D2.3 Bibracte Pilot Prototype v0.1

Due date M12: 31/01/2026

Dissemination level: Public

Authors:

Agathe Le Riche - Maugis (Bibracte)

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EXECUTIVE SUMMARY

This document accompanies the Deliverable *D2.3 Bibracte Pilot Prototype v0.1* in order to provide documentation on the first version of the prototype for this scenario, with short description and a preliminary assessment report.

This deliverable is deeply linked to other documentation provided in the project, and specifically:

- *D2.1 Pilot Specification and planning*, which illustrates the specifications of the end product for each pilot, with production schedule and planning (M6, 31/07/2025)
- *D3.4 Toolbox Beta version*, which illustrates the status (testing phase) of the tools that are used to create and deliver each Pilot scenario, and which compose EUreka3D-XR toolbox (M9, 31/10/2025).

The prototype is an augmented reality experience to be accessed onsite at the premises of Bibracte. A demonstration video presenting the on-site experience is provided in this document, along with the possibility of accessing the web application of the design tour.

The document is composed of the following chapters:

1. Description, with short summary of the Pilot scenario, including access to the prototype
2. Assessment, with indication of challenges encountered and preliminary assessment report
3. Next steps and conclusions

This deliverable and the prototype v0.1 will be followed by a second prototype (internal version), to be showcased in the EUreka3D-XR final event in Cyprus held on 26 May 2026; and a final release of the pilot scenario with extended description and assessment report delivered at the end of the project on 31/07/2026, corresponding to *D2.6 Bibracte Pilot Prototype v1.1.*

1. DESCRIPTION

The scenario "The Hidden Side of Bibracte" offers an immersive augmented-reality visit of the archaeological site of Bibracte, the former Gallic capital of the 1st century BCE. The narrative starts from a simple observation: most of what once constituted the ancient city has now disappeared, is invisible, buried, or difficult for visitors to understand. The scenario therefore aims to reveal these hidden dimensions of the site directly *in situ*, thanks to augmented-reality technologies.

The users are visitors to the archaeological site (general public, families, school groups, archaeology enthusiasts), especially those who explore the site without a guide and without visiting the museum. The experience is designed to be autonomous and accessible through a geolocated mobile application.

The user moves freely around the site with their smartphone. As they approach points of interest (POIs), the application triggers digital content associated with each location. Visitors become active participants in their visit by choosing their own pace, exploring the proposed content, and interacting with it.

At each POI, users visualize in augmented reality 3D models of archaeological structures (backfilled remains, reconstructions of vanished buildings, etc.) anchored in the real landscape, explained through audio presentations and complemented by images, videos, and PDF documents. In addition, users can manipulate 3D models of archaeological objects (rotation, zoom) while quizzes allow them to test their knowledge and enhance interaction within visiting groups.

The scenario thus transforms the site visit into an immersive and educational experience, making the invisible visible and enabling a better understanding of the archaeological site, while strengthening the connection with the museum and scientific research.

The Bibracte prototype has been prepared using two complementary tools:

a) The AR Tour Builder, a web-based authoring tool that allows cultural heritage professionals to create location-based AR tours without programming.
b) The AR Tour Experience, a mobile app that complements the AR Tour Builder tool and serves the tours designed via the AR Tour Builder to on-site visitors.

ACCESS TO THE PROTOTYPE V0.1

The prototype is an augmented reality experience to be accessed onsite at the premises of Bibracte.

- DEMONSTRATION VIDEO: presentation of the prototype of "The Hidden Side of Bibracte" tour as experienced on-site via the AR Tour Experience app: VIDEO
- It is also possible to sign in at the online AR Tour Builder web application to access the specific design tour "The Hidden Side of Bibracte". For this it is necessary to register at: https://eureka.ails.ece.ntua.gr/. After the registration and upon request it is possible to access the design tour.

2. ASSESSMENT AND CHALLENGES ENCOUNTERED

The initial evaluation phases of the AR Tour Experience application and the AR Tour Builder tool made it possible to identify the main technical, ergonomic, and methodological challenges related to implementing an augmented-reality visit at an outdoor archaeological site.

A first on-site test was carried out in September 2025 in collaboration with NTUA.
This session made it possible to observe the application's behaviour under real usage conditions, particularly with regard to geolocation, point-of-interest triggering, visualization of 3D models in augmented reality, and their anchoring within the physical space. It also highlighted the decisive impact of network coverage on access to multimedia content.

One of the main challenges identified concerns the augmented-reality visualization of 3D models that include underground components. These elements appear to float above the ground, which negatively affects the understanding of the remains. To mitigate this effect, an initial solution was implemented: conditional display of the models only in the immediate vicinity of points of interest, with automatic hiding when the user moves away.

Another major issue observed relates to the precise anchoring of 3D models representing structures that are now backfilled or partially vanished. The quality of the experience relies heavily on the accuracy of georeferencing and model orientation. This information was integrated into the metadata via the AR Tour Builder tool, allowing for improved stability of the reconstructions within the real environment.

A second testing phase was conducted in January 2026, coinciding with the delivery of the AR Tour Builder tool and the design of version 1 of the scenario.
This phase made it possible to evaluate the tool in real content-production conditions, by structuring points of interest via the AR Tour Builder that are later visualised on-site via the AR Tour Experience app.

Initial feedback confirmed the overall clarity of the interface, the good readability of the hierarchical structure (project, tour, POI), and the consistency of the step-by-step guidance offered to users. These elements facilitate adoption of the tool by non-developer users. In addition, the ability to preview content, particularly images, allows you to check their loading time based on their size and correct it if necessary.

A number of bugs and suggestions for improving existing functionalities have been identified during this phase. These included issues related to language management for content entry, temporary inability to save certain resources and POIs and edit some project metadata, as well as ergonomic concerns related to responsive display and the accuracy of POI geographic positioning. Another desirable feature that was not yet implemented concerns the ability to automatically extract 3D models from Europeana.

Most of the aforementioned issues (e.g. problems related to saving titles, media, external links, and the unintended duplication of content in the library) have already been addressed by the NTUA technical team, with some still under development (such as the automatic extraction of 3D models from Europeana links).

Overall, this second phase confirmed the relevance of the no-code approach proposed by AR Tour Builder, while also highlighting the need for progressive refinements to ensure a robust, intuitive, and fully operational authoring experience for heritage professionals.

3. NEXT STEPS AND CONCLUSIONS

Building on the results of the initial evaluation phases, the next steps of the project will be structured around four main axes: consolidation of the scenario, progressive integration of user feedback, dissemination of the project, and preparation for sustainable deployment.

Scenario and content consolidation

In the short term, work will focus on finalizing the overall narrative of the scenario *"The Hidden Face of Bibracte"* and on the definitive structuring of the points of interest. This phase will include:

- final selection of additional POIs for the scenario,

- enrichment of the main 3D content,

- coherent structuring of complementary content,

- stabilization of the narratives specific to each POI, in line with pedagogical and scientific objectives.

The selection of complementary content will be refined in order to ensure a balance between documentary richness, clarity, and accessibility for the general public.

Integration of user assessment

The internal evaluations scheduled for February (both tools), followed by external evaluations in March with stakeholders (the scenario and both tools) and in May–June with end users (the scenario and AR Tour Experience), will make it possible to collect detailed feedback on:

- the usability of the AR Tour Builder tool,

- the smoothness of the AR Tour Experience application,

- comprehension of the content,

- the quality of augmented-reality anchoring,

- the overall accessibility of the experience.

This feedback will be iteratively integrated into successive versions of the prototype, leading to a stabilized version of the scenario and tools that is aligned with the real practices of professionals and visitors.

Dissemination and valorisation

The scenario and tools will be presented at the project's final event in Limassol (Cyprus), representing a major milestone for European visibility. In parallel, several regional (May in Bibracte and June in Dijon) and national (June, online) dissemination and capacity-building actions are already scheduled. These activities will promote awareness of the scenario and tools and support their appropriation by professionals in culture, education, tourism, and the cultural and creative industries.

These actions aim not only to showcase the project results, but also to encourage future reuse of the tools on other heritage sites.

Preparation for post-project continuity

A strategic reflection will be conducted on the position of the AR Tour Experience application within Bibracte's existing digital ecosystem, particularly in relation to the current application *La Boussole*. This reflection will address the technical, organizational, and financial conditions required for potential long-term adoption.

In addition, opportunities to extend the system to other sites within the Grand Site de France "Bibracte – Morvan des Sommets" territory will be explored, as well as the possibility of developing participatory routes involving local stakeholders.

Conclusion

The scenario *"The Hidden Face of Bibracte"* provides a concrete illustration of the capacity of the EUreka3D-XR tools to renew forms of heritage mediation by offering an immersive, interactive, and accessible experience directly in situ. It demonstrates that it is possible to make invisible, vanished, or abstract heritage realities visible and understandable, while strengthening the link between the archaeological site, the museum, and scientific research.

Beyond the specific case of Bibracte, this scenario constitutes a transferable demonstrator for many heritage sites facing similar challenges. It highlights the strategic value of no-code and open-source tools for democratizing the creation of augmented-reality cultural routes.