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D1.6 Ethics issues mitigation measures

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Authors:
Valentina Bachi (Photoconsortium)

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Executive summary

The main research area of EUreka3D-XR focuses on transforming online cultural contents into compelling narratives and extended reality scenarios, and delivering them to the common European data space for cultural heritage, through new tools, capacity building resources, and inspiring open access content to cultural heritage professionals and other stakeholders.

This document outlines the potential ethical concerns within the EUreka3D-XR project, focusing on the various work areas that may present ethics risk and highlighting the mitigation measures and strategies that the EUreka3D-XR partners will implement to address them, ensuring ethical conduct and responsible decision-making throughout the project.

The identified ethical areas of attention are:

- "Humans", as the project will engage with participants onsite and online, in seminars, workshops and user groups;
- "Personal Data", as the project will collect data in user testing, focus group participation, surveys, feedback collection, newsletter management and analytics of websites' use;
- "Non-EU Countries", as the project includes a partner based in Switzerland;
- "Artificial Intelligence", as the project will include minor AI-based features in the development of some of the tools.

The project has set up an internal Ethics Board to discuss and reflect on the various aspects related to these areas of potential ethical risks. Moreover, the project has established measures and procedures to meet the highest ethical standards in compliance with applicable regulations, in order to conduct responsible implementation of the EUreka3D-XR project.

The document is structured into the following chapters:

1. Introduction
2. Humans
3. Personal Data
4. Non-EU countries
5. Artificial Intelligence
6. Conclusions

1. Introduction

This report describes the ethical attention areas that apply in the context of the EUreka3D-XR project. It identifies and illustrates reflections on ethical issues that may arise across the project's various areas of work, and outlines mitigation measures that the EUreka3D-XR partners implement in response.

EUreka3D-XR project aims at developing and testing tools dedicated to cultural heritage professionals, for the creation of XR scenarios that reuse digital cultural content in compelling narratives that engage users. The participation of humans (both from project partners and outside the consortium) in project's activities, the collections and processing of data, also including data transfer to/from the associate partner located in Switzerland, and the use of some AI-based features in the project's tools raise potential ethical risks that need to be properly addressed.

For each identified area of attention, this document provides a description of the issue, and the measures implemented in order to ensure ethical compliance with EU frameworks, also indicating any relevant documents to be collected to ensure compliance with applicable international, EU and national laws and contribute to the responsible implementation of EUreka3D-XR project thereby increasing its social acceptance and the attention to the highest ethical standards.

For each identified ethical issue, the EUreka3D-XR project follows the guidance provided in the EU document *How to complete your ethics self-assessment*[1] issued on 13 July 2021, with specific reference to the provisions applicable to the Digital Europe Programme (DEP), and with specific consultation of the supporting guidance of the *Ethics and data protection* report issued on 05 July 2021[2] for the matters of data protection.

1.1 Role of this deliverable in the project

The inclusion of this deliverable in the EUreka3D-XR project follows the recommendation of the *Ethics Summary Report* received in May 2024 during the negotiation phase preceding the finalisation of the Grant Agreement. The summary acknowledged that the consortium shows some awareness regarding few ethical issues, but recommends for more details to be provided on how these will be handled and which mitigating measures and safeguards will be put in place.

The sections where further reflections and actions by the consortium are recommended are:

- Section 2 "Humans", due to the participation of professionals, students and other stakeholders in seminars, workshops and user groups;
- Section 4 "Personal Data", also linked to activities in the project that include collection of personal data such as user testing, focus group participation, surveys, feedback collection, newsletter and analytics of websites' use;
- Section 6 "Non-EU Countries": given the consortium includes a partner based in Switzerland, this may cause some data to be transferred between partners, whether or not they are from EU countries;

[1] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/how-to-complete-your-ethics-self-assessment_en.pdf
[2] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ethics-and-data-protection_he_en.pdf

- Section 8 "Artificial Intelligence": some of the tools planned to be realised in the project deploy minor generative AI-powered features including AI-aided 3D reconstruction of heritage artefacts and sites, and digital representations of human characters which talk in multiple languages with visitors of sites.

Reflections about each of these issues and proposed mitigation measures are illustrated in the next chapters.

1.2 Ethics Board

While not specifically recommended in the *Ethics Summary Report*, the consortium set in M1 an internal Ethics Board including representatives from all the partners. The EUreka3D-XR Ethics Board includes participants who had previous knowledge and competence about the ethical topics, and less experienced ones, thus resulting in a lively group where discussions offer also an occasion for learning and building capacity. The members of the EUreka3D-XR Ethics Board also appointed as Data Protection Officer the project coordinator dr. Antonella Fresa, who is involved in all stages of the project and is referent on data privacy and data protection rules.

The Ethics Board meets regularly in online meetings on a monthly basis, and is aware of the project's main ethical issues, which in general terms concern the respect for persons and for human dignity in all the project's tasks; a fair distribution of benefits and burdens between project participants; the rights and interests of the participants, both from the consortium and outside; and the need to ensure participants' free informed consent in all the activities that involve external stakeholders.

A particular consideration will be given to vulnerable categories of individuals in case they are engaged with the project's activities (such as children, impaired or discriminated people, minority communities and local communities whose heritage is represented in the project's applications, persons unable to give consent, etc.), ensuring to avoid discriminatory practices or unfair treatment. Appropriate and lawful data treatment and awareness of the complexities raised with the participation of a partner from Switzerland are taken into account. Finally, a fair use of minor AI-based features in the development of some of the project's tools is considered a fundamental topic of attention that the project looks at.

2. Humans

This chapter discusses ethical issues and mitigation measures applied by the EUreka3D-XR project with respect to the participation of humans, in particular CH professionals, students, researchers, citizens and all kind of stakeholders, in the project's outreach activities, including:

- presentations, dissemination and other public events, aimed at raising awareness of the project and its results;
- capacity building events, such as seminars and workshop both onsite and online, aimed at improving the knowledge or skills of heritage professionals, educators, curators, and other categories of stakeholders;
- focus groups and user groups engaged by the project and aimed at testing and evaluating the project's tools and XR scenarios.

Besides the project partners working on these tasks, the participation of other stakeholders recruited via outreach and dissemination activities will be entirely voluntary. The project will list target groups for capacity building and dissemination activities based on which groups can benefit from the project's research, tools and scenarios, to develop a differentiated and sectorial-based capacity building implementation plan, with specific actions tailored to the needs of the different stakeholders and aiming to reach a diverse audience. The D5.1 Capacity Building Implementation Plan and the D4.1 Dissemination and exploitation plan are respectively due in May 2025 and July 2025 and will include a thorough reflection on project's target groups.

Fig. 1 Audience at the public presentation of the project in Pisa and online, 27 February 2025

Participants' informed consent will be obtained and clearly documented, including information regarding the participant's right to refuse to participate and to withdraw their participation or data at any time.

Participants will receive a project-specific informed consent form to review and accept, along with clear and accessible information sheets that describe the aims, methods and implications of the project activities, the nature of their participation, and additional information about data collection, anonymisation, and processing.

In addition, when the project activities involve surveys, interviews, or focus groups that collect and store personal information, the project will implement appropriate privacy, data protection and data management provisions as described in Section 3.

Summary for activities involving human participants in project's events:

	Details about recruitment	**Exclusion criteria**	**Ethics issues mitigation measures procedures**
Professionals in CH and experts involved in seminars and project's events, with talks or capacity building, training, learning activities	Recruited in the project's networks	No exclusion criteria	Informed consent forms for recording and dissemination of their speeches, presentations and other learning materials, collected either via online form or in writing Information sheets provided in online form or in writing.
Professionals in CH and other sectors, participating in project's events, surveying, focus/user groups, both online and on site.	Recruited via outreach activities including online advertising, newsletters, social media campaigns.	No exclusion criteria	Informed consent forms collected either via online form or in writing Information sheets provided in online form or in writing.
Potentially vulnerable individuals including people with impairments, minorities or under age, to be engaged with evaluating project's XR scenarios to assess user engagement	Recruited via outreach activities including online advertising, newsletters, social media campaigns.	No exclusion criteria	Informed consent forms collected in writing. Specific form to collect parental consent in writing. Information sheets provided in online form or in writing.

3. Personal Data

3.1 General provisions

Via the outreach and dissemination activities of the project that include website, newsletter, and online and onsite events, EUreka3D-XR will collect and treat some data that may refer to identifiable natural persons, such as for example:

- name,
- address,
- e-mail,
- location data,
- Internet Protocol (IP) address,
- cookie ID
- phone number and other contact information.

In the treatment of such personal data, EUreka3D-XR project implements data minimisation and data protection by design, in particular:

- the project will collect only data that are necessary and proportionate to achieve the specific task of dissemination or evaluation they refer to;
- for the scopes of reporting or analysis, such personal data will be anonymised so that the persons who provided such data cannot be identified;
- the data will be securely stored either by the coordinator Photoconsortium or the communication and dissemination leader CRDI;
- the project's policies and procedures are established to protect the fundamental rights of the data subjects, such as the right to withdraw consent or access to data and the right to file a complaint to a supervising authority.

Informed consent to data processing will be implemented for all project's activities, and information sheets will be provided to the data subject, in easily accessible form and using clear and plain language. The informed consent form, either in written or online format, will include:

- the identity of the data controller and the contact details of the Data Protection Officer;
- the specific purposes of the processing for which the personal data will be used in the project;
- the subject's rights as guaranteed by the GDPR and the EU Charter of Fundamental Rights, in particular the right to withdraw consent or access their data, the procedures to follow should they wish to do so, and the right to lodge a complaint with a supervisory authority;
- information as to whether data will be shared with or transferred to third parties and for what purposes;
- information as to data transfer to/from organisations outside the EU such as to project partner MIRALab (Switzerland).
- information about how long the data will be retained before they are destroyed.

3.2 Data collection in events

Participants in EUreka3D-XR onsite or online events will be invited to voluntarily provide their personal data for the scopes of the project's reporting, user feedback analysis, and dissemination of content and learning materials linked to its EUreka3D-XR events. In specific, reporting and analysis will be performed in the project with the scope of improving the project's capacity building activities and also for impact assessment, to evaluate the profile of event's participants, in particular their geographic provenance, occupation, level of digital literacy and previous knowledge about 3D and digital cultural heritage. Such reporting and analysis will be done by using anonymised and aggregated data, so that the individuals who provided such data cannot be identified.

3.3 Data collection via online channels

The EUreka3D-XR project leverages a strong online presence to reach out to stakeholders and different types of users. Some data about users are collected directly, such as with the registration to the newsletter mailing list, to project's events, etc. Other data are collected automatically by the IT system of the website https://eureka3d-xr.eu/ and its parent https://eureka3d.eu/ and of the project's blog https://www.digitalmeetsculture.net/projects/eureka3d-blog/: this is primarily technical data such as the browser and operating system of the user.

User data is collected for any information added to platforms Europeana used as a steward of the data space for cultural heritage: pro.europeana.eu, europeana.eu, dataspace-culturalheritage.eu, and europeana.atlassian.net/wiki/spaces/EF/. Any pages that mention EUreka3D-XR, for example the project page on Europeana Pro[3], is subject to user statistics gathering and storage by the Europeana Foundation. Data collection happens using Matomo, an EU based and self-hosted solution that complies with GDPR. No user data is ever shared with third parties by Europeana, user data are only gathered to create aggregated user stats. More information can be found in Europeana's Terms of Service: https://www.europeana.eu/rights.

3.4 Data Processing

Personal data, and in particular email addresses, are processed to send public newsletters from the project, upon consent provided by the subscriber. The personal data collected in the project may be subject to data transfer between project partners, thus including EU countries and Switzerland.

