrast uniform.

1. Go to **Image** → **Adjustments** → **Brightness/Contrast…**
2. **Adjust brightness and contrast**
3. Click '**OK**'

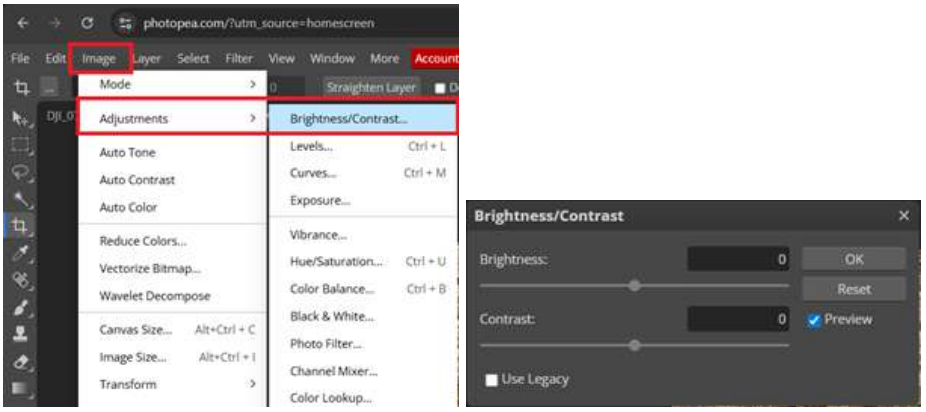


Figure 22 Path to adjust brightness and contrast in Photopea

CREATE SEAMLESS TEXTURES

In the previous step, a texture was created that can be repeated multiple times across the entire surface. However, this repetition can cause visible sharp cuts that break the surface's continuity, making the model unrealistic. **To create a seamless texture from an image, you must first translate it horizontally and vertically to see how repetition can affect the final result.**

1. Go to **Filter** → **Other** → **Offset**…

2. Move the image horizontally and vertically by an amount equal to half the resolution.
    a. To know the image resolution, go to **Image** → **Image Size** and note the resolution.

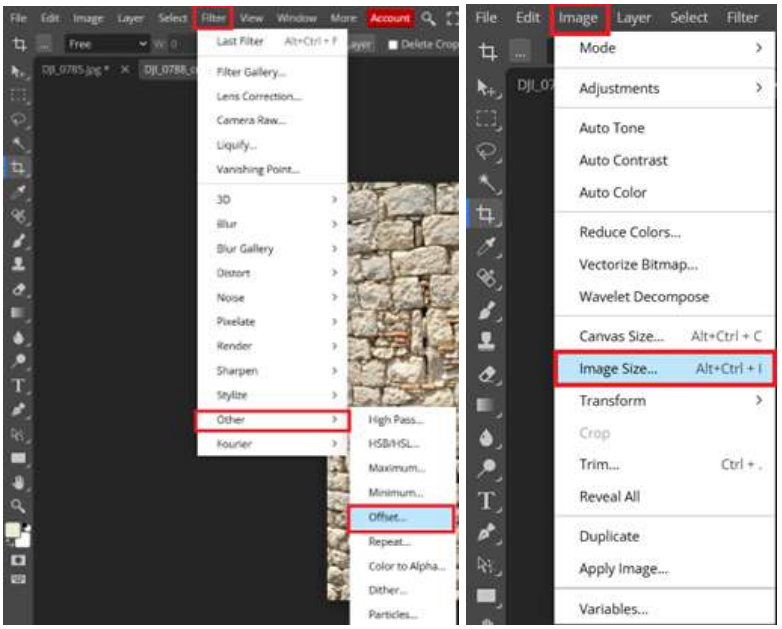


Figure 23 Left: path for offset. Right: path to retrieve image size in Photopea

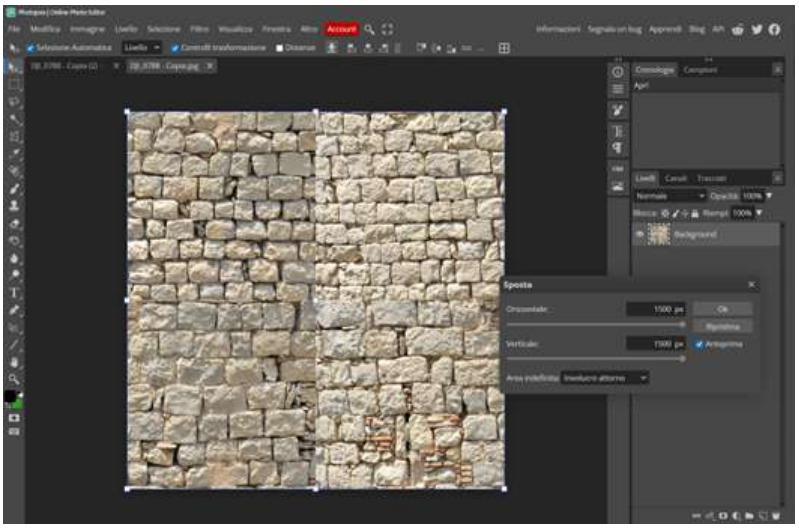


Figure 24 Offset command in Photopea

By performing the **Offset command**, you may notice that the connection between one repetition and the next has discontinuities. Once you confirm the move, **you must then adjust each image in the repeated areas, proceeding as described above in the Image Cleaning section.**

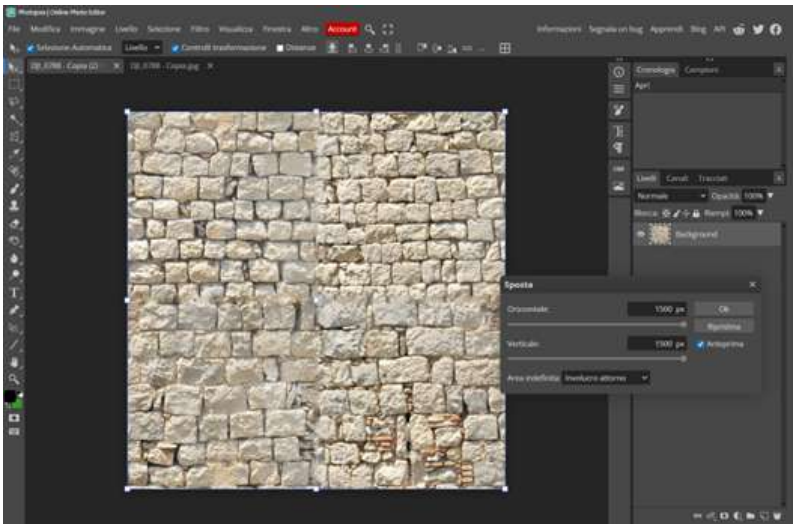


Figure 25 Offset command in Photopea

Once you've fixed the seams between each repetition, you can reset the image's positioning with the **Filter → Other → Offset command** and move the image horizontally and vertically by an amount equal to half the resolution in negative value. So considering the same image, you need to move it horizontally and vertically by -1500 pixels.

TEXTURE EXPORT

To export the texture, click **File → Export As... → PNG**

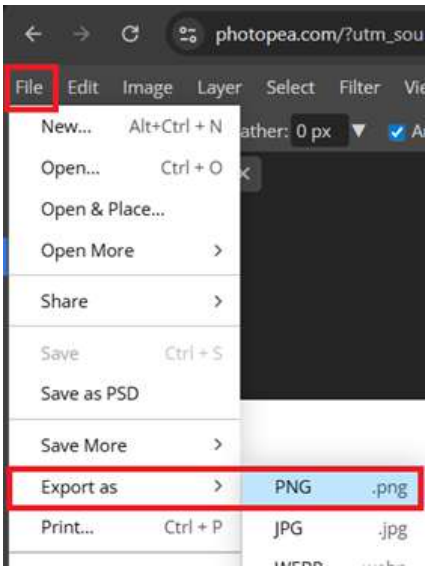


Figure 26 Export path in Photopea

Step 5: Apply the texture to the 3D model (Blender)

The final step involves applying the newly created texture to the model obtained previously after the mesh cleaning operations. The application that allows you to perform this operation is once again Blender. **After opening a new project and deleting the default objects from the scene**, you need to import the model to which you want to apply the texture.

> Watch the demo via this link: APPLYING TEXTURE TO THE 3D MODEL (BLENDER)

Import the 3D model

1. Go to '**File'**
2. Select '**Import'**
3. Select the file type
    a. Models output to Trellis have a .GLB extension, so you need to select **glTF 2.0 (.glb/.gltf)**.
4. Choose the desired file from your browser
5. Select **Import glTF 2.0**.

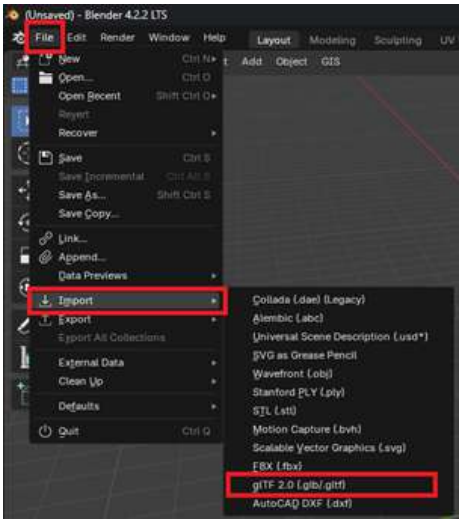


Figure 27 Import path in Blender

Material creation and texture import

1. Select **the Material view mode** in the right sidebar
    a. The model generated by Trellis already has a material with an assigned texture. You can edit the existing material or delete it and create a new one.
2. Expand the **Surface section**
3. Click the arrow next to the Base Color entry
    a. Under Base Color you will see that a texture has already been assigned. This is the one assigned by Trellis during the 3D model generation.
    b. To replace it with the one created with the previous step, **click the cross on the left next to the file name**. The display will now change.
4. Click '**Open**' to open the file browser that allows you to load the texture you created in Photopea.

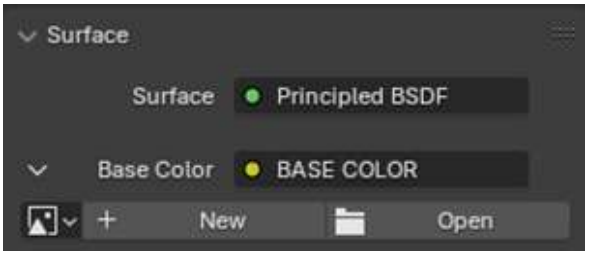


Figure 28 Material view mode in Blender *Figure 29 Surface section in Blender*

5. Click '**Open image**'.
    a. It is immediately applied to the entire model, but not uniformly, as you can see below.
    b. To solve this problem, you need to perform a correct UV mapping, which is described further in this manual.

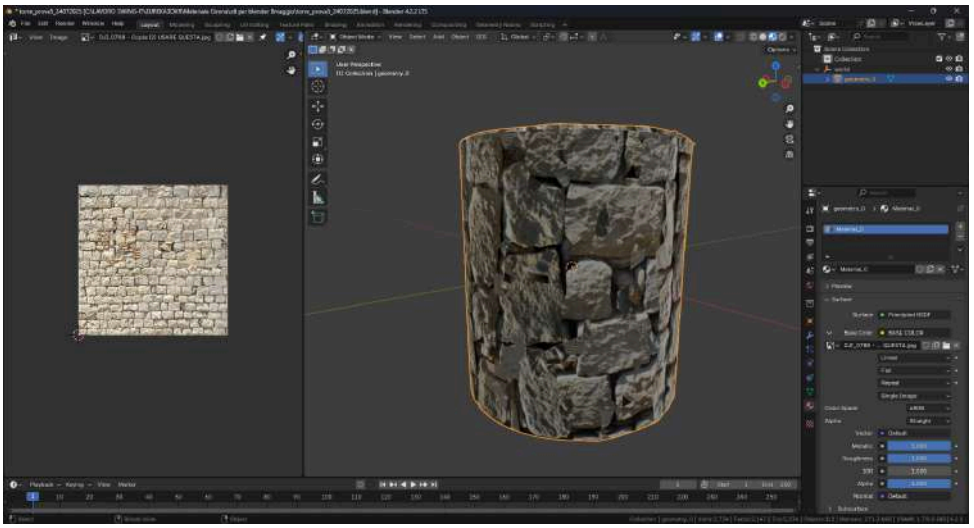


Figure 30 Result after uploading a new texture file

6. If your object must be opaque, set the value of the Metallic parameter to 0 (the default setting is 1).

Applying textured material and correct positioning

Once you have created the material and adjusted its parameters (such as roughness, gloss, or colour), you can apply it either to the entire mesh or to selected parts of the model. By default, a material is assigned to the whole object, but this can be refined depending on your needs.

If you only want the material to affect specific areas:

1. Select the model
2. Go to **Edit Mode**
3. Use the Faces filter to select all faces you want to assign the material

4. In the Material tab: select the desired material and click 'Assign'.

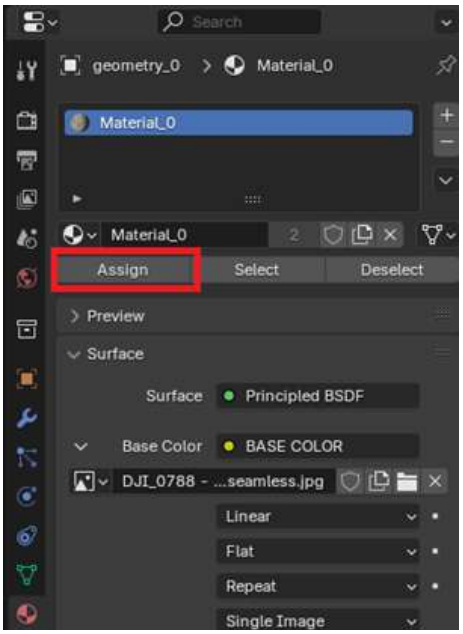


Figure 31 Assign a Material to a face

Note: The texture will be displayed incorrectly, as it needs to be mapped, which is described in the next step.

UV mapping

UV mapping is necessary to tell Blender how to distribute the texture across the model's surfaces. When calculating the model, Trellis can map the texture that is generated concurrently; changing the texture doesn't always mean the same mapping can be used.

Take a look at this example

You may notice that the texture you want to assign fills each polygon randomly. Since this isn't what you're looking for, you need to recalculate the mapping so that the texture is applied to the entire model in an orderly fashion, rather than to individual polygons.

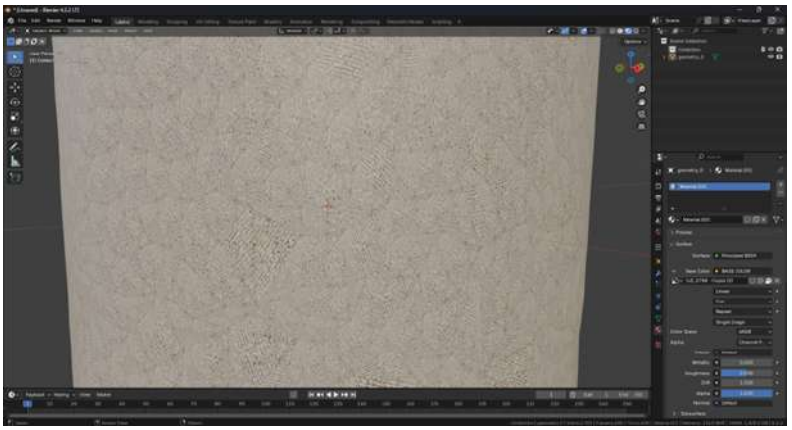


Figure 32 Example of a misaligned texture an a model before UV mapping

For UV Mapping

1. Enter **Edit mode**
2. Set the **Face filter** 

3. **Press 'A'** on your keyboard to select all faces
4. Click right to open the context menu
5. Select **'UV Unwrap Faces'** → **'Unwrap'**

This way, the entire surface of the model is wrapped around the texture.

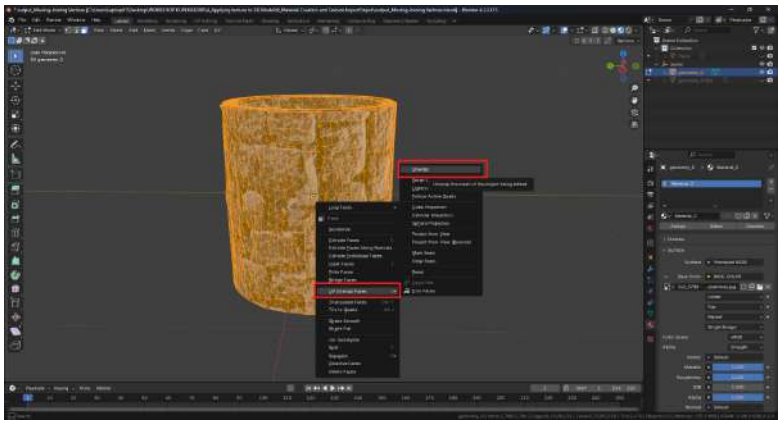


Figure 33 Context menu for unwrapping the model

From this point, you can intervene in two ways:

Option 1: if the object has a complex volume

1. Right click with all faces selected
2. In the context menu select **UV Unwrap Faces** → **Smart UV Project**

It cuts the mesh based on an angle threshold (angular changes in your mesh). This gives you fine control over how automatic seams are created. It is a good method for simple and complex

geometric forms, such as mechanical objects or architecture. This algorithm examines the shape of your object, the faces selected and their relation to one another, and creates a UV map based on this information and settings that you supply.

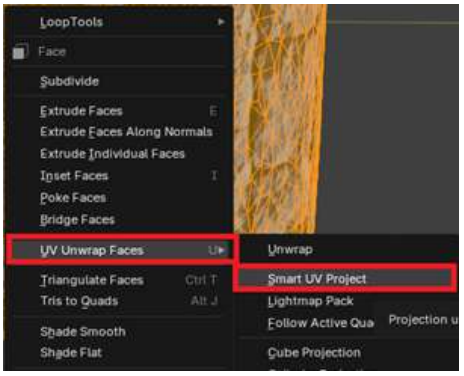


Figure 34 Smart UV Project

Option 2: if the object has a regular shape (cube, cylinder, sphere)

1. Right click with all faces selected
2. In the context menu select **UV Unwrap Faces → Cube/Cylinder/Sphere Projection**
    a. This way, a mapping already adapted to the shape is applied.

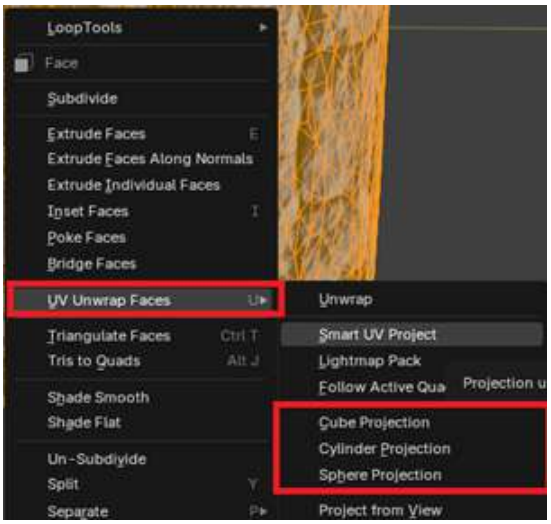


Figure 35 Cube/Cylinder/Sphere Projection

Exporting the final model

The final step is to export the newly created model in a format compatible with the EUreka3D-XR Project tools.

1. Select the 3D model
2. Click **File → Export → glTF 2.0 (.glb/.gltf)**

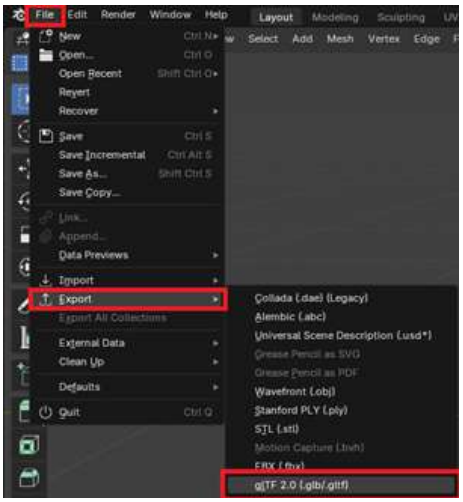


Figure 36 File export path

Important: Inside the file browser it is important to expand the Include section drop-down menu and check the Limit to Selected Objects option, otherwise objects outside of the one of interest could be exported.

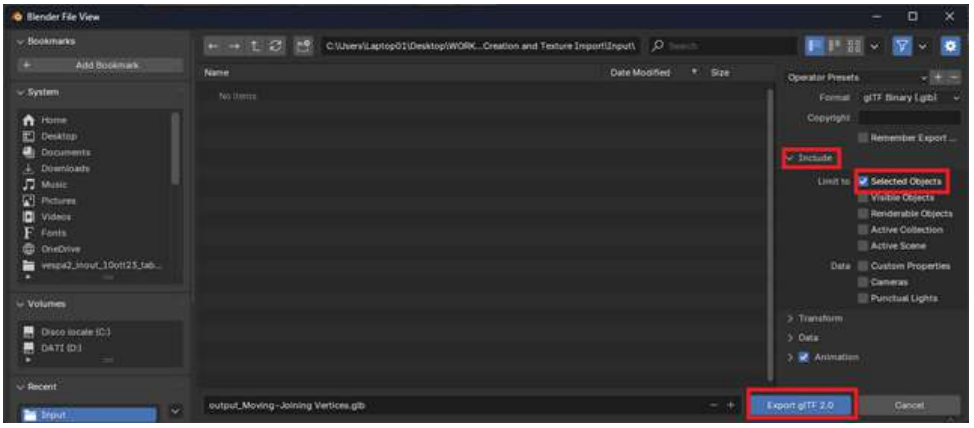
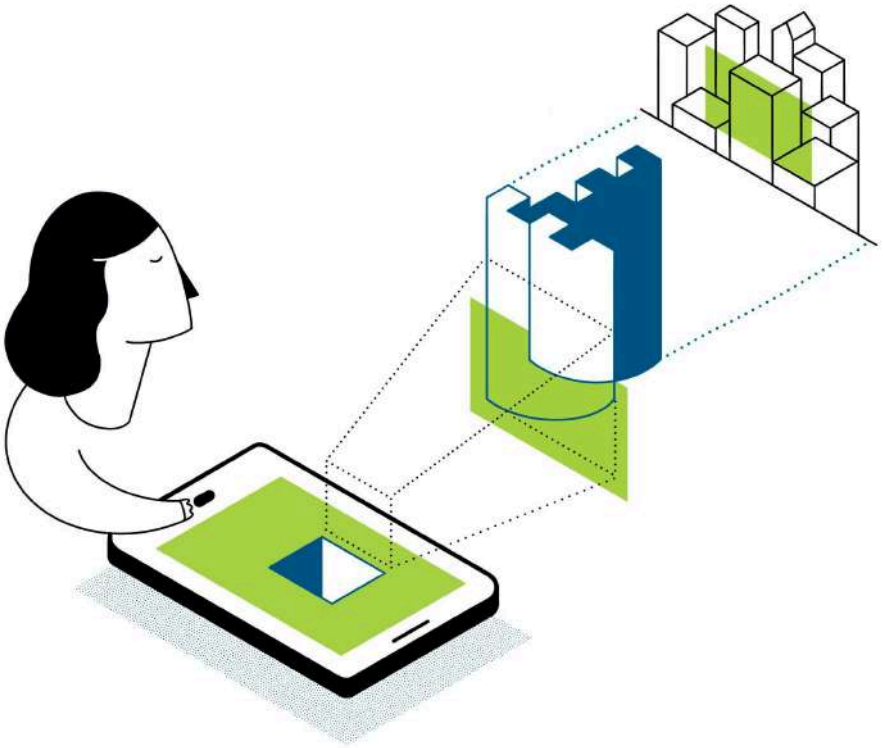


Figure 37 File browser for export

Co-funded by the European Union



3D XR Studio

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Version and date:

V1.0, 16/04/2026

TABLE OF CONTENTS

1. Introduction

This step-by-step guide explains how to use the 3D XR Studio, a web-based authoring platform for creating immersive XR experiences. It is designed specifically for cultural heritage professionals and curators who want to bring history to life for their audiences, without the need for advanced technical skills.

