3D models of Cultural Heritage

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Summary

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Abstract

The aim of activity 4.3 is the reconstruction with immersive techniques of the city gate of the archaeological site of Altino, known in literature as the gateway. Revisiting the work of interpretation and two-dimensional reconstruction of the structure and using 3D methodologies in an open source environment, an developed a modelling approach for the gate that extends its possibilities both in interpretation and dissemination, for different classes of users. Particular attention was paid to the study of materials and the contextualisation of the lagoon landscape.

3D models of Cultural Heritage

An in-depth study was dedicated to the reconstruction and enhancement with immersive methodologies of the Altino landing gate**.** The choice of this case study was dictated by its character particularly significant, both for its architectural and monumental and for its functional and symbolic value, and finally for the context in which it fits.

Digital Cultural Heritage (DCH) describes a form of intangible heritage which, because of its intangible nature, allows it to be studied at a distance, to be circulated freely and, at the same time, to be subjected to processes of virtual anastylosis to see it as it once was and to be narrated in museums with new forms of communication for different classes of users. In the international panorama, Information and Communication Technologies (ICTs) have changed the ways in which cultural heritage is transmitted, generating new languages, multiplying the levels of storytelling, and enabling the adoption of communication strategies based on interaction, choice and communication strategies based on interaction, choice and sharing.

The aim of the this WP is the research and definition of a workflow that, starting from a bibliographical and iconographic research bibliographical and iconographical research, leads to the development of virtual and reality application of the city gate of Altino.

The strong monumental connotation of Altino's landing gate and the knowledge produced by excavations and the survey of its foundations have repeatedly led to to advance reconstructive hypotheses. Various solutions have been employed to propose such reconstructions and favour the volumetric perception of the archaeological complex.

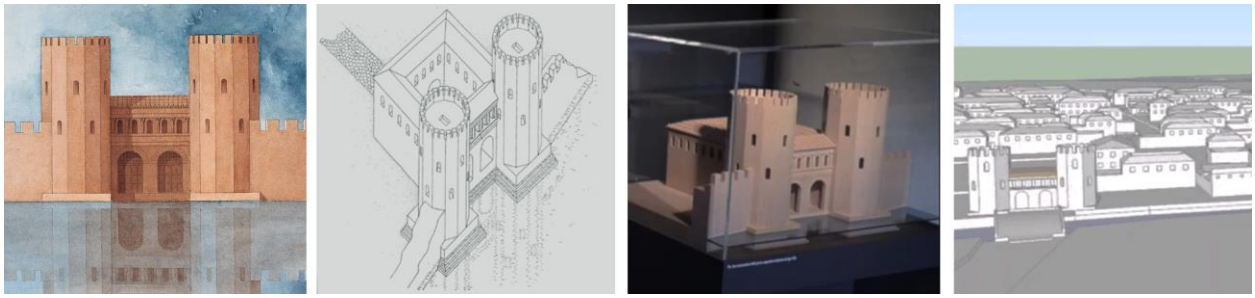
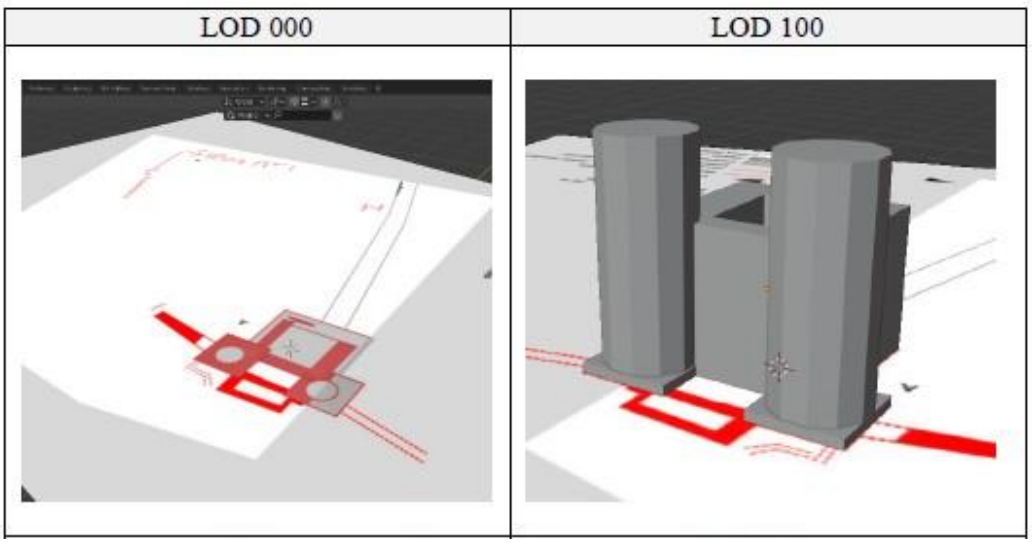


Figure 1: the reconstructions of the gateway proposed in the literature.