In any case, the project will make use only of aggregated, non-personally identifiable data. When visiting the project's websites, statistical analyses may be made of users' navigation behavior, and the analysis is anonymous, i.e. it will not be possible to identify users from this data. This happens primarily using Google analytics as a widely used tool, even if some concerns about this tool are raised in the EU: in this light, the aggregated information analysed in the scopes of the project limit to the number of viewers, viewed pages, and downloaded PDFs. The analysis of data from social media indicators will be done using the tools included in each platform. Furthermore, the Basecamp platform is used exclusively for information exchange among participants in the project, while Zoom is the main tool for organizing online project meetings, conferences, seminars, and workshops.

The privacy policy of the EUreka3D-XR project is published at: https://eureka3d.eu/privacy-policy/

[3] https://pro.europeana.eu/project/eureka3d-xr

Summary for personal data collected and treated in the project:

	Details about personal data collection	**Protection measures**	**Ethics issues mitigation measures procedures**
Protection of personal data	Collected onsite and online in project's events Collected automatically by project's online channels	Data minimisation Anonymisation	Project specific data protection and privacy policy, including contact details of the data protection officer Informed consent forms collected either via online form or in writing Information sheets provided in online form or in writing.
Tracking and profiling, for reporting and analysis purposes	Collected automatically by project's online channels	Data minimisation Data aggregation Anonymisation	Informed consent forms collected either via online form or in writing Information sheets provided in online form or in writing.
Data transfer	Collected and imported/exported between the EU countries of project's partners and to/from Switzerland	Data minimisation Data aggregation Anonymisation	Informed consent forms collected either via online form or in writing Information sheets provided in online form or in writing.

4. Non-EU countries

This section discusses EUreka3D-XR activities involving Switzerland as a non-EU country. In particular with respect to the participation of associate partner MIRALab in project task T3.3 to develop a prototype tool that will be used and demonstrated in the XR scenario set in Cyprus. This is a collaborative work that implies active participation of MIRALab in various project's activities such as:

- development of the tool in Switzerland and collaborative testing and evaluation with the other partners in EU
- travelling of MIRALab's personnel to the project's events in EU countries, including but not limiting to Italy (kick-off meeting M1), Belgium (capacity building event M6); Spain (demonstration event M12), Cyprus (final event M18)
- travelling of project partners to Switzerland for possible dedicated meetings, to be agreed in the course of the project if need be
- data transfer to and from Switzerland, particularly about the tool's presentation to EUreka3D-XR audiences and stakeholders and the tool's evaluation via the XR scenario produced in Cyprus.
- no materials will be transferred to and from Switzerland besides the data.

A risk-benefit analysis was conducted during the proposal preparation phase regarding the involvement of MIRALab. The decision to include this Swiss partner is based on their extensive experience and strong portfolio of past projects, which ensure high-quality contributions and support the development of an innovative and user-friendly tool for Cultural Heritage Institutions (CHIs).

Moreover, the participation of Switzerland does not present specific ethical concerns related to the exploitation of participants or local resources, nor does it pose risks to project teams and staff, or involve research activities that are prohibited within the EU.

Additionally to the involvement of Switzerland, some of the tools used in project's communication and working activities are US-based, such as Google Drive, Basecamp, Zoom and the use of Google Analytics: the data processing relating to the use of these tools is presented in the previous section 3.4.

5. Artificial Intelligence

5.1 General considerations

The use of generative AI has raised ethical concerns among both academic circles and the broader public. These concerns partially relate to the public perception of AI, but also relate to authenticity and authority of digital assets as well as environmental impact and privacy. In this light, the recommendation from the EU's AI Office and member states[4] to encourage the creation of codes of conduct for AI systems, to promote voluntary adherence to certain standards, encouraging minimization of environmental impact, promoting AI literacy, ensuring inclusivity and diversity, and preventing negative impacts on vulnerable groups will be an important step in supporting a mindful approach to the use of AI in all sectors.