By following this guide, you will be able to:

- Create a new XR project in the 3D XR Studio web component
- Define a geographical area and import 3D models within it
- Design a guided tour with points of interest, narratives, and multimedia
- Fine-tune the placement of 3D models using the mobile component
- Share the experience with visitors on their phones via a downloadable app

This guide is intended for

- Cultural heritage professionals, archivists and museum curators
- Researchers involved in digital heritage projects

Before you start you will need

- A computer with a web browser
- Valid credentials to access the 3D XR Studio (compatible with the EGI Single Sign-On)
- Your 3D models ready (GLB format recommended), along with any images, videos, or audio files you wish to include
- A smartphone (compatible with Google ArCore) if you plan to use the on-site fine-tuning functionality via the mobile component

Preparation of your materials and workspace

Before opening the 3D XR Studio, prepare the following materials:

- **3D Models**: Export them in GLB format. Optimise polygon count for mobile rendering.
- **Images**: JPG or PNG files to be used as information panels or decorative elements.
- **Audio files:** most common formats, for narration.
- **Video files**: most common formats, short clips (keep file sizes reasonable for download).

2. Overview of the workflow

Step 1 – Plan	Select your media assets and decide the scope of your XR experience (which area, which 3D models, which narrative).
Step 2 – Create	Log in to the web component, create a new project and configure the area on the map.
Step 3 – Build	Import 3D models, place them in the virtual environment, and set coordinates, orientation, and scale.
Step 4 – Narrate	Define the guided tour route by placing path points. Add points of interest and associate media to each of them (text descriptions, audio, video, images).
Step 5 – Totem	Set up physical totems with QR codes at the site.
Step 6 – Refine	Use the mobile component on-site to fine-tune model placement and validate the experience in Augmented Reality.
Step 7 – Visit	Visitors download the app, scan the QR code, and enjoy the AR experience.

3. Step-by-step guidelines

3.1 Prepare your assets

STEP 1	**Gather and Organise Your Media** Collect all content before opening the tool.

Before accessing the 3D XR Studio web component, prepare the following materials:

- **3D Models**: Export them in GLB format. Optimise polygon count for mobile rendering (for an AR application is a good practice to use less than 30.000 polygons).
- **Images**: JPG or PNG files to be used as information panels or decorative elements.
- **Audio files**: most common formats, for narration.
- **Video files**: most common formats, short clips: keep file sizes reasonable for streaming, considering that the wifi is not guaranteed, it is a good practice to upload video in a 720p resolution (1280x720).

3.2 Log in to the web component

STEP 2	**Authenticate and Access the Dashboard** Use your institutional credentials.

1. Open your browser and navigate to the 3D XR Studio web component URL.
2. Click Log In and authenticate using the EGI Single Sign-On (SSO) mechanism
3. Once logged in, you will land on the main Dashboard, where all your environments are listed.

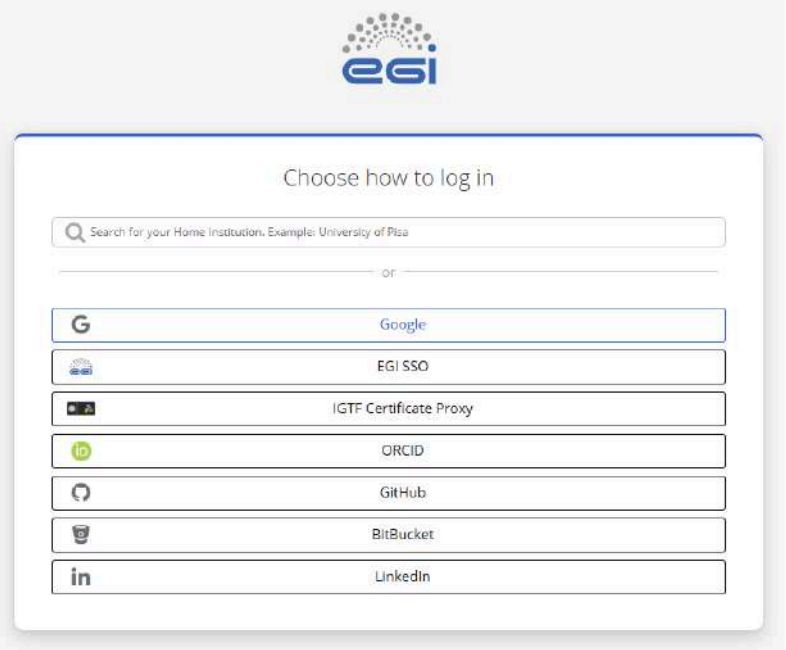


Figure 1 EGI Single Sign-On (SSO)

3.3 Create a new environment

STEP 3	**Set Up Your XR Experience Environment** Define the basic parameters of your experience.

1. From the Dashboard, click **Create New Environment**.
2. Enter a descriptive name for your environment (e.g., "Ancient City Walls AR Tour").
3. Specify Longitude and Latitude of the geographical area visible on the world map.
4. Fill the eight input field boxes defining the borders of the area within which the XR experience will take place.

5. Click Save Changes to confirm. A blue shape will highlight the borders of the area available for the next steps.

Figure 2 Input screen for editing environments

3.4 Import and position 3D Models

STEP 4	**Add 3D Models to Your Scene** Place and orient models within the virtual environment.

1. Add 3D Objects in the library.
2. Insert them in the scene.
3. The models will appear in the 3D scene.

Once a model is in the scene, position it precisely:

- **Set Coordinates:** Enter latitude, longitude, and altitude to position the model geographically.
- **Set Orientation**: Adjust the rotation (x, y and z axis) so that the model aligns correctly with its physical counterpart.
- **Set Scale**: Resize the model to reflect real-world dimensions or the desired visual effect.

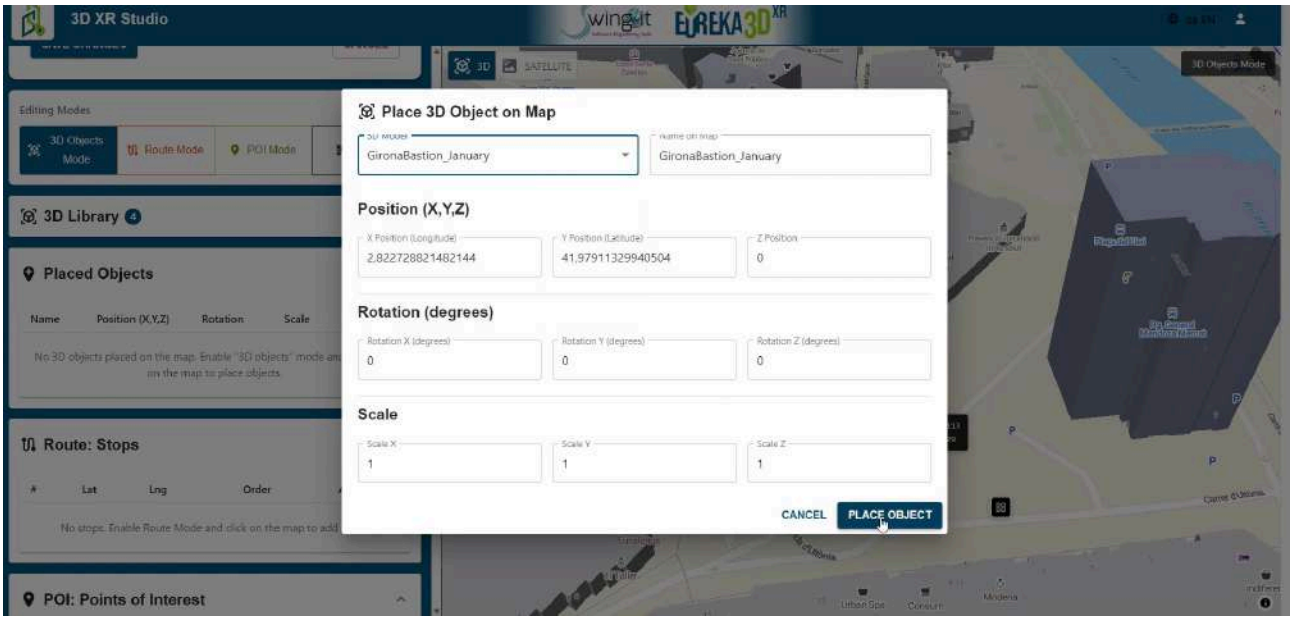


Figure 3 Input screen for positioning 3D models

> 💡 Tip: Iterative Fine-Tuning
> *Do not worry about achieving perfect placement at this stage. You will have the opportunity to fine-tune all model parameters on-site using the mobile component (Step 7).*

3.5 Create the guided tour route

STEP 5	**Define Path Points and Points of Interest** Structure the narrative journey for your visitors.

PATH POINTS

1. Click on the map to place Path Points. These define the suggested walking route for visitors.
2. Add, delete, or move points by clicking on them and using the edit controls.

POINTS OF INTEREST

1. Identify locations where you want visitors to stop and engage.
2. Click on the map to place Points of Interest (POIs).
3. For each Point of Interest, you can associate the following content:

    - Title and descriptive text (displayed as an information panel)
    - Audio narration: plays automatically or on tap
    - Images: displayed in a gallery
    - Video clips

Figure 4 Overview of route stops

3.6 Set up physical totems and starting points

STEP 6	**Anchor the AR Experience in the Physical World** Define where visitors begin their journey.

The 3D XR Studio uses **physical totems** — printed panels placed at the site — as real-world reference. Visitors use these totems to initialise the AR experience.

1. You can edit the correct placement for each totem in the map.
2. For each physical totem, put the correct QR code on it.

> 💡 How Visitors Use the Totem
> *When a visitor reaches a totem, they scan the QR code, download the app (if not already installed), and hold their phone next to the totem. The app uses the totem as a spatial anchor to calibrate the AR scene — no internet connection is needed once the initial download is complete.*

3.7 Finetune with the mobile component

STEP 7	**On-Site Refinement Using AR** Use the curator view of the mobile component to perfect model placement.

The mobile component has a dedicated **Curator Mode** that allows you to adjust 3D models in real time, directly in the field.

1. Install the 3D XR Studio mobile component on your smartphone: https://3dstudioxr.eureka3dxr.fedcloud.eu/download
2. Log in with your curator credentials.
3. At each totem location in the real world, initiate the AR scene by scanning the QR code.
4. In Curator Mode, you can:
    - Select any 3D model and adjust its position, scale, and rotation in real time
    - Add visual occlusions to make models appear correctly behind real-world elements
    - Add, move, or delete Path Points along the tour
    - Preview what the visitor experience will look like from a visitor perspective
5. Save all changes: they are synced back to the web application automatically.

💡 Key Reminder
It is highly recommended to export 3D models in GLB format for best compatibility.
Optimise model file sizes before uploading to ensure smooth AR performance on mobile devices.
Test your experience on various smartphones.

3.8 Review

STEP 8	**Final Checks and Go Live** Validate your experience and make it available to visitors.

Finally run through this checklist:

- ☐ All 3D models are correctly positioned and scaled
- ☐ All Points of Interest have titles, descriptions, and associated media
- ☐ The tour route flows logically and whenever possible avoid areas with heavy traffic
- ☐ The totem are placed correctly with their attached QR codes
- ☐ You have tested the full visitor experience on a mobile device

4. The visitor experience

Once the experience is published and the totems are in place, visitors can engage with the AR tour as follows:

Step 1 – Find the Totem	The visitor locates a physical totem at the site, following on-site signage.
Step 2 – Download	The visitors follow the instructions on the totem in order to download the 3D XR Studio mobile component.
Step 3 – Calibrate	After opening the app, the visitors read the instructions inside the app.
Step 4 – Explore	The AR experience starts: 3D models appear overlaid on the real world, a suggested path is displayed, and audio/text/video media is accessible at each POI.
Step 5 – Navigate	The visitor follows the path, discovering each point of interest. The experience now works fully offline.

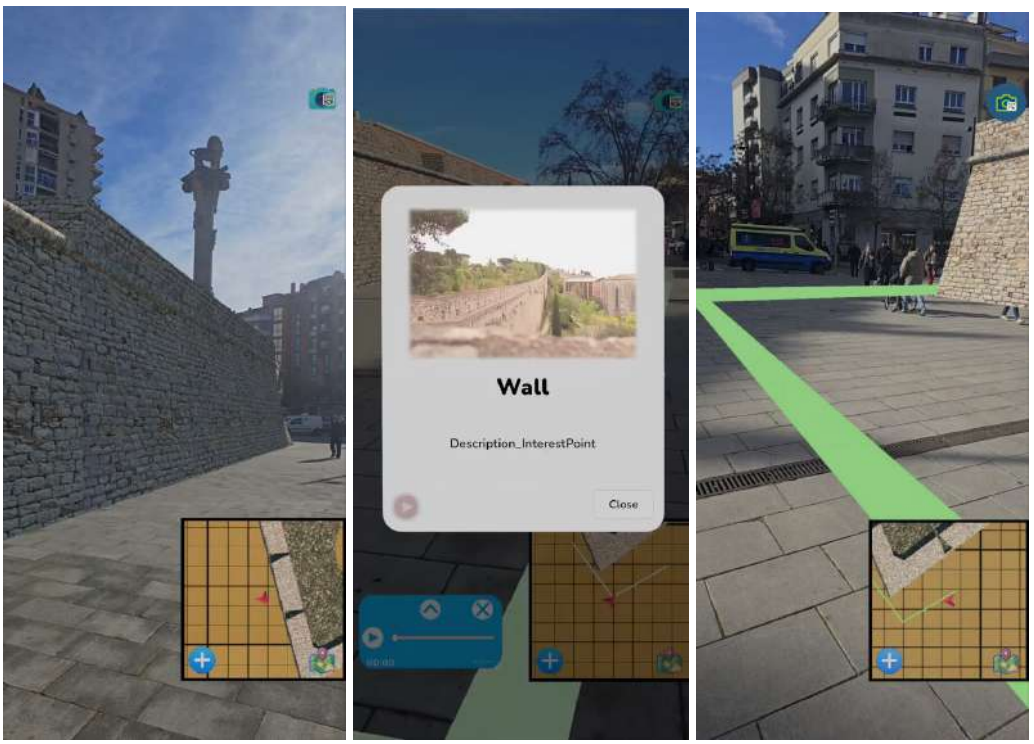


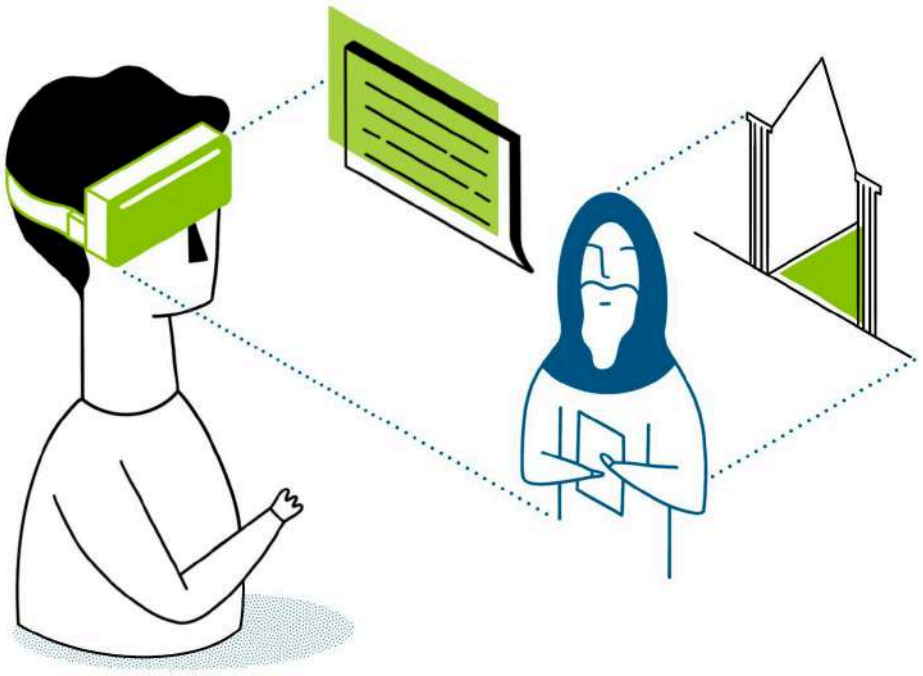
Figure 5 Visitor view on an AR experience

5. Help and more information

Should you encounter any issues or have any questions, please do not hesitate to contact Swing:It via email (info@softwareengineering.it). Further information, as well as the latest contact details, are available on the official website at swing-it.net.

EUREKA3D XR

Co-funded by the European Union



Avatar Builder

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Version and date: V1, 15/04/2026

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INTRODUCTION

This step-by-step guideline introduces **Avatar Builder**, a framework designed to help users create and animate 3D avatars for virtual experiences and for multiple visualisation platforms.

No prior experience in 3D modelling or animation is required. The guide focuses on **practical actions and clear instructions**, allowing curators, educators, and content creators to concentrate on storytelling and interpretation rather than technical complexity.

By following this guide, you will be able to:

- Create a digital human character
- Animate the character using pre-made motions
- Reuse the same avatar across multiple virtual platforms

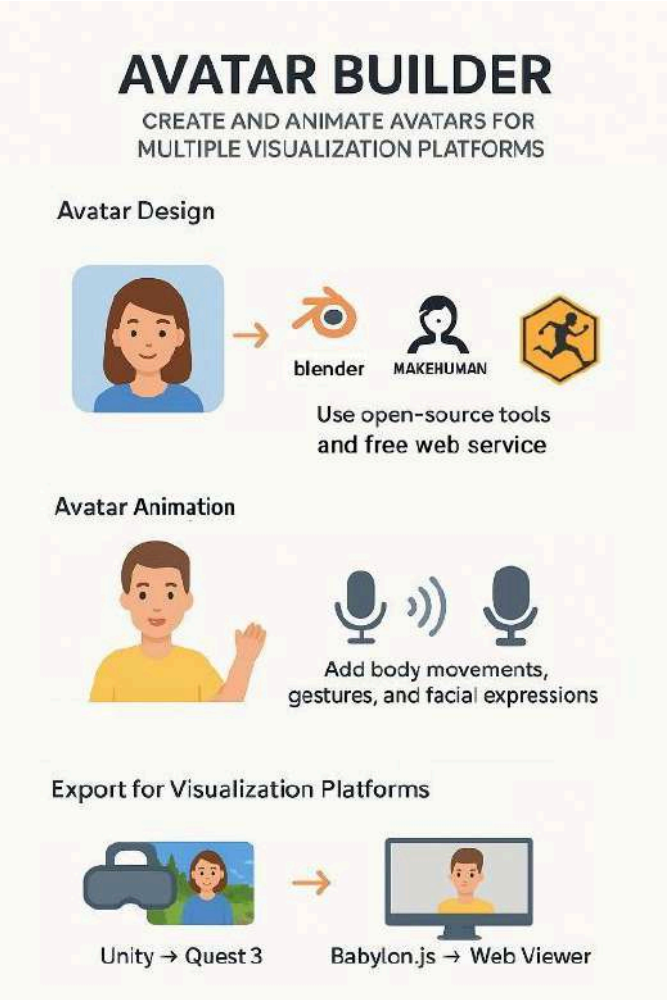


Figure 1 The framework

This guide is intended for

- Cultural Heritage Professionals
- Creative and XR professionals
- Or anyone else interested in creating digital characters for virtual experiences
- No programming skills or technical background are required.

Tools and software used in this guide

- **MakeHuman**: for creating the avatar's body, face, and clothing (To install on your computer)
- **Mixamo**: a web-based service to add animations to your avatar
- **Blender**: for refining and preparing the avatar for export for visualisation (To install on your computer)
- **Unity Hub** is necessary to streamline the management of multiple Unity Editor versions, projects, licenses, and module installations (like Android/iOS support) in one centralised location. While not strictly required to run a single version of the editor, it is the official, recommended tool for managing installations, projects, and licensing, providing a "gateway" to the Unity ecosystem

  For our Demo, we are using Unity version **2022.3.7f1**

  Note: Use the latest stable versions of MakeHuman and Blender. Mixamo works directly in your browser, no installation is needed.

Before you start, you will need

1. **A computer**
   - Windows, macOS, or Linux
   - Internet access

   Note: A computer with a good graphics card will make Blender run faster, but it's not strictly required for simple avatars.

2. **Installation of the software tools**

- Install MakeHuman.
  - Go to Releases and follow the instructions provided here.
- Install Blender on your computer.
- Mixamo is a web-based tool and does not need installing.

3. **Optional materials**

- Reference images, sketches, or descriptions of your character
- Headphones or speakers if you want to preview animations with sound

Preparation of your materials and workspace

- **Organise folders for each project:**
  - Raw character files

- Refined Blender files
- Animated files from Mixamo
- Exported character, FBX folder and GLB folder

Overview of the workflow

Creating an animated avatar involves four main steps, each supported by free and accessible tools. Users will create the character with MakeHuman, refine its appearance with Blender, add movement in Mixamo and finally export it for VR, AR, or web-based platforms.

Figure 2 Overview of the workflow

Step-by-step guidelines

Step 1: Avatar design

What is MakeHuman?

MakeHuman is a free and open-source 3D computer graphics software used to create realistic virtual human characters for use in other projects like video games or animations. It uses a graphical user interface with sliders to control macro-level attributes like gender, age, height, and weight, and detail-level features for facial and body parts. Users can then export their creations in various formats to other 3D programs like Blender or Mixamo.

The software is developed by a community and supports sharing resources like clothing, poses, and rigs.

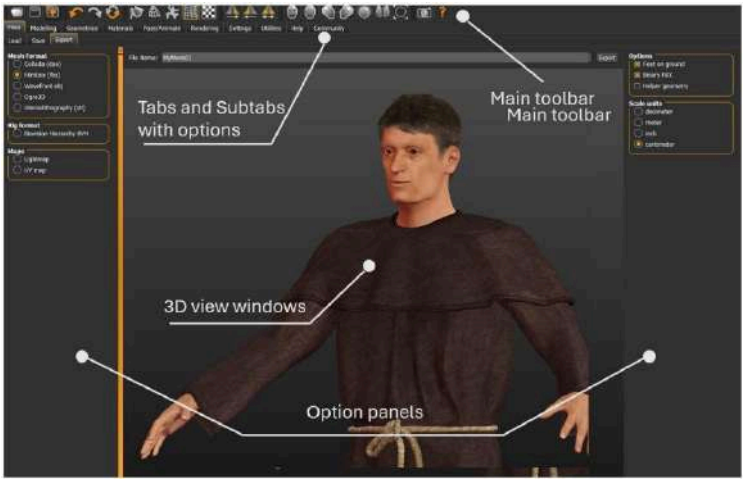


Figure 3 MakeHuman interface

Using Your Mouse in 3D

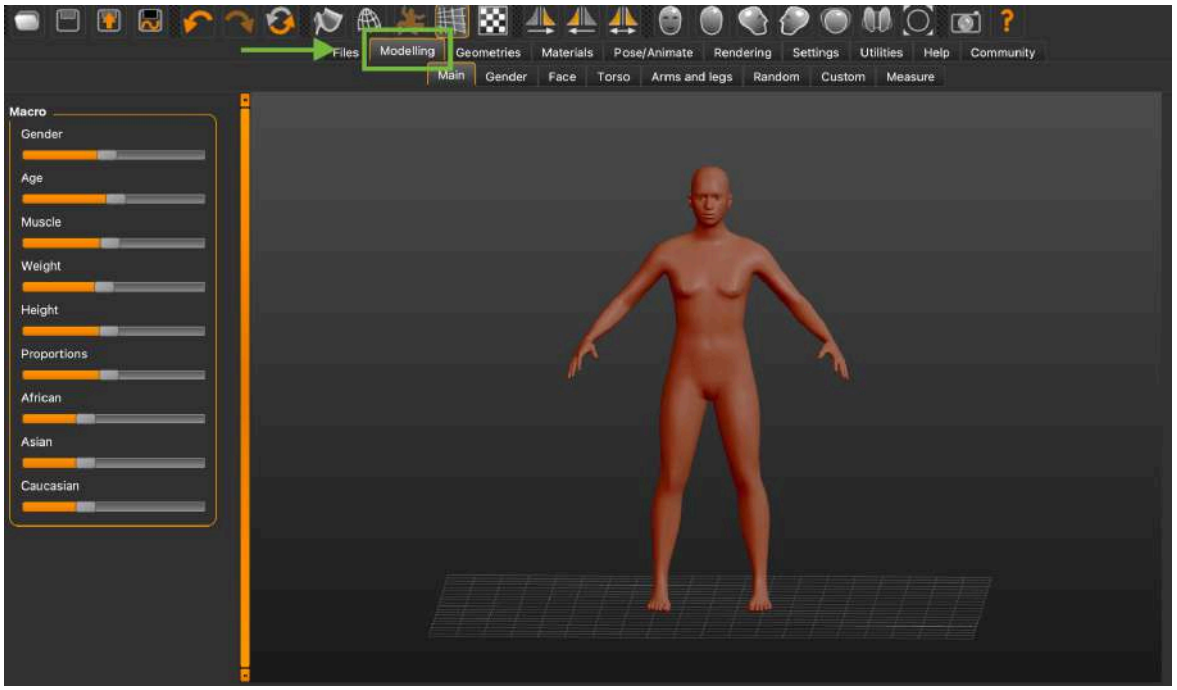
The mouse plays an extremely important role in 3D. With the mouse users can move pieces on the model, zoom in/out, move the model, rotate, pan, etc.

The following diagram demonstrates the way to navigate with the mouse.

How to create an avatar in MakeHuman?

1. **Launch MakeHuman**
   Open the MakeHuman software. The workspace will display a default human model.

2. **Set Base Parameters**
   Go to the Modelling tab.
   In the Modelling tab, adjust the avatar's basic characteristics:
   a. Gender: Male or Female
   b. Age: Child, Teen, Adult, or Elder
   c. Height and Weight: Modify overall body proportions



3. **Customise Body Features**
   Refine body details in the Body section by adjusting:
   a. Muscle tone
   b. Chest, arms, and legs size
   c. Torso and hips proportions
   d. Fingers, hands, and feet if needed

4. **Adjust Facial Features**
   In the Face tab, modify facial structure, including:
   a. Eyes (shape, size, spacing)
   b. Nose (length, width, angle)
   c. Mouth and lips (shape, thickness)
   d. Ears (size, position)
   e. Jaw and cheeks

Figure 4 Customising the body and the face

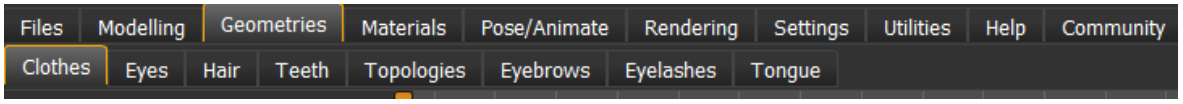
Customising the body and face in MakeHuman is a key step in creating a realistic and personalised avatar. The software provides intuitive sliders that allow you to precisely adjust body proportions such as height, weight, muscle definition, chest, arms, legs, torso, and hips. At the same time, detailed facial customisation options enable fine control over features including the eyes, nose, mouth, ears, jaw, and cheeks. These tools make it possible to shape both the overall physique and the facial identity of the avatar.

5. Add Clothing and Accessories

Clothes and hairstyles can be added to the avatar through the Clothes and Hair sections, where available assets can be applied directly to the model. For more variety and customisation, you can access the Community tab, which provides a large collection of **clothing and hair models created by the MakeHuman community**. Within this tab, filtering options and keyword search tools allow you to quickly find specific types of clothing or hairstyles, such as jackets, shoes, dresses, or particular hair styles. Once selected and downloaded, these assets can be easily applied to the avatar.

In the Clothes or Geometries tab:

a. Select clothing items such as shirts, pants, and shoes
b. Adjust size and fit to match the body shape



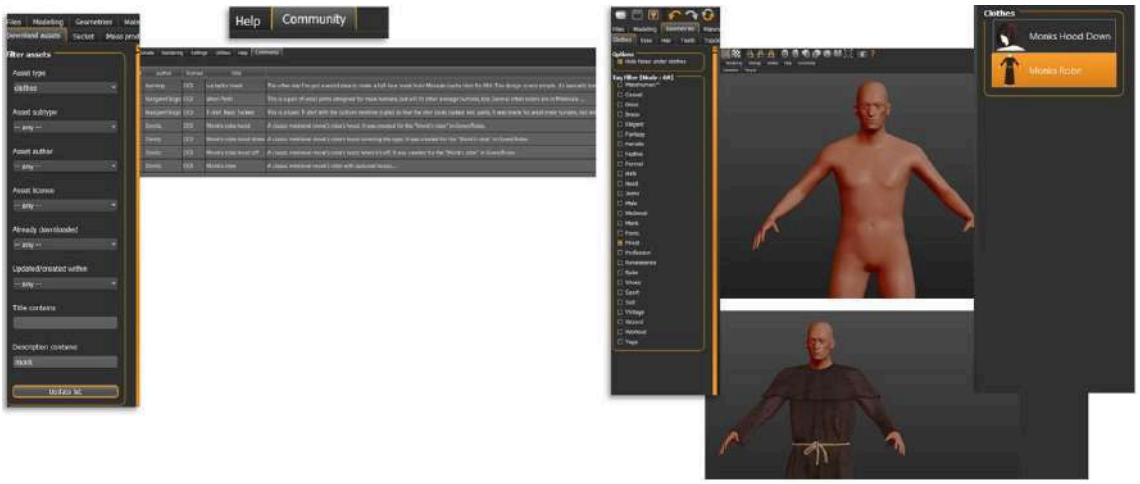


Figure 5 Clothing the avatar

6. Select Skin and Hair

In the Appearance or Materials section:

a. Choose skin tone and complexion
b. Select hair style and color
c. Set eye color and add eyelashes if desired

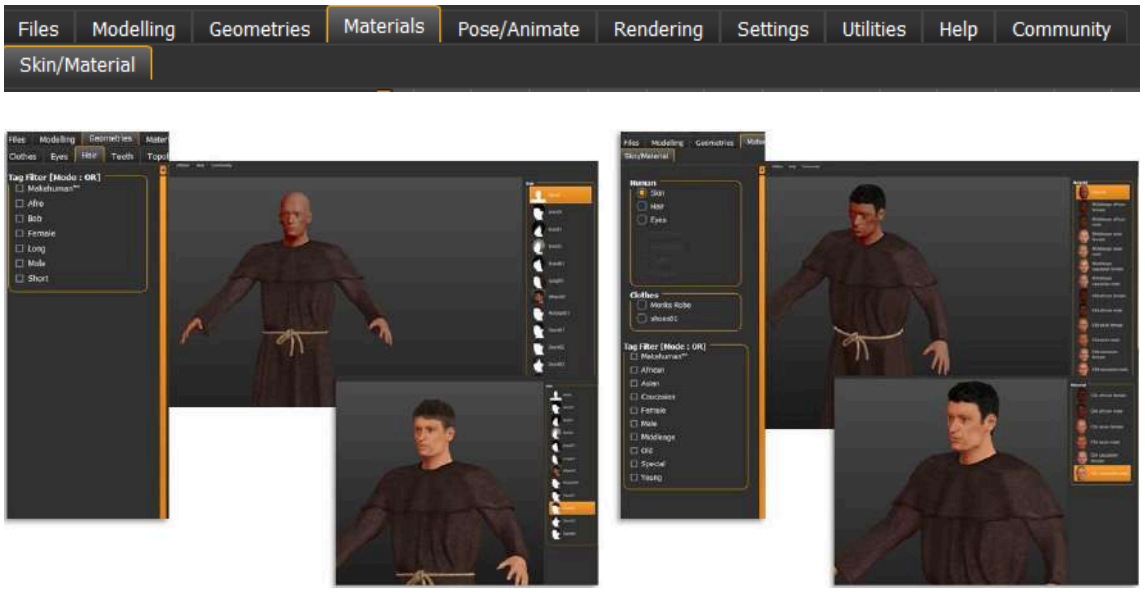


Figure 6 Adding hair and customising the skin

7. Pose and Expression (Optional)

Use the Pose/Animate tab to:

a. Change the avatar's pose
b. Add facial expressions if required

The Pose and Expression (Optional) tab in MakeHuman allows us to define how the avatar appears in a static or dynamic state. **If you want to create a static avatar** with a specific body pose and facial expression, this tab provides predefined poses and expression controls that can be applied easily. By selecting an appropriate pose, you can adjust the posture of the avatar to match the intended presentation, while facial expression options help convey emotions or character personality. This is especially useful when the avatar is intended for visualisation, presentation, or reference purposes rather than animation.

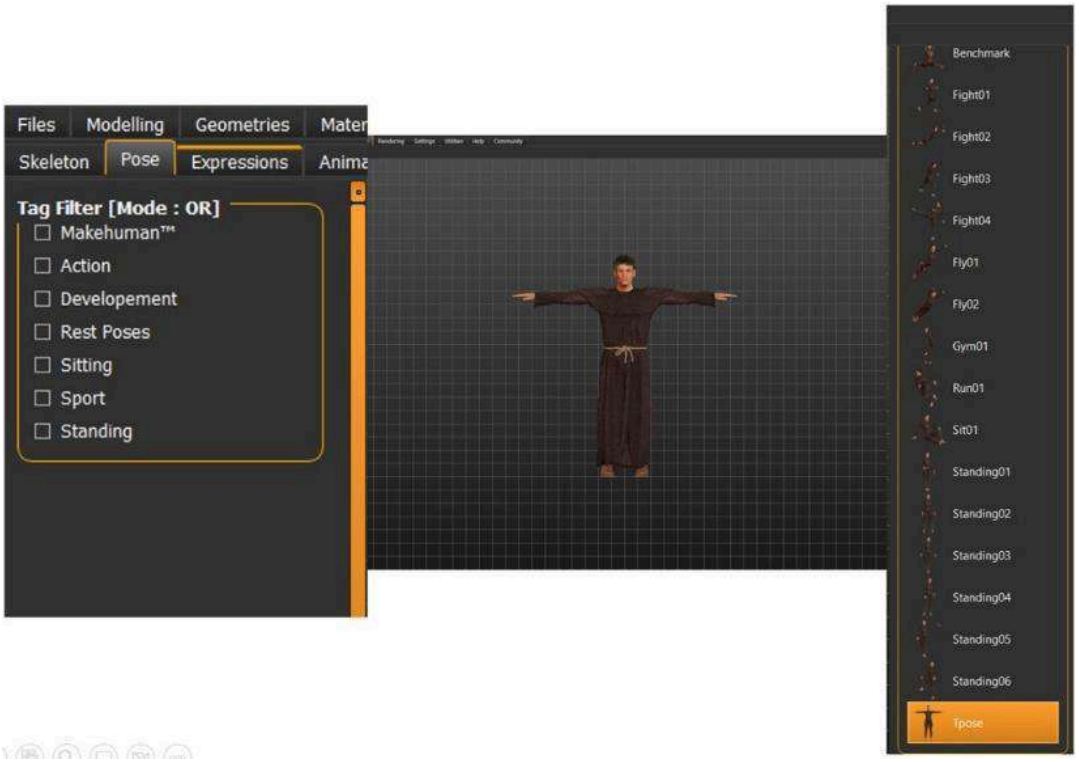


Figure 7 Putting the avatar in a T posture

If the avatar is intended for further animation in Mixamo or other animation software, it is recommended to assign a T-pose to the model (Figure 7). A T-pose places the arms extended horizontally and the body in a neutral position, which helps facilitate the rigging process by allowing the software to correctly detect joints and body proportions. Using a T-pose ensures better compatibility with automatic rigging systems, reduces animation errors, and results in smoother and more accurate animations.

8. Preview the Avatar

Rotate and zoom in the 3D view to check the avatar from different angles. Make any necessary final adjustments.

9. Save and Export

a. Save the project via **File → Save** for future editing.
b. Export the avatar for use in other applications via **File → Export**, choosing the desired format (obj, .fbx, .dae).