The approaches to the theme of city gate have therefore been varied, sometimes aimed at the most aseptic representation of volumes, at times aimed at a greater involvement of the senses. In any case, the theme of water and the relationship between architecture and the natural element have always been central to the representation, as well as the search for the monumentality of the building.

Little or no attention has instead been paid to the historical evolution of this complex architectural complex. This aspect, however, constitutes a preponderant element in the historical analysis of the monument and in the reading and interpretation of the building. historical analysis of the monument and in the reading and interpretation of the excavation plans. The incomplete transposition of the excavation (visible in situ or on plans) in its reconstruction/interpretation risks inducing greater confusion in the user, as it does not visible structures (the bridge pier) and the proposed interpretative model. proposed.

The modeling of the landing gate was done in Blender environment, an open source cross-platform software. The geometry of the elevation was realized applying the principle of Levels Of Detail (from LOD 000 to LOD 300) that allows not only to visualize different levels of detail, but also to scan the interpretive evolution.



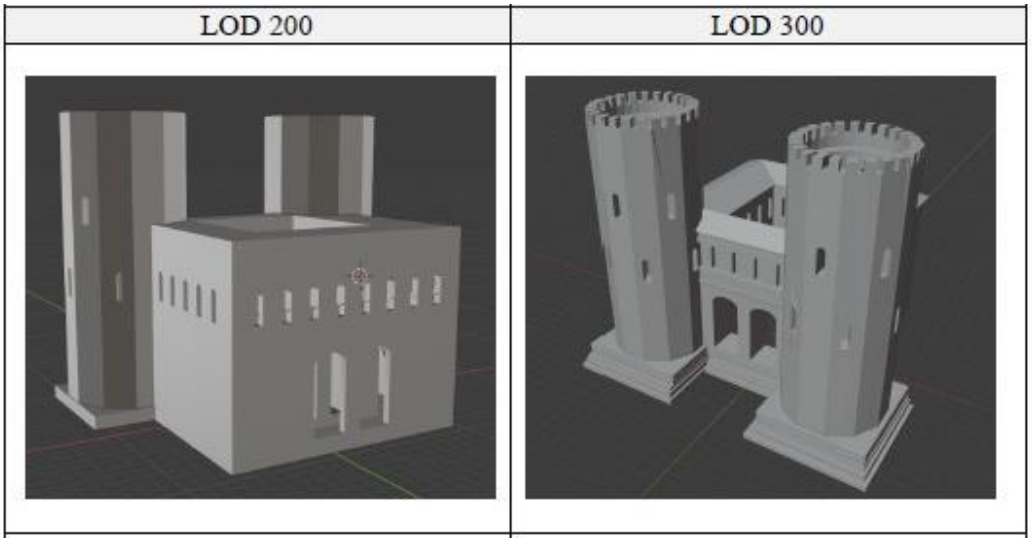


Figure 2: the reconstruction of the city gate was realized from LOD 000, which corresponds to the appropriately scaled floor plan, and reaches subsequent levels of complexity through processes of extruding the geometries and the addition of additional decorative elements (such as windows, battlements and moldings).

The Virtual reality is generated from the three-dimensional model produced in Blender and is represented within a panoramic photo in spherical perspective. This photo is generated by exporting an equirectangular rendering from Blender and Virtual Reality viewers (in this case, Oculus Go headsets were used). Oculus Go headsets were used). The succession of spherical photos was assembled into a real virtual tour, realised through the web application Kuula.co (https://kuula.co/share/collection/7PsD6?logo=0&info=0&fs=1&vr=1&sd=1&initload=0&thumbs=1)

