Chapter 4

Building Information Modeling (BIM): Great Misunderstanding or Potential Opportunities for the Design Disciplines?

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ABSTRACT

The BIM universe will undoubtedly arouse great and diversified interests amongst actors involved in the design/building process but also of scholars dealing with representation disciplines. The BIM systems appear in fact particularly suitable to respond to both needs providing on a single platform analytic tool, visualization interfaces, assessment instruments but also a bundle for the representation of reality. And, in addition to that, always taking into account the management of the process in terms of timing that is a key element for a correct handling of any building workflow. Nevertheless, the urgency of optimization of time and resources will drive very rapidly this change achieving, eventually, the real result: an evolution of future generation professionals, more willing and able to cooperate beyond personal skills.

INTRODUCTION

About 20 years ago, the so-called digital revolution came forcefully into architectural domain radically changing the way architecture was designed, documented, represented, visualized and even built. Lines traced on paper were first confronted and then quickly overcome by digital mathematical entities (points, lines, surfaces) interactively created, edited and visualized by users using a CAD software on a personal computer (Caffi, 2006).

DOI: 10.4018/978-1-5225-0680-5.ch004
Although technological resources were very limited in those “proto-digitalism” years (not even comparable with the computing potentials that are commonplace for us), nevertheless the main tendencies of this revolution/evolution were already quite clear: on one side, those users (the majority) who simply tried to adapt their traditional drawing tools and approaches to a new medium; on the other, a smaller number of pioneers who explored a new way of constructing architecture directly using parametric 3D objects (both in virtual and real sense). The system adopted by this second group is currently described with the acronym BIM (Ciribini, 2013; Caputi, Odorizzi, & Stefani, 2015).

In the first case, the representation respected the traditional workflow, although requiring its adaptation to CAD platforms and interaction tools and devices (mouse and keyboard instead of pencil and rulers).

The drawing changed thus its backing and its input mode, but preserved its role and main features. Users just had to perform “digitally” their tried and tested activities to achieve the standard description of any architectural object (Bianchini, Borgogni, Ippolito & Senatore, 2015).

In the second case, instead, the descriptive character of any graphic element of the representation was enriched and enhanced by a symbolic component linking the element itself to the widest range of underlying information. This method of work took thoroughly advantage of IT potentials and especially of its ability to share and integrate different data using a graphic interface. The design outputs, traditionally made of separate products (drawings, reports, tables, programs, quantity bills, etc.), found a sort of unification in this BIM digital environment as items of a database ordered according to the single architectural element. In this framework, the graphic representations became at the same time evocative views, portals to access the informative database, 3D virtual objects highly corresponding to their real counterpart at the end of the construction process. The parametric nature of these 3D elements eventually provided an interesting flexibility to the system and the possibility of automatically updating the entire connected database even in case of slight changes (in dimensions, typology, position, material, etc.). The inner architecture of CAD and BIM systems, though sharing a considerable number of functions, is nevertheless very different. In particular, BIM works directly with libraries of 3D parametric objects from which the designer extracts and customizes all the single elements that, one after the other, build the final construction.

More than just software for drawing, CAD and BIM provide thus two different answers to the same representation and design issues (Schmitt, 2008). On the one hand, CAD systems preserved the traditional structure of the architectural project (as collection of “unique” outputs) providing though a significant enhancement of the representation phase (i.e. elimination of physical media, copy/paste/move/delete/undo and other editing tools, perfect replicability and sharing of digital outputs, etc.). On the other, instead, BIM allowed for great benefits in terms of productivity (Biagini, 2002): better control of the project, construction process and also building management, even if paying more than something in terms of design freedom for the rigid structure and limited extension of libraries (Biagini, 2007).

Presently though, BIM systems have much improved thanks to the technological evolution and nowadays provide more refined tools to manage the processes related with architectural design and construction. User-friendly and partially automated tools allow for a very detailed simulation and assessment of the building workflow from different standpoints: formal, descriptive, qualitative, quantitative, etc. The “past” quest for completeness of the architectural project (always partially achieved collecting the several different outputs mentioned in previous lines) is achieved by BIM systems not only by working directly with virtual 3D objects “augmented” by additional information, but especially using for all operations a single interoperable software platform. This possibility of coexistence for all main parameters of a construction actually represents the key factor of BIM systems success because it has provided to

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