The Export Options in MakeHuman allow the user to save the completed avatar in formats compatible with external 3D and animation software. **For animation purposes**, the most commonly used formats are FBX and OBJ. Exporting the model in FBX format is recommended when the avatar will be uploaded to Mixamo, as this format supports proper geometry and skeletal data required for automatic rigging and animation. Alternatively, the OBJ format can also be used, mainly **for static models or further editing**, although it does not include rigging information by default. By exporting the avatar in FBX or OBJ format, you can easily import the model into Mixamo, apply animations, and then reuse the animated character in games, simulations, or other 3D applications.

Figure 8 Export options

STEP 2: AVATAR ANIMATION

WHAT IS MIXAMO?

Mixamo is a web-based animation platform developed by Adobe that enables you to easily rig and animate 3D characters without requiring advanced animation skills. It works by automatically by generating a skeleton for an uploaded character model and binding it to the mesh through an intuitive auto-rigging process. Once rigged, the user can choose from a wide range of predefined animations such as walking, running, jumping, or idle movements. These animations can be previewed, adjusted, and applied directly to the avatar. This process enables quick and efficient animation creation, making the avatar suitable for use in games, virtual reality environments, simulations, or other interactive applications.

Mixamo is a free service, requiring only an Adobe account to sign in.

PROCESS OF ANIMATING THE AVATAR IN MIXAMO

This step-by-step process allows users to quickly transform a static 3D character into a fully animated model using Mixamo.

1. **Access Mixamo**

Open a web browser and go to the Mixamo website. Sign in using an Adobe account.

2. **Upload the Character**

Click on the Upload Character button and select your exported FBX or OBJ file. Mixamo will load the model into the interface.

3. **Set Rigging Markers**

Once the model is uploaded, Mixamo will ask you to **place markers on key body parts**, such as the chin, wrists, elbows, knees, and groin. These markers help Mixamo understand the character's anatomy. After placing the markers, click Next. Mixamo will automatically generate a skeleton and rig the character. This process usually takes a few moments.

Figure 9 Upload and rig the avatar in Mixamo

4. Choose an Animation

After rigging is complete, **browse the animation library** available in Mixamo. **Select an animation** such as walking, running, jumping, or idle movements. The animation will be applied to the character and previewed in real time.

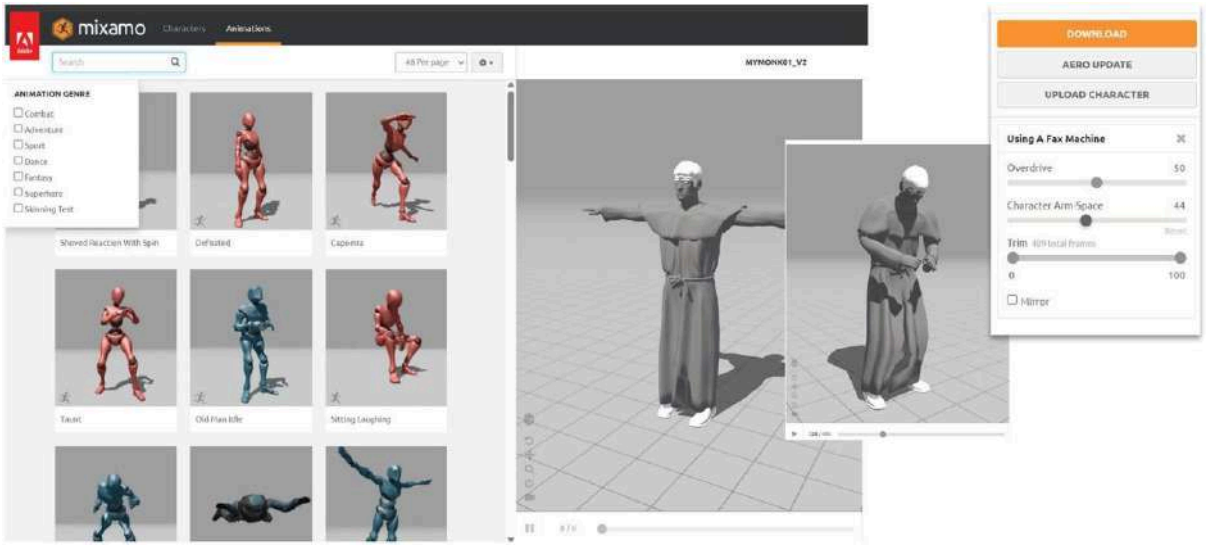


Figure 10 Choosing and adjusting an animation

5. Adjust Animation Settings

Use the available controls to modify the animation parameters, such as speed, arm spacing, or movement intensity, to better suit your needs.

6. Download the Animated Character

Once the animation has been finalised, the user downloads the animated character from Mixamo by clicking the Download button.

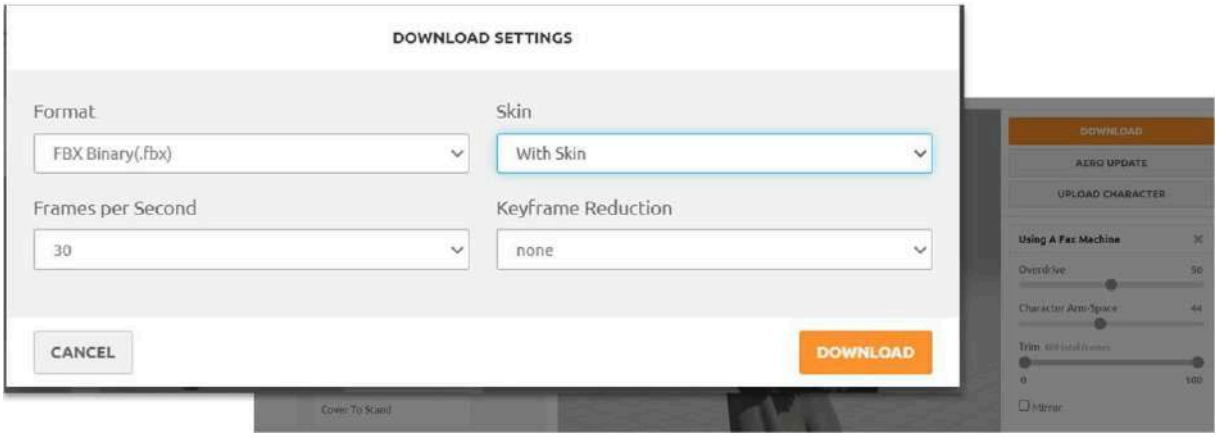


Figure 11 Downloading the animated avatar

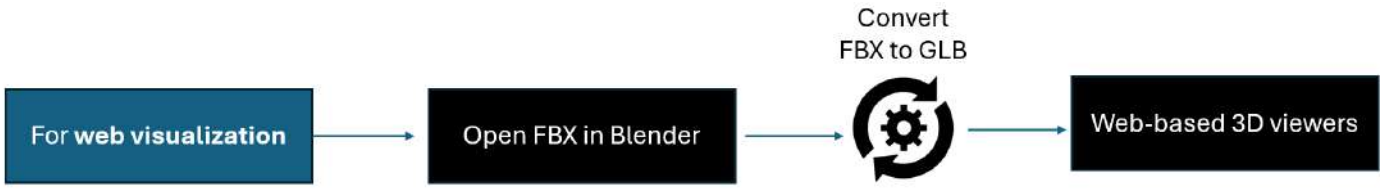
7. Preparation and Conversion for Final Platform Use

The downloaded animated character is then prepared for its final use depending on the target platform:

The FBX format with skin is the most appropriate option, especially for virtual reality (VR) applications, as it includes both the character mesh and the animation data in a format that is fully compatible with game engines such as Unity. This ensures that the animated avatar can be directly imported and used in immersive VR environments without additional rigging or adjustments.

For web visualisation, the FBX file must be converted into a GLB (glTF binary) format, which is more efficient and widely supported by web-based 3D viewers.

This conversion is typically done by importing the FBX file into Blender, where materials, scale, and animations can be checked before exporting the model as a GLB file. This process ensures optimal performance and compatibility for displaying the animated avatar on the web.



Step 3: Avatar format conversion in Blender

Blender is a free, open-source 3D creation software used for modeling, texturing, animation, and file format conversion. It is commonly used as an intermediate tool to prepare and optimise 3D assets for different platforms.

To convert an animated character from Mixamo into a web-friendly format, the user can import the FBX file into Blender by selecting **File → Import → FBX (.fbx)** and choosing the downloaded Mixamo file. (Figure 12)

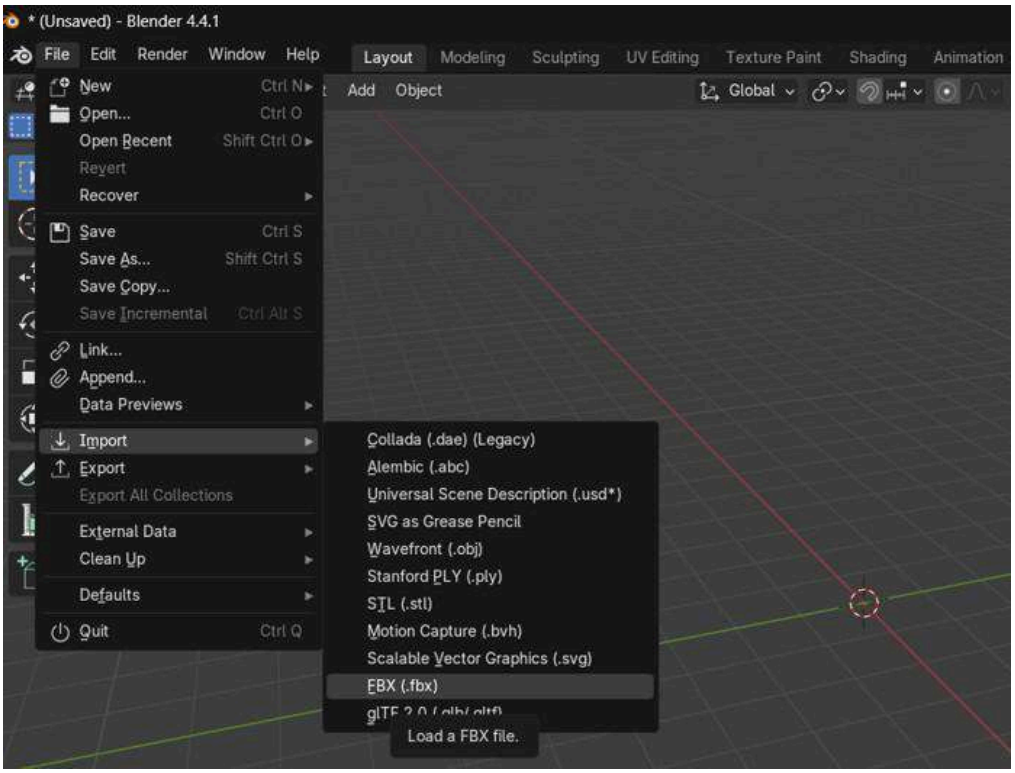


Figure 12 importing the FBX into Blender

Once imported, the character, including its mesh, materials, and animations, can be reviewed and adjusted if necessary.