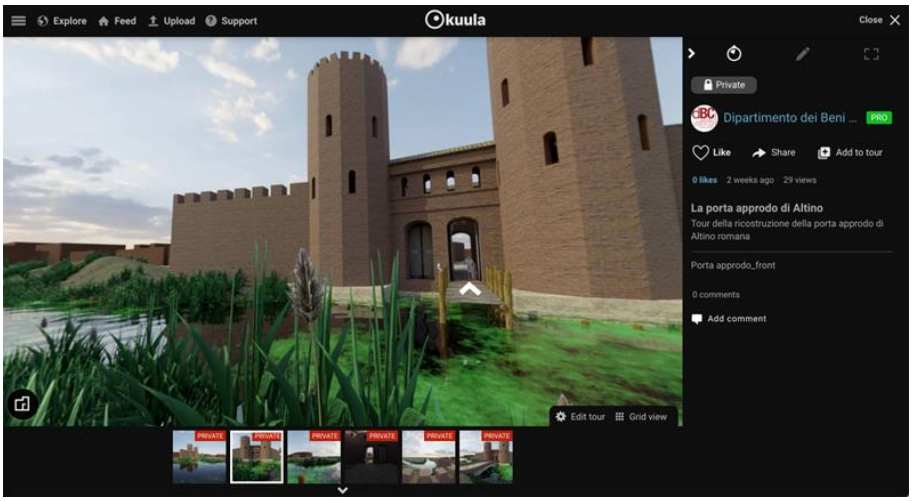


Figure 3: the application's home screen

In the definition of the equirectangular photos, the choice of user positioning was carefully considered.
In order to ensure this perception, priority was given to viewpoints that would enhance the height effect of the gate towers or allow an overall view of the monument. The equirectangular images were therefore realised, for example, from the pier at the foot of the towers, which therefore overlook the observer, or from the top of the towers themselves.
The choice of immersive fruition has necessarily also led to care for the component of materials, colours and contextual environment.
Archaeological excavations and material studies made it possible to distinguish the different building components by attributing materials and textures to the models. An essential component of immersive reality is in fact the realism achieved in the modelling and dressing of the model. From a methodological point of view, model dressing makes use of textures PBR (Physically Based Rendering). This term indicates a rendering technique that simulates the characteristics of a material and its response to light in real time. and its response to light.
With regard to the landscape context, palaeoenvironmental studies and research by remote sensing have provided useful clues to the planimetric reconstruction of the surrounding urban and environmental aspect.

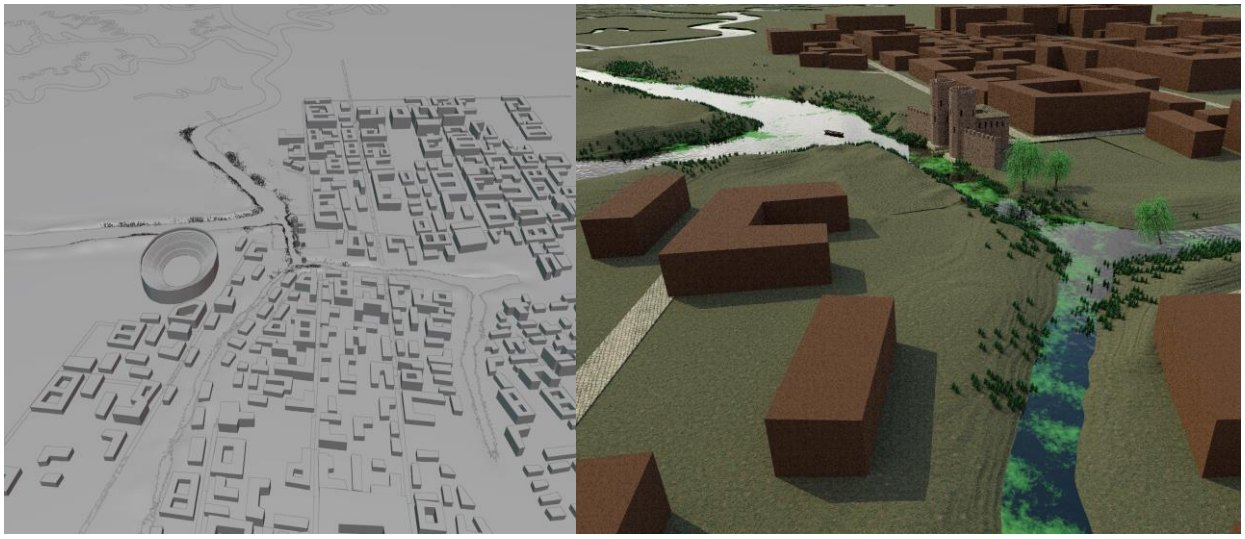


Figure 4: the landscape context is derived from palaeoenvironmental studies and remote sensing research (Mozzi et al., 2011): these make it possible to propose a planimetric reconstruction of the urban context and surrounding environment.

Particular attention was paid to the water component, both in the reconstruction and in the choice of viewpoints of the spherical photos. Visualisations related to the port function of the structure were also proposed. port function of the structure, such as an immersive reality proposal simulating the landing from the water element.

Figure 5: photorealistic effect has been tested both using Physically Based Rendering textures and physical reconstruction of the surrounding urbane surfaces.