The ongoing debate about the use of generative AI as a means for creative expression in visual art centres around two key points: 1) Where does the material used to train the AI come from and 2) What is the status of generative AI art both commercially and philosophically. The latter of these two is arguably the crucible of the debate and while it may seem out of scope for EUreka3D-XR, the discussion on how AI can be employed to the CH domain is highly relevant for the project given it is deeply embedded in the digital transformation process of the CH sector. In general, EUreka3D-XR embraces full transparency with respect to the usage of AI or any other form of digital processing.

Currently, generative AI output cannot be copyrighted, and is de facto CC0 as the creative input does not satisfy the *de minimis* criteria of copyright which only extend copyright protection to human created work. The US Copyright Office has however ruled (2025)[5] that copyright can apply to an original expression of work created by a human author even if the work also includes AI-generated material. It should be noted that this does not cover purely AI generated material (i.e. independent AI generative content) or where there is insufficient human control over the expressive elements. This is still in flux as both AI and its implementation develop.

Philosophically speaking, the question of authenticity and creativity is significant. While the debate continues on whether generative art is art or what even constitutes art in the post post-modern era, the question boils down to replication of the human genius, as the creation of art has always been seen as a uniquely human activity, and certainly has always legally been seen as such. As Cultural Heritage explicitly preserves the legacy of human activity, the role of generative AI has strong parallels many of which have yet come to surface in the common discourse.

Cultural Heritage is used to explore, understand and create identity through the combination of the tangible and intangible manifestation of human activity, and thus implies interpretation. In today's approach, rather than having "experts" interpret culture and its legacy (often including elitist, colonial, political or religious viewpoints), cultural heritage should allow communities to express their own histories and understanding in their own way and their own terms. We could argue that the results of generative AI must be able to be peer reviewed in the same way as human generated content, to ensure that either by design, omission or accident

[4] https://artificialintelligenceact.eu/article/95/

[5] United States Copyright Office Copyright and Artificial Intelligence Pt2 Copyrightability 2025 https://www.copyright.gov/ai/Copyright-and-Artificial-Intelligence-Part-2-Copyrightability-Report.pdf

the human legacies used in training the AI do not deceive or misrepresent the communities which they are supposed to support to the outside world.

Serious Digital Cultural Heritage, especially those with a strong visual component, has struggled over this period to demonstrate how digital tools, also including AI features, can be used in developing and reusing CH beyond the illustrative, and in improving the interactivity of users with such content, as it is happening with the new immersive technologies in XR scenarios.

In this light, EUreka3D-XR will ensure 'ethics-by-design' and disseminate the following general principles when AI is involved with creating digital assets:

1) All digital assets created using generative AI by EUreka3D-XR shall be clearly identified in their meta/paradata, as such to mitigate accidental reuse of an asset assumed to be authentic.
2) No digital asset created using generative AI by EUreka3D-XR shall be distributed, reused, redeployed or exposed outside of the project context until explicitly been approved by the representative of the community the asset is designed to represent. In particular, the scenario by partner CUT which deals with religious heritage is approached ethically, by establishing a direct dialogue with the monks of the Saint Neophitos Englystra, as the custodians of that cultural heritage, aligning the work with how they wish it to be represented; there is also a wider dialogue with the Church in general. This is intended to stop the misrepresentation, appropriation or digital exploitation of the represented community, its interests and rights without full and informed consent.
3) Where generative AI has been used by EUreka3D-XR as part of digital analysis, those parts created through the intervention of generative AI shall be clearly identifiable in the asset and/or the asset meta/paradata. Ideally this will be undertaken using separate objects to distinguish those parts created though the generative AI process, as an alternative when separation of parts is not possible additional visual material (for example secondary texture maps) will be used to delimit the areas of contribution from generative AI. This is intended to mitigate accusations of lack of intellectual transparency within the representation of the asset.
4) All datasets, algorithms, parameterization or similar methods used to train and produce generative AI output used by EUreka3D-XR shall be documented and archived with the same high standards as any other digital asset. These should be openly available for academic scrutiny but must be available on request. This mitigation is in place to protect the intellectual integrity of the use of generative AI as an assistive tool within the CH domain.
5) An archive of all digital material used in the training of generative AI, its output and provenance agreements created as part of EUreka3D-XR shall be offered to the community of origin at the end of the project. This is to mitigate accusations of misrepresentation and misappropriation but more importantly provide the community the means by which to pursue future development of their cultural assets in the future without recourse to the EUreka3D-XR project or its consortium members.

In line with the current EU policy on AI and the AI Act (Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence)[6] all members of the consortium have been made aware of the current regulations and policy surrounding the use of AI.

[6] See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1689 for the full Act

Specifically we take note of Article 50 and the issues surrounding our obligations to transparency regarding the use of AI within the project to ensure that humans are informed when interacting with AI components and that generated AI content is identifiable and clearly and visibly labelled when necessary to preserve trust and integrity of cultural heritage and its stakeholders.

Further while it is acknowledged that the development of AI components for implementation in EUreka3D-XR currently falls under exceptions for open source and research and development (Article 2 point 12 and points 6 and 8 respectively) all members of the consortium are mindful of the policies when those systems are placed on the market or put into service.

5.2 EUreka3D-XR tools and AI features

In EUreka3D-XR, five tools will be developed:

1. Online tool for creating custom AR tours, retrieving 3D objects from CH repositories such as Europeana and associating with locations on a map;
2. Mobile app that allows visitors to experience phygital tours by superimposing 3D digital objects and accompanying digital descriptions onto the physical world;
3. 3D Modelling software pipeline using digital photo archives;
4. Web tool for creating XR/AR experiences, also using a range of predefined layouts for UX and UI
5. Tool to create the digital representation of human characters that provide storytelling to visitors of CH sites.

The online tour editor and respective mobile app for serving AR tours on-site (tools numbered as 1-2 in the list above), both developed by partner NTUA, will not make use of any generative AI or other machine learning technologies.

Also the XR/AR experiences creator, numbered as 4 and developed by partner Swing.it, will not make use of any generative AI or other machine learning technologies.

There is a minor use of generative AI in the tools numbered as 3 and 5. The ethical and technical aspects the project is committed to are illustrated below.

5.2.1 The AI-based 3D modelling software pipeline (tool 3)

The AI-based 3D modelling software pipeline, to be developed by partner Swing.it, is designed to convert 2D images drawn from cultural heritage photographic archives into 3D representations. The pipeline combines automated processes (based on Microsoft Trellis Software) with manual refinement to ensure high-quality output and user-friendly workflows. The tool combines technology and human input that aims to enhance the quality of visual representation and establish a standard in the field. The solution is provided by partner Swing.it.

Swing.it aims to provide a robust, transparent, and respectful method for generating 3D models from 2D archival images, ultimately enriching the immersive experiences offered through EUreka3D-XR while safeguarding the integrity and heritage value of the original cultural assets.

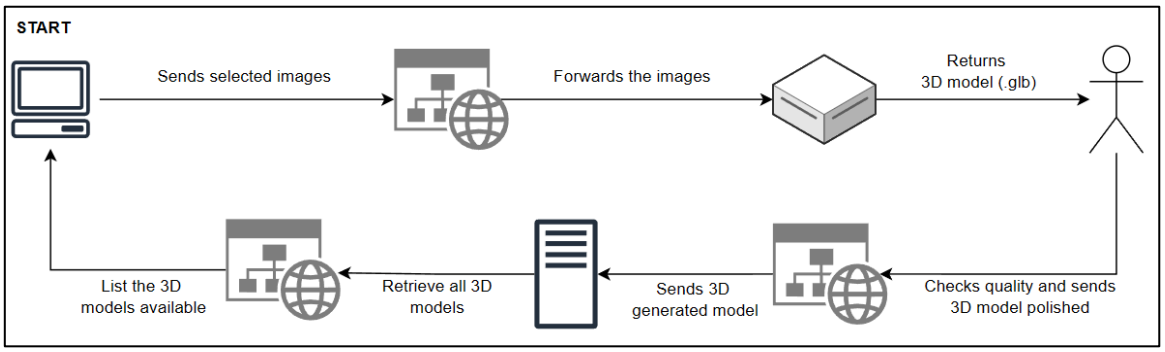

Fig. 2: the human-in-the loop methodology of Swing.it tool for AI-assisted 3D modelling software