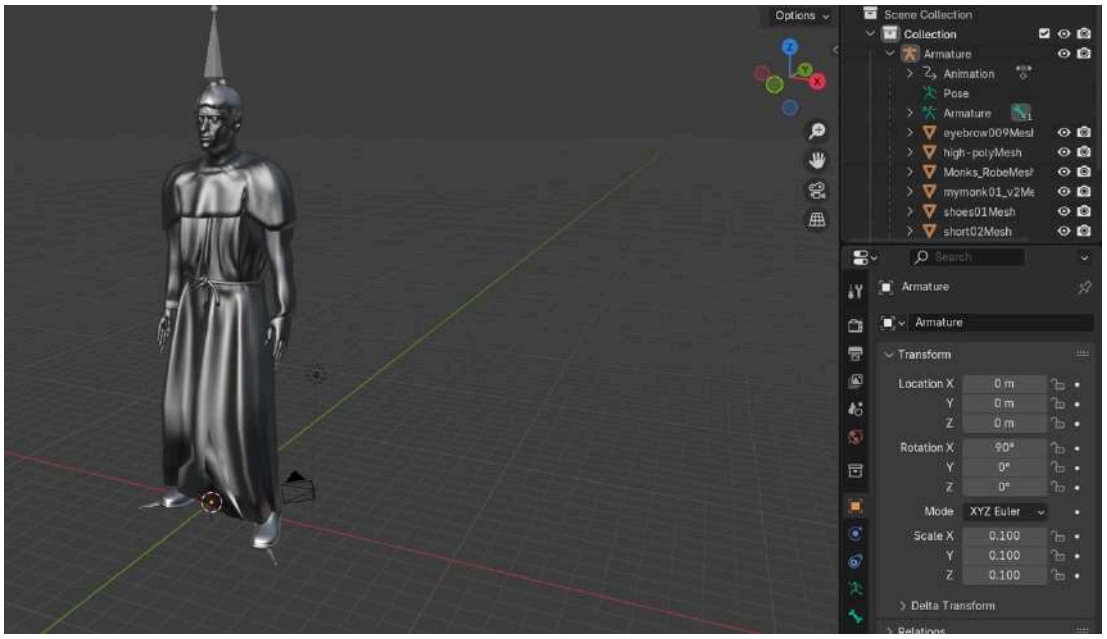


Figure 13 The imported FBX in Blender

Note: To avoid visual distraction, you can hide the skeleton from the right-side panel.

Important: A very common issue when importing FBX files from Mixamo into Blender and is usually related to how materials and textures are interpreted.

When the model looks metallic or shiny, Blender is often assigning incorrect values to the Principled BSDF shader.

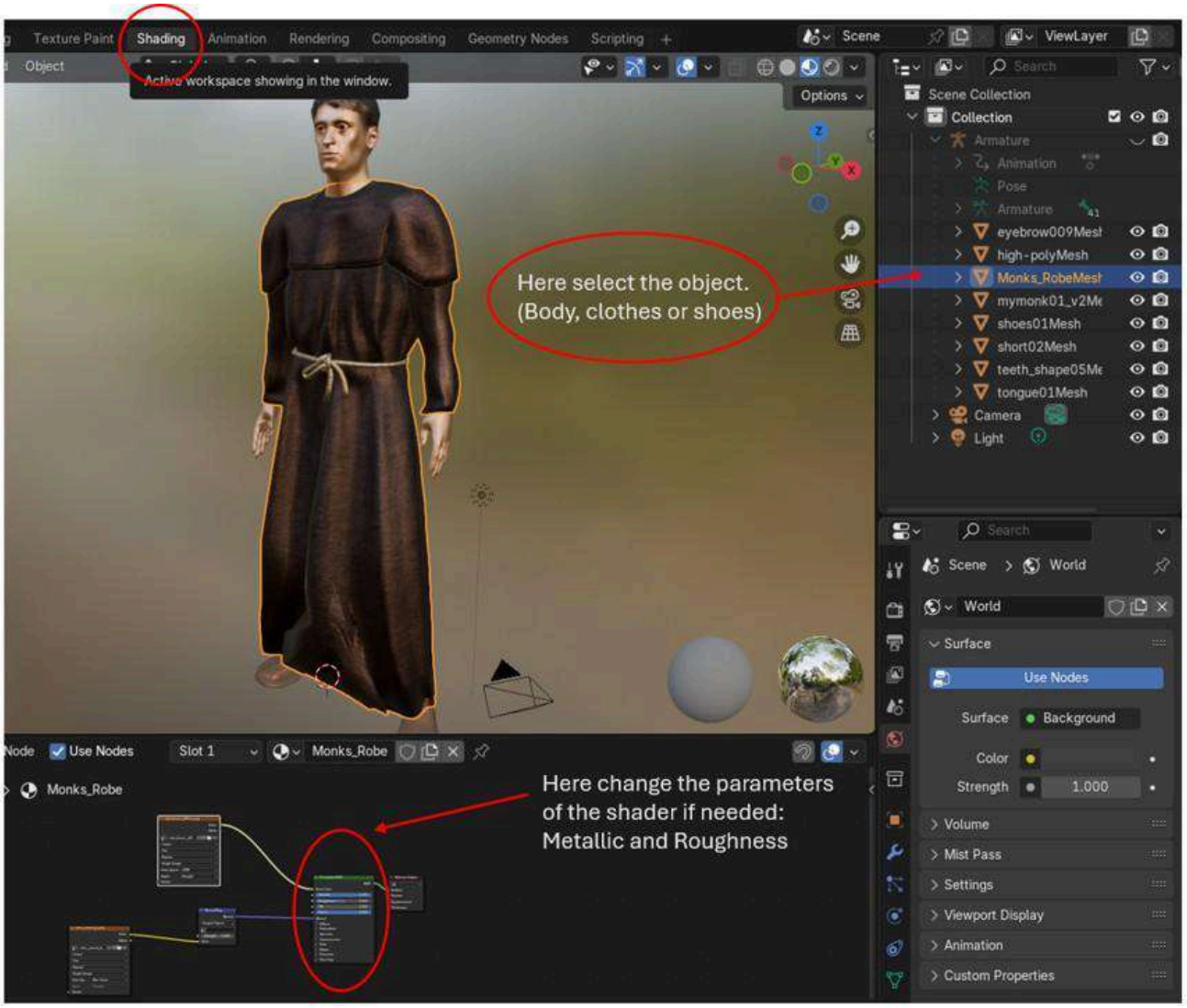


Figure 14 Retrieving the correct colors

To retrieve the correct colors, follow these steps:

1. **Check the Material Shader**
    a. Select the character mesh.
    b. Go to the Material Properties panel.
    c. Make sure the material uses a Principled BSDF shader.

2. **Reconnect the Texture Properly**
    a. Open the Shader Editor.
    b. If the texture is not connected correctly, add an Image Texture node.
    c. Load the character's diffuse/albedo texture and connect it to the Base Color input of the Principled BSDF shader.

3. **Adjust Metallic and Roughness Values**
    a. Set Metallic to 0.0 (this usually fixes the metallic look).
    b. Increase Roughness to around 0.5–0.7 for a more natural skin or fabric appearance.
4. **Check Viewport Shading Mode**
    a. Switch to Material Preview or Rendered mode to see accurate colors.
    b. In Solid mode, colors may appear incorrect or flat.

5. **Verify Texture Color Space**
    a. Select the Image Texture node.
    b. Set Color Space to sRGB for color (diffuse) textures.

    Note that when you export your model from MakeHuman in FBX, a folder containing the textures will be created. This is in case you need to reload your texture in Blender.

6. **Apply or Reassign Materials if Needed**
    a. If multiple materials are present, ensure each mesh part has the correct material assigned.

After these adjustments, the avatar's colors should appear natural again. This step is especially important before exporting the model to GLB for web visualisation, as correct materials ensure proper rendering across platforms.

Figure 15 The 3D model after shader adjustment

Step 4: Facial animation (optional) in Blender

Instead of relying on external add-ons, **basic facial animation can be achieved directly within Blender** using shape keys. Shape keys are predefined facial deformations included in the MakeHuman character, allowing simple control over expressions such as mouth opening, smiling, or blinking. This method works consistently across Blender versions and does not require any additional installation.

After importing the animated character (with body animation from Mixamo), users can enhance realism by adding a few key facial movements. For example, blinking can be created by animating eyelid shape keys at regular intervals, and simple mouth movements can be added by keyframing different mouth shapes over time. Although this approach does not provide precise lip synchronisation, it is sufficient to give the character a more natural and expressive appearance.

This simplified method ensures that the workflow remains easy to follow, robust, and suitable for non-technical users. It also keeps the pipeline fully compatible with modern Blender versions while still allowing users to experiment with basic facial animation techniques.

Once both body animation (from Mixamo) and basic facial animation (using shape keys) are completed in Blender, the character can be exported for use in different visualisation environments.

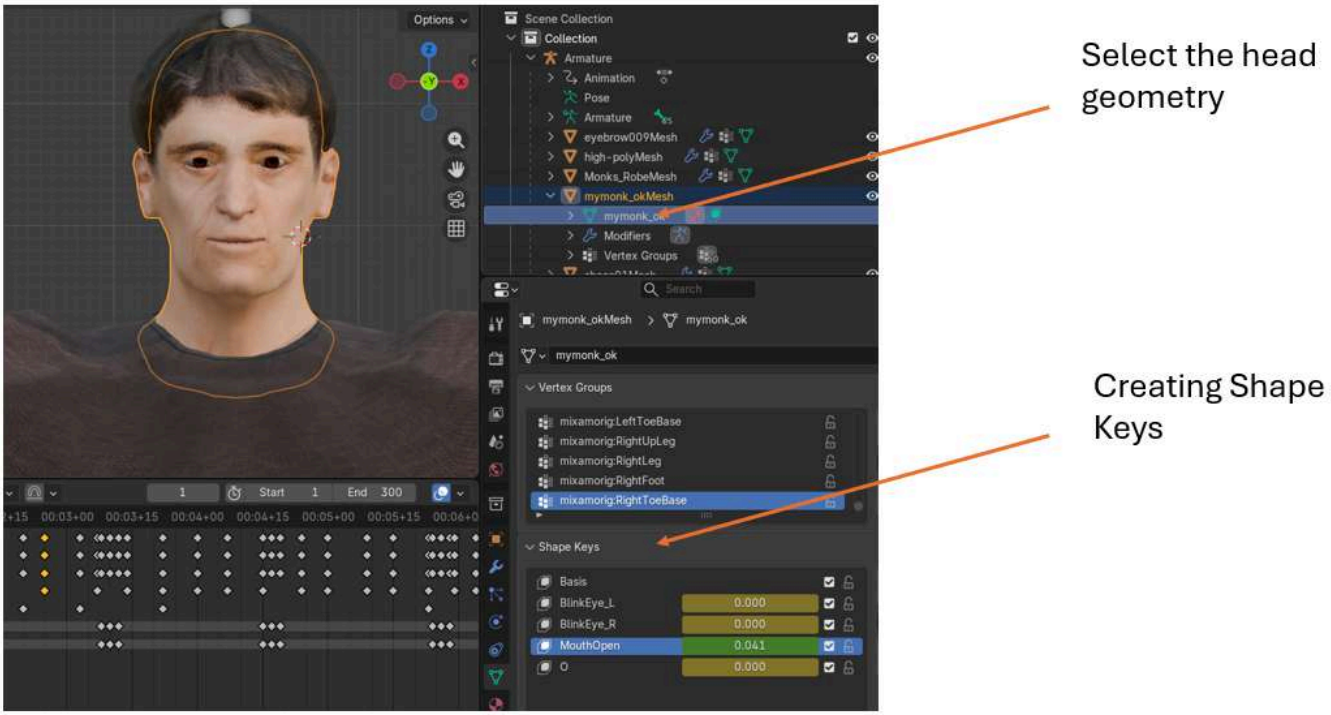
If the animation includes audio (for example, speech or narration), the sound file should be placed in the same folder as the exported 3D file. This ensures proper organisation and makes it easier to link the audio with the animation in the target environment.

This method allows simple facial expressions such as blinking and basic mouth movement to enhance the animated character.

Quick Steps: Adding Basic Facial Animation in Blender

1. **Select the character mesh (face)**
   In the 3D View, click on the character's head or body mesh.

2. **Open Shape Keys**
   Go to Object Data Properties (green triangle icon) → Shape Keys.



