Chapter 3
From Digital Survey to a Virtual Tale: Virtual Reconstruction of the Convent of Santa Maria delle Grazie in Milan

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ABSTRACT

Nowadays, the innovative learning methods, such as serