Chapter 68

3D Reconstruction for the Interpretation of Partly Lost or Never Accomplished Architectural Heritage

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ABSTRACT

During the past years there has been the birth of significant projects about digitization and virtual preservation of cultural heritage. Such panorama offers great chance to develop 3D modeling for cultural heritage. 3D reconstruction offers a chance to digitize historic objects which are still extant, and also to reconstruct and visualize objects which are no longer extant and that can only be known from historic descriptions or depictions. The chapter focus on the latter aspect. In fact, 3D modeling of extant objects is technologically or logistically challenging but virtual reconstruction of non- or no longer- existent items adds more importance to interpretation of historic sources. This chapter illustrates the current situation taking into account the state of the art, the different suggestions in solving such kind of problem, and through up to date examples will suggest a possible unified method to give life to both lost buildings and never built ones. The goal is to find common points with other similar cases, to obtain a common procedure and to suggest ways of development.

INTRODUCTION

The increasing use of computer technologies in projects involving the acquisition, documentation and communication of cultural heritage has led to fast and ever higher demands of standards and methodologies in order to create best practices models. The digitization of cultural heritage, the creation of databases shared on the network and the implementation of policies for the identification of shared global

standards have registered a considerable interest in Europe. The Europeana repository for example is an open access archive where digital copies, also 3D models, of cultural heritage objects can be viewed by a wide audience.

"In particular, Europeana Professional is the common website for Europeana projects, reaching cultural heritage professionals and technologists. It is the official source for technical information, metadata standards and case studies, and also brings together all projectwork" (Europeana Professional website, 2014). "Among the Europeana projects, 3D Icons establishes a complete pipeline for the production of 3D replicas of archaeological monuments and historic buildings which covers all technical, legal and organizational aspects. Also 3D Icons creates 3D models and a range of other materials (images, texts and videos) of a series of internationally important monuments and buildings; and contributes content to Europeana using the CARARE aggregation service". (Europeana Professional website, 2014)

This chapter is related to the debate about the use of ICT in cultural heritage. Within the study of the architectural heritage, 3D modeling plays a fundamental role. In fact, 3D modeling is the best way to illustrate architecture and it is a powerful tool to describe and share information about a building.

Nowadays, 3D modeling is commonly used both for the design of a new building (in order to illustrate all the volumetric and constructive features) and for the study of existing buildings, with the aim to define the restoration process and/or the re-utilization of the facilities. In recent years the importance of computer technology used in archaeological and architectural surveys has rapidly increased. Today there are numerous ways of digital solution for this kind of survey. Virtual 3D reconstruction is one of these.

To achieve a correct 3D virtual reconstruction particular attention is needed in survey operation. In fact, the 3D modeling of historic buildings is closely related to the survey procedure nowadays largely codified and tested. The Declaration of Rome on architectural survey states that "By architectural survey it is meant the whole set of investigations and operations aimed at identifying the meaningful characteristics (from the morphological, dimensional, figurative and technological standpoint) of an architectural unit or of a urban complex, and evaluating them to develop a simplified 3D model which will enable the analysis of the building unit, thus facilitating the interpretation of its transformation stages and of its structural, formal and aesthetic characteristics. Architectural survey is then a process which must result in a deep knowledge of the unit under investigation to highlight all its geometric, dimensional, figurative and structural values, materials used, building techniques, deterioration conditions and relationships with the urban context."(Cundari, 2001, p. 311)

During the restitution phase the 3D modeling development is very important and useful in order to show the peculiarity of a particular architectural heritage. Moreover if well conducted, 3D survey restitution can give much information related not only to the dimensional aspect but also related to the historical ones. By adding the time dimension, the model could describe the different building phases and the diachronic evolution of the construction. This operation is connected to the historical and architectural interpretation of the building. Such interpretation depends on the scholars that analyze the historical document and the stratigraphy.

As Ogleby (2007) states "there are several conventional stages in the graphical reconstruction of an antiquity. These include the gathering of source information, the interpretation of this information, the use of contemporaneous example and parallels, the development of a basic geometric wireframe, the addition of detail to this framework and finally the rendering (artistic or otherwise) of the result. This process is common (or should be common) to the generation of imagery regardless of whether a computer is involved". When the cultural heritage has gone partially or totally lost, 3D reconstruction plays a fundamental role, however the procedure is not yet fully coded and it is closely related to the interpreta-

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