Data Sources and Licensing: The pipeline is only processing 2D images to which legal access is allowed to the project, ensuring proper licensing and compliance with copyright regulations. No personal or sensitive data are included in the input dataset. Should any image inadvertently contain identifiable personal elements, it will be excluded or anonymised to comply with GDPR and project ethics guidelines.

Bias Mitigation and Inclusivity: We acknowledge that biases can arise if the training datasets are not diverse enough (e.g., focusing on specific types of artefacts and/or styles). Our team strives to gather a broad and representative set of cultural heritage images, in collaboration with content providers. We will review our models for any systematic distortions and/or misrepresentations as well as update the models to ensure fair and inclusive outputs.

Technical Robustness and Transparency: Our use of Microsoft Trellis is designed to be traceable and, where possible, explainable, by documenting training data, model configurations, and parameters. We adopt a "human-in-the-loop" approach: AI output is always reviewed by domain experts or project staff to validate accuracy and quality before incorporation into final 3D scenarios.

Respect for Authenticity and Cultural Context: While AI methods can fill gaps in partial data or enhance imagery, we take care to distinguish between reconstructed or interpolated elements and those that are documented. Any sections generated or significantly modified by AI will be indicated (e.g., via metadata/paradata, disclaimers, or dedicated labeling), preventing confusion about their authenticity or authority.

Risk Assessment and Data Protection: We maintain a robust risk assessment plan for all phases of the AI pipeline (development, testing, deployment). This includes identification, analysis, treatment of potential issues around data leaks, unauthorised usage, or misinterpretation of AI-generated content. Personal data protection follows the principles of minimisation and anonymisation. No personal identifiers will be traced or stored in our AI processes.

Ethical Oversight and Compliance: Swing.it works closely with the EUreka3D-XR Ethics Board to ensure alignment with all relevant EU, national, and institutional regulations, including GDPR. We will publish documentation on our AI pipeline covering both Microsoft Trellis usage/configuration and the training datasets so that partners and external adopters can evaluate reliability, replicability, and ethical standards.

Documentation and Dissemination: Proper documentation on the AI d pipeline will be made available, including training datasets and methodological details, so that project partners and potential adopters can evaluate its reliability, replicability, and ethical standards. In respect of the open access approach of the project, it will be possible to share the trained models or relevant datasets/subsets for academic scrutiny and reuse, supporting the broader cultural heritage community in assessing and building upon this work.

5.2.2 Virtual Heritage Character creator (tool 5)

The character creator, developed by partner MIRALab, will reuse the MIRALab dataset of digital human characters. Generative AI from MIRALab will be used to produce audio speech from text in multiple languages. In the case of the CUT scenario which will reenact the life of monks in the Saint Neophytos Englystra, such text is provided by partner CUT in agreement with the experts of Saint Neophytos and history of the Englystra. The visitors will be able to see the virtual characters on a tablet, screen or via headset and VR glasses, and it will be possible to ask the characters to tell their stories.

These Virtual Heritage Characters are created with mainly 3D tools and there is no development and deployment of AI-based systems to create the model. As these Virtual Heritage Characters will present orally their past story, the tool uses some existing LLMs programs available at MIRALab to generate the audio tracks in mp3. However, as mentioned, the content of the speech or talk will be fully provided by cultural heritage partners in Cyprus. The input text given to virtual characters will be fully controlled by the heritage partners in Cyprus as well as the partners of the project. There will be no direct or spontaneous interaction of the humans with the virtual heritage characters.