Attention was paid to the user of the reconstruction, who with this model interacts with the new approach favours the acquisition of historical information and the understanding of the interpretative component. The immersive experience first allows the user to become a unit of measurement himself by perceiving without mediation the actual dimensions of the monument. To this are added perceptive components that guarantee, therefore, the involvement of the user, both from the physical and sensorial point of view, promoting an effective and persistent experience.

Figure 6: Virtual tour and immersive visualisation from equirectangular images.

The dissemination approach is also supported and emphasized through the possibility of placing textual hotspots on specific elements of the reconstruction to enhance the semantisation of what is represented. The outputs will be transferable in any other context with similar purpose of valorization and fruition. These deliverables can be considered as a “good practice” for other pilot sites in order to develop a responsible, suitable an innovative tourism**.**

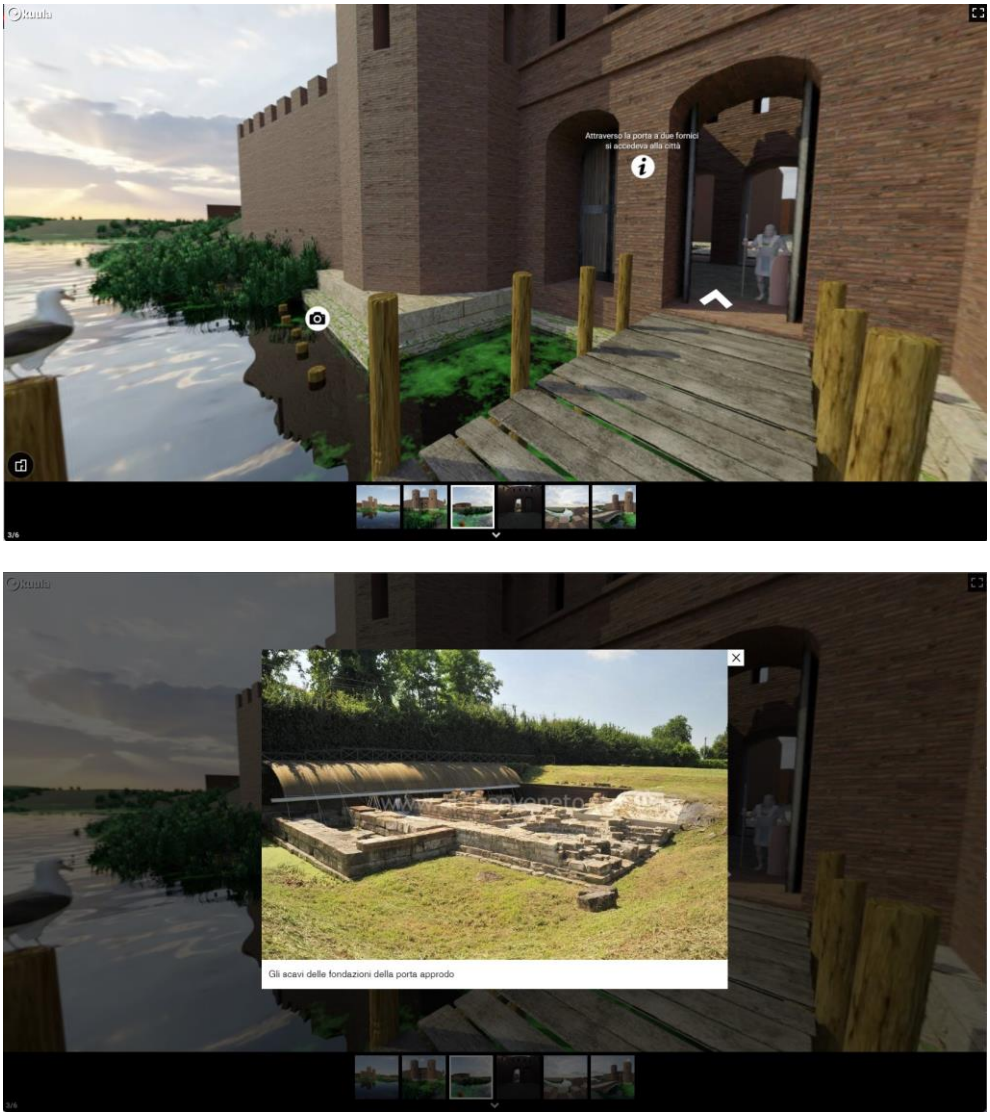


Figure 7: the use of hotspots within the spherical photo gives the user directions to follow the tour route and display textual and photographic information.