3. **Create a blink animation**
   a. Locate eyelid shape keys (e.g. Blink, EyeClose)
   b. Set Value = 0 at frame 1 → Right-click → Insert Keyframe
   c. Move to frame 10 → Set Value = 1 → Insert Keyframe
   d. Move to frame 20 → Set Value = 0 → Insert Keyframe
   e. Repeat later in the timeline for natural blinking

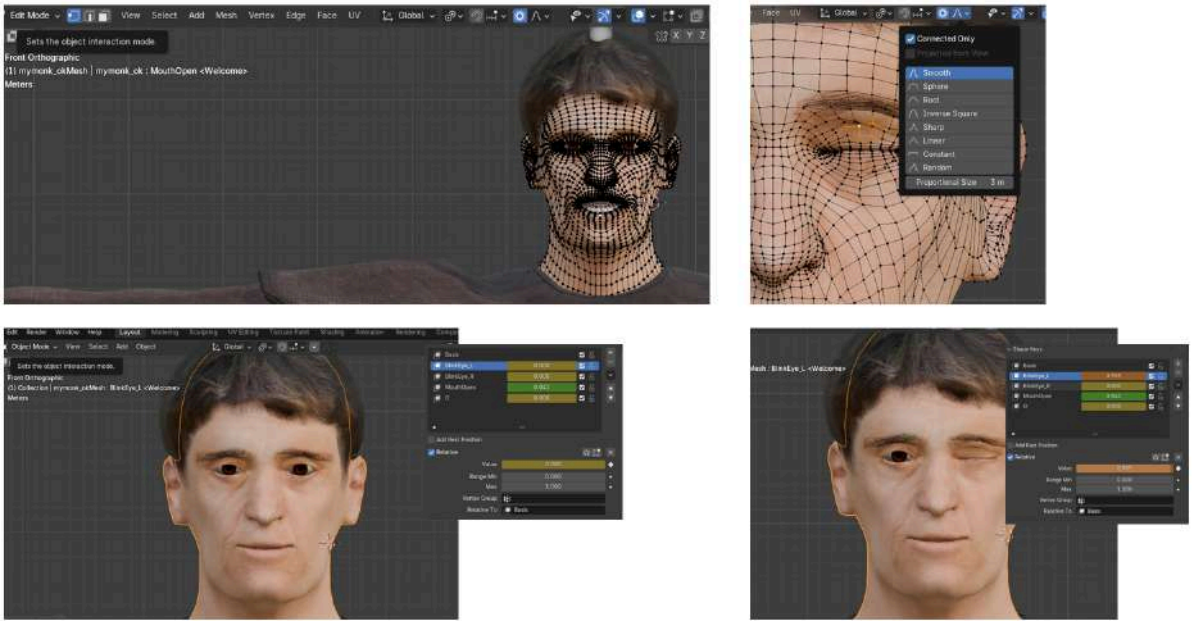
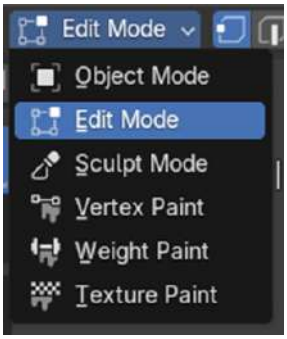


Figure 16 Modify the geometry points

To modify the geometry points and shape the facial expression, **switch to *Edit Mode***. In this example, we are creating a blinking animation for the left eye. (*Figure 16*)



4. Create simple mouth movement

Mouth movements (such as opening the mouth) are created using the same method as blinking eyes, by modifying the relevant shape keys in Edit Mode and keyframing their values.

a. Select a mouth shape key (e.g. MouthOpen, A, O)
b. At different frames, change the Value (0 → 1 → 0)
c. Insert keyframes to simulate speaking

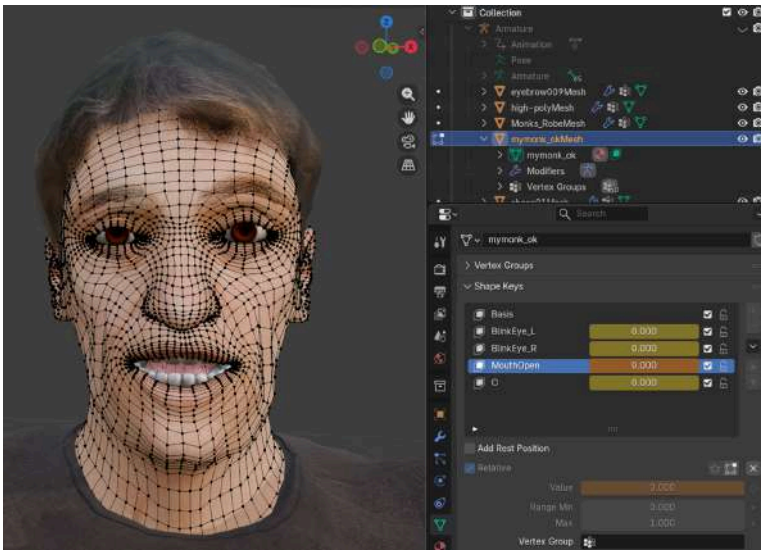


Figure 17 Creating Shape key for "Mouth open"

5. Animating Shape Keys for Facial Animation

After creating the required shape keys, animate their values by inserting keyframes at different frames to produce the desired facial animation.

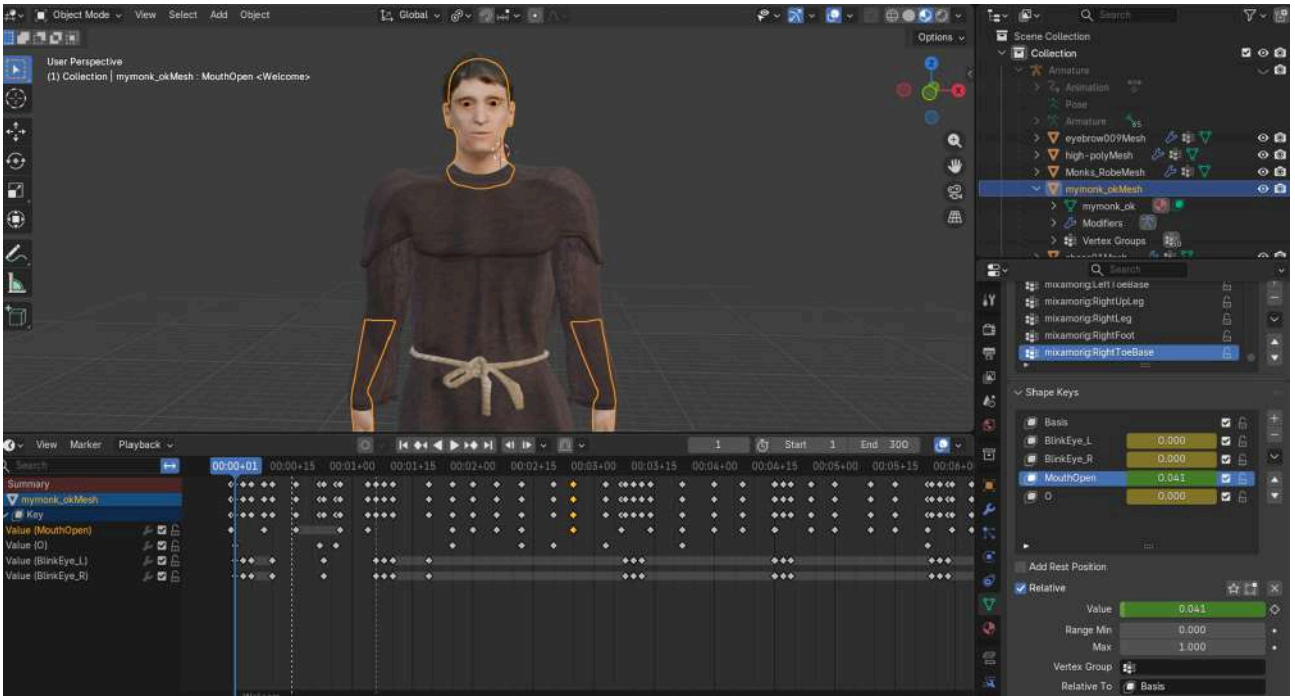


Figure 18 keyframes inserted at different time for the different shape keys

Figure 19 The generated facial expression at different frames

6. Adding the audio file

The audio file can be loaded into the timeline, allowing the keyframes to be adjusted accordingly to simulate the character speaking in sync with the audio.

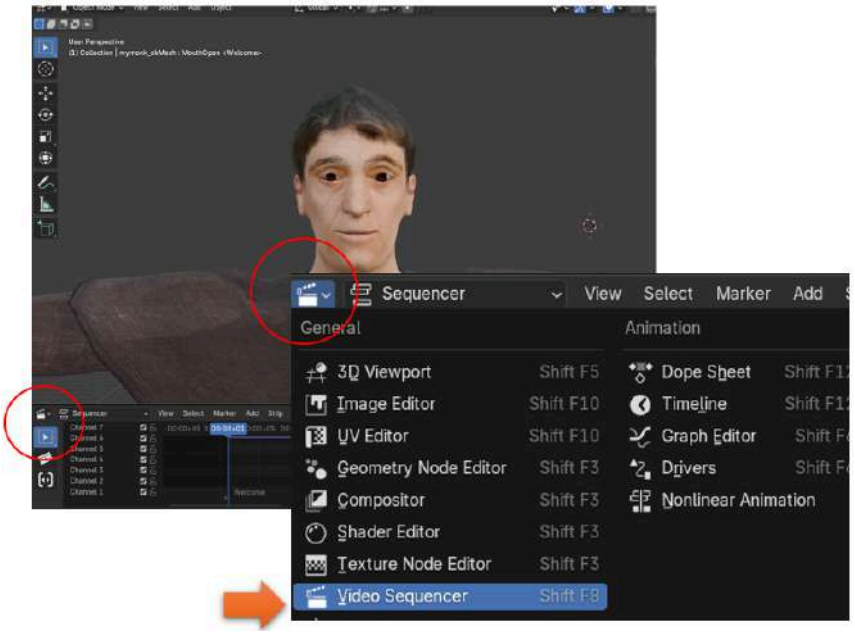


Figure 20 Adding an audio file

7. **Play the animation**
   Press Spacebar to preview the result and adjust timing if needed.

This final step completes the pipeline, allowing the animated character to be reused across web and immersive platforms.

Further Resources for facial animation:

- Shape Keys For Beginners
- Facial Shapekeys For Beginners

After verification, the model can be exported as a GLB (glTF binary) file: **File → Export → glTF 2.0 (.glb)**.

This format is optimised for efficient loading and rendering, making it ideal for web visualisation and real-time applications while preserving animations and textures.

Figure 21 Export to GLB format

Step 5: Visualisation of the animated avatar in the MIRALab 3D Animation Viewer

Web-based visualisation

MIRALab 3D Animation Viewer is a web-based 3D model viewer with advanced features including audio synchronisation, 360° panoramic backgrounds, and multi-scene support. The viewer is hosted by Eureka3D-XR github.

a. Upload your 3D files to the EGI DataHub (https://github.com/EUreka3D-XR), A SHARE_ID will be automatically created for the file.
b. In your Browser type the following URL by adding the SHARE_ID at the end: http://3dwebviewer.eureka3dxr.fedcloud.eu:8141/{SHARE_ID}

The viewer will:

a. Fetch the file from EGI DataHub
b. Auto-detect the file type
c. Load the appropriate viewer
d. Display the content

Further information about the viewer can be found here: https://github.com/EUreka3D-XR/WebAnimationViewer

VR/MR visualisation

To create a VR/MR experience, a ready-to-use Unity template is provided. (put link to data Hub)

This template already includes all the necessary technical setup (VR camera, scene, and configuration).

The Unity template is designed to hide technical complexity. Users only need to import their avatar and launch the application.

1. **Open the Unity template**
   a. Download and open the provided Unity project
   b. All VR settings are already configured
2. **Import your avatar**
   a. Export your character as FBX from Blender
   b. Drag and drop the file into the Unity project
3. **Replace the example character**
   a. Delete or hide the placeholder character
   b. Drag your avatar into the scene
4. **Connect your headset**
   a. Connect your Meta Quest 3
   b. Make sure it is recognised by Unity
5. **Build and run**
   a. Click “Build & Run”
   b. The application is automatically installed on the headset

Important: for users who are not familiar with tools such as Unity, a complete step-by-step user guide is available here.

HELP AND MORE INFORMATION

If you require any additional help or have questions regarding the process, please feel free to contact us for support. Further assistance can be provided upon request. Additionally, a video demonstrating the same workflow described in this manual is available at the following URL, where you can view the complete process step by step for better understanding.

- Video showing the same workflow: https://www.youtube.com/watch?v=C41Hs9EUxYY
- Further information about the viewer can be found here: https://github.com/EUreka3D-XR/WebAnimationViewer

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