Chapter 2

The Surveying and Representation Process Applied to Architecture: Non-Contact Methods for the Documentation of Cultural Heritage

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ABSTRACT

The constant development and improvement of laser scanning instruments together with the digital rebirth of photogrammetry (photomodelling) has triggered the operative and methodological evolution that in many aspects has already facilitated the acquisition phase, especially referring to the time required for the procedure. The present paper, however, investigates the methodological changes occurred especially in the last decade concerning surveying and its representation. We shall describe the peculiarities and articulations of these methods aiming at pointing out some conceptual issues involving measurement, interpretation and representation. The final objective is to construct an “operative critical method” which seems indispensable to standardize and regulate the procedures of data collection, elaboration and representation of architectural artifact providing results more objective and reliable: in other words more scientific.

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INTRODUCTION

The possibility of carrying out an accurate survey of complex geometries, a task that would yield a deep study of the object with the perception and analysis of geometric and material details performed at considerable cost with traditional techniques, has recently become a necessity felt stronger with the passage of time. Similarly, it is even more necessary to archive and document the actual state of the objects analyzed, especially when there is a need for reconstruction or maintenance work to carry out.

Precisely because of the typological and dimensional variety of architectural artifacts, their surveying, analysis and representation allows one to ponder equally diverse and variable problems. One of the possible solutions to the problems inherent in the surveying process is working out guidelines that would standardize all the stages of surveying independently from the object under analysis.

In principle, the aim of data acquisition, elaboration and representation is to produce “scientific results”, that is to say, outcomes that are repeatable and similarly more objective. For this reason, the guidelines should focus on the following problems:

- Understanding and solving of the criticality level of the acquisition instruments and technologies;
- Suggestions for the correct application of the technologies under consideration;
- Possibilities of speeding up surveying and representation;
- Reciprocal feedback between operative protocols, instruments and the general Survey Theory.

The present article puts forward a “critical operative method” which seeks to establish some common principles of the entire process while not aspiring to provide a formal general protocol. Obviously, the point is to put forward some guidelines which will be dynamic and continuously evolving, conceived with the aim of preserving the characteristics of “scientificity” of the entire process of surveying and representation while at the same time constituting the fruit of constant experimentation with diverse objects with the use of different technology (long range laser scanner, short range laser scanner, photomodelling).

BACKGROUND

The surveying process has undergone considerable changes with the passage of time. This was due to the introduction of innovative technologies for data acquisition as well as to the application of digital technologies for representation. The new technologies solved some of the problems of surveying, for example, accelerating data collecting, yielding graphic models less subject to interpretation and more adequately corresponding to reality, or offering the possibility to reproduce the graphic models many times with the view to sharing it with other researchers and scholars (see Figure 1, see Figure 2).

The technology developed in the last twenty years makes it possible to obtain millions of points almost automatically in ever-shorter spans of time. This performance level produces quite detailed graphic models but they do not go well with subjective interpretation that is the characteristic feature of the stage of representation. What is more, the collected data and the 2D and 3D models – if they are digital - become elements to be “archived” so that they can be used and shared by various users for different purposes (see Figure 3).

The characteristics of being used and shared designated to the final result of the surveying process, i.e. to models with a distinct formal, figurative as well as geometric relation between their constitutive parts, become a “perfect” medium for conveying information (see Figure 4).