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The Engelbourg's ruins: from 3D TLS point cloud acquisition to 3D virtual and historic models

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The Castle of Engelbourg was built at the beginning of the 13th century, at the top of the Schlossberg. It is situated on the territory of the municipality of Thann (France), at the crossroads of Alsace and Lorraine, and dominates the outlet of the valley of Thur. Its strategic position was one of the causes of its systematic destructions during the 17th century, and Louis XIV finished his fate by ordering his demolition in 1673.
Today only few vestiges remain, of which a section of the main tower from about 7m of diameter and 4m of wide laying on its slice, unique characteristic in the regional castral landscape. It is visible since the valley, was named "the Eye of the witch", and became a key attraction of the region.
The site, which extends over approximately one hectare, is for several years the object of numerous archaeological studies and is at the heart of a project of valuation of the vestiges today.
It was indeed a key objective, among the numerous planned works, to realize a 3D model of the site in its current state, in other words, a virtual model "such as seized", exploitable as well from a cultural and tourist point of view as by scientists and in archaeological researches. The team of the ICube/INSA lab had in responsibility the realization of this model, the acquisition of the data until the delivery of the virtual model, thanks to 3D TLS and topographic surveying methods. It was also planned to integrate into this 3D model, data of 2D archives, stemming from series of former excavations.
The objectives of this project were the following ones:
• Acquisition of 3D digital data of the site and 3D modelling
• Digitization of the 2D archaeological data and integration in the 3D model
• Implementation of a database connected to the 3D model
• Virtual Visit of the site
The obtained results allowed us to visualize every 3D object individually, under several forms (point clouds, 3D meshed objects and models, etc.) and at several levels of detail. The 3D model integrated into a GIS is now a precious means of communication for the valuation of the site. Accessible to all, including to the distant people, he allows discover the castle and his history in an educational and relevant way.
From an archaeological point of view, the 3D model brings an overall view and a backward movement on the constitution of the site, which a 2D document cannot easily offer. The 3D navigation and the integration of 2D data in the model allow analyze vestiges in another way, contributing to the faster establishment of new hypotheses. Complementary to other methods already exploited in archaeology, the analysis by the 3D vision is, for the scientists, a significant saving of time which they can so dedicate to the more thorough study of certain put aside hypotheses.
In parallel, we created several panoramas, and set up a virtual and interactive visit of the site. In the optics to perpetuate this project, and to offer to the future users the ways to continue and to update this study, we tested and set up the methodologies of processing. We were so able to release procedures clear, orderly and applicable as well to the case of Engelbourg as to other similar studies.
At least, some hypotheses permits to reconstruct virtually first versions of the original state of the castle.