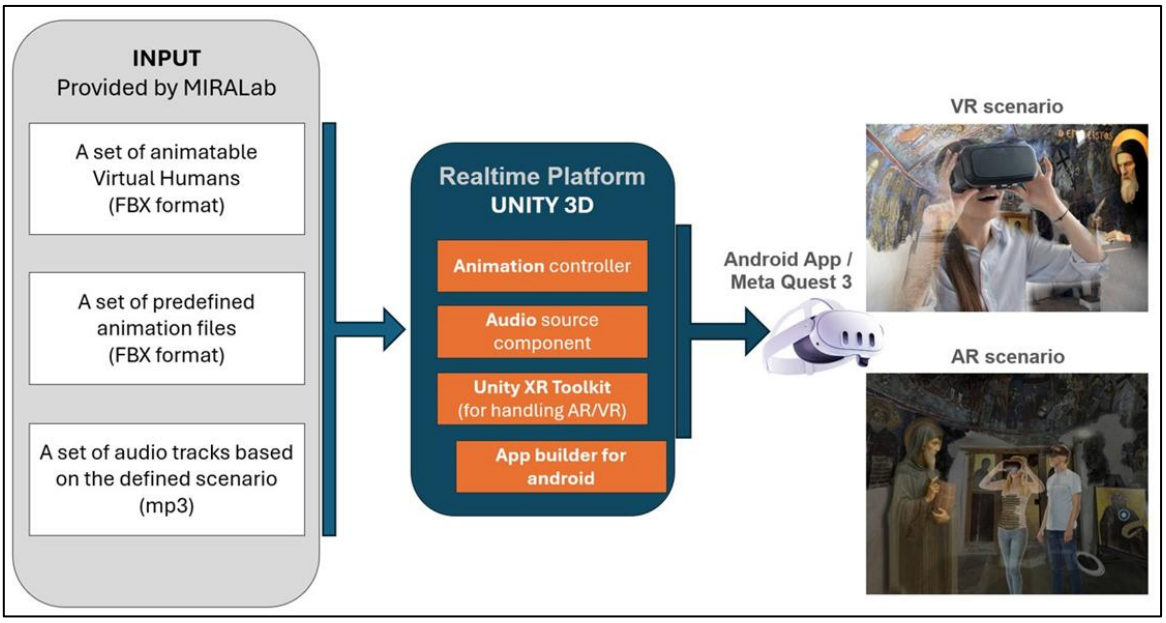

Fig. 3 Overview of the process for the MIRALab tool creating the virtual character in AR/VR scenario

Conclusions

This deliverable illustrates the ethics mitigation measures put in place by EUreka3D-XR project concerning:

- the participation of natural persons in project's seminars, workshops and focus/user groups, both online and onsite
- the data protection measures for the privacy of personal data and for any data processing occurrence in the course of the project
- the involvement of Switzerland as non-EU country
- a fair, ethical, and transparent use of AI throughout the project.

A Data Protection Officer has been appointed as the point of contact for any matters related to privacy and data protection of users engaged in in-person and online interactions. The appointed DPO is the project coordinator Antonella Fresa. The project's privacy policy is publicly available on the project's website which all communication of the project that addresses potential users or participants will refer to.

The participation of Switzerland as a non-EU country does not pose critical concerns or specific issues.

Two tools developed in the project will make use of some generative AI to support the tool's features:

- the 3D modelling software which will use AI to support virtual reconstruction of gaps and other missing parts in 3D models generated from 2D contents, validated and monitored with a human-in-the loop methodology;
- the virtual character generation tools that enables the creation of speaking characters who will tell stories about heritage sites, where the audio track in mp3 is AI-generated basing on controlled texts produced and validated by cultural heritage experts.

While the AI elements in these tools are minor, awareness of the ethical concerns connected to AI is recognised by the consortium and the responsible partner, with appropriate attention and commitment to ethical standards. Furthermore, the project commits to transparent communication regarding the use of AI.

Finally, in February 2025 the EUreka3D-XR project set up an Ethics Board composed of representatives from all partners, that will meet regularly over the course of the project to monitor and discuss ethical issues and exchange knowledge.