

Chapter 11

From the Digitization of Building Materials to Their Use in BIM Models on an Open Standard Platform: The eBIM Project and Its Applications

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ABSTRACT

The information data that can be included in models can also relate to the different dimensional domains of BIM depending on the purpose of the model itself. On this premise, the POR-FESR eBIM project “Existing Building Information Modeling for the Management of the Intervention on the Built Environment” has developed skills, models, and solutions related to the conservation and enhancement of the built heritage using the BIM methodology implemented on dedicated IT platforms, identifying and characterizing the materials that compose it (from the shell to the structure to the covering). Among the various building materials, particular attention has been devoted to ceramic tiles and to their role and uses in the building industry for their digitization and use in BIM models on an open standard platform.

INTRODUCTION

The project “Existing Building Information Modeling for the management of intervention on existing buildings”, of which the CIDEA of the University of Parma is the lead partner, is a project co-financed by the Emilia-Romagna Region within the framework of the Call for Strategic Industrial Research Projects aimed at the priority areas of the Intelligent Specialization Strategy (DGR n. 986/2018) POR_FESR 2014-2020 (ASSE 1 Research and Innovation) and has invested the Construction and ICT sectors.

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To these two areas belong all the partners who have operated in an integrated way within the project that has seen the involvement of different sectoral supply chains, connected with the main one of construction: digital technologies applied to the acquisition and restitution of 3D data of the built environment, information technologies for the implementation of web platforms with semantic content, industries in the ceramic sector and construction companies.

The research and technology transfer activities carried out within the project concerned the conservation and valorization of the built heritage, both historical and non-historical, using the BIM methodology, by defining operational protocols for the use of the protocol on existing buildings, through the identification and characterization of materials (from the shell to the structure, to the covering), up to the transfer of information on dedicated semantic web platforms (Apollonio, Gaiani & Bertacchi, 2019).

The experience carried out, with the aim of optimizing the techniques of advanced Geomatics for the creation of three-dimensional models of historical buildings and implementing algorithms for the generation of integrated structural models in a BIM environment, has allowed to select among the possible case studies on which to test the protocol of survey and modeling in a BIM environment, a series of architectures exemplifying the diversity of construction period, construction techniques used, types and dedicated functions, up to the category of intervention to be implemented on them to achieve a reuse consistent with their characteristics.

Within the eBIM project, thanks to the parametric modeling carried out on the selected case studies, one of the main objectives was precisely the implementation of the semantic database aimed at supporting the extraction of values by the various categories of users, thanks to the wide availability of the data collected throughout the process and within shared technological environments: technologies and procedures for acquisition, integration, modelling, and representation.

BACKGROUND

As is well known, BIM is a project management methodology, in all its phases, which is optimized for collaboration and visualization during the development and realization phase of a project, but which increasingly also addresses the management and maintenance of the same during its life cycle: its purpose is therefore primarily to support the professional to develop and realize the project through a collaborative process focused on the physical, functional and user aspects of a building.

In this process, the information content within a three-dimensional model prepared according to the BIM methodology is the most important part. The information data that can be included in models can also relate to the different dimensional domains of BIM depending on the purpose of the model itself (Baiardi & Ferreira, 2020). In this sense, the issue of data interchange and the usability of data over time becomes just as important as the choice of information to be included in the models.

In the research project POR-FESR “eBIM existing Building Information Modeling for the management of the intervention on the built environment”, it has been experimented how much the information can be usable in time and updatable through the creation of information models in which they are connected to external databases structuring information fields that describe building materials, making easier the updating of the information that takes place outside the BIM model (Figure 1).

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