ABSTRACT

Nowadays, when people talk about BIM software, they refer to new constructions, made of regular elements and standard parameters. The question is: what happens when one, instead of a new building, considers an ancient or existing one? To answer this question, the possibility of using effectively the BIM process for the maintenance and the conservation of Cultural Heritage has to be evaluated. In particular, the research examines the case study of the archaeological site of the Sanctuary of Diana in Nemi (Rome), which is an important example in the National Heritage. The final product consists of a parametric model, where one can find, embedded in a database, all the information about the elements for the management of conservation projects. Highlighting positive aspects and existing limits, in order to contribute to further studies on the subject, leading to a mandatory implementation and use of this software, even in relation to future European legislative framework.

KEYWORDS

BIM, Conservation, Cultural Heritage, Maintenance, Survey

1. INTRODUCTION

The aim of the research in progress today is to test, with real data and real case studies, the BIM process and highlight the difficulties in order to improve it. In particular, the target is to test these programs, which satisfy the requirements of the new buildings, and see if they can also be successfully used in complex situations, as those linked to the Cultural Heritage field, where you have to consider the unicity of the architectural elements, the constructive systems and materials (not standardisable as the new ones), the damage of the structures and the environmental conditions. Specifically, the presented work focuses on the theme of Archaeological Heritage that is defined by ICOMOS (1990): “The archaeological heritage is that part of the material heritage in respect of which archaeological methods provide primary information. It comprises all vestiges of human existence and consists of places relating to all manifestations of human activity, abandoned structures, and remains of all kinds (including subterranean and underwater sites), together with all the portable cultural material associated with them”.

The choice to deal with the study of an archaeological site is determined by the urgency to protect and conserve them (e.g. the Italian case of Pompeii). As “the overall objective of archaeological heritage management should be the preservation of monuments and sites in situ, including proper long-term conservation and curation of all related records and collections etc” (ICOMOS, 1990), it’s necessary to verify the possibility of a parametric model, interoperable, semantic and clever, capable of offering a 3D representation of the heritage within all the information about its life cycle.
and all the survey made during time. Also the complexity proper of Archaeological Heritage of some characteristics (historical, architectonical, structural, constructive, materials and decay) makes the case study interesting in order to evaluate the feasibility of several operative and management procedures (Italian Cultural and Environmental Heritage Code, 2004).

Nowadays, there is a constant diffusion of BIM systems among different fields of application. Building Information Model is not a single software, but it is a process that supports both the information sharing and the maintenance of buildings. Harpaceas states that the BIM modules are three: “Authoring”, including all the software that build the 3D model; “Tools”, used for the computes and the information about the materials in the construction site; “Review”, checking the final model implemented by all the information, ensuring that the structural, architectural and plant models correspond.

It is clear that the potential, which until now has been used mostly in the new constructions field, can be adapted and refined in the CH field.

Before showing the case study, it is important to know which data are managed in archaeological areas.

2. WHAT THE CULTURAL HERITAGE NEED FROM A BIM SYSTEM?

What is interesting for the potentiality offered by the BIM technology is the methodical approach not only for the interventions needed, but also for the management of the cultural Heritage, with the activities to monitor its health condition and the maintenance.

The working method realized using these instruments would allow the achievement of these tasks:

- The digital representation of the existing building;
- An informative database about all the different elements of the heritage;
- A recurring checking of the health condition of the heritage;
- The evaluation of the effects of different typology of intervention.

The management of existing site has different needs from the new buildings, therefore it is important to know the precise information that the model must contain:

- Geo localization
- Shape of the element
- Materials
- Different layers of materials
- State of decay
- Historical information
- Environmental conditions

2.1. Uses of BIM in Cultural Heritage Fields: International Experiences

The modern Information Technologies (IT) tools offer several possibilities to organize the knowledge of the artefacts, in order to conserve, protect and valorise them. The general trend is to build dynamic and suitable tools to handle the information about the restoring and management process.

The digital archiving techniques, analysis and administration of the data, use the 3D model as a support where it is possible to georeference the material and topological information, the transformations in time, the constructive and technical installations (as climate services, utility services, lighting, etc.). In this way, if all the archive is constantly updated, it contributes to the life cycle management and the plan of work of the ancient building or archaeological site.
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