Chapter 9

The Renaissance Proto-Parametrization: A Project Tool

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ABSTRACT
The chapter proposes the definition of a workflow aimed at the BIM modeling of historical architectures referable to the classical language of Renaissance treatises. Through the experimentation on a case study conditioned by pre-existences, the authors exploit the potential offered by BIM software to contain standardized and rewritable information through the management of the temporal phases. Starting from the discontinuous model, ideal geometries are defined using a continuous mathematical language. These geometries are gradually adapted to the case study by consecutive steps of modification. The different phases of the modeling are recorded in the database, favoring the transparency of the process. HBIM thus becomes an instrument not only of modeling and documentation, but also of analysis and interpretation of the architectural complexity of the historical built heritage.

INTRODUCTION
To get to know thoroughly, and never completely, a historical architecture in its complexity it is necessary to organize a vast set of information of various kinds: geometric, material, technical-constructive, historical, etc. This information structure, very often, does not reside within the same digital platform, today’s preferred means for recording and transmitting data. On the contrary, the various platforms used, in many cases, are not compatible with each other.

Some difficulties in the management of such information could be mitigated if we resort to the use of codes that generated some types of architectures, in this specific case renaissance.

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In this way a method is set up to classify the elements that make up an architectural space, which, although different, can be traced back to common geometric matrices and, therefore, can be parameterized.

The parametric modelling of architectural heritage components and their possible variants pushes to find a digital platform that is a complex information system, so as to respond to the need to manage as much information as possible in a single database.

It is to be noted that already at the dawn of modernity, with the invention of printing, we began to remove the need for direct experience of architecture to enhance its virtual dimension, thanks to the great accessibility of two-dimensional graphic models based on rules systems.

Therefore, a parallelism between the Renaissance treatises and the parametric digital modelling was born spontaneous (Figure 1).

This dialogue between these different worlds becomes more dense if we consider that the treatise was born to standardize, to characterize and to spread on the territory an architectural practice.

Among the software that exploit parametric modeling, there are some that lend themselves in a particular way to generate standardized, queryable and interoperable models. This kind of modeling, applied to the historical built heritage, is part of a process of managing the heritage itself that is the HBIM.

The difference between a traditional CAD approach and a BIM is that the latter represents, not only a tool for the creation of papers, but a real computerized archive, an integrated database in which everything is parametric and interconnected.

It is a matter of discussion whether a BIM approach can be adapted to the particular needs that relate to a multidisciplinary context such as that of architectural heritage. The BIM model excludes from the process some factors and operators not foreseen in a process designed for new buildings - protection bodies, historians, restorers, etc. - and this, consequently, implies the need for an increase in interoperability. To intervene on the possibility of interacting between professional figures and platforms, digital and otherwise, a common language must be found: the drafting of codes, geometries linked to each other by relations between the parties, can be the road to pursue in the search for the common matrix.

Since BIM is an integrated method of knowledge that makes it possible to work on finite elements, the objective of this research is to study historical architectures whose models of analysis are integrated between them, starting from the discrete model - point cloud. We want to experiment with the application of these models and to test their effectiveness for the study of historical architectures for which a common stylistic and geometric matrix is recognized.

Figure 1. Parallel between the Renaissance parametrization of the Vignola’s treatise “Rule of the Five Orders of Architecture” and the digital one BIM: setting of the profile families to be nested within 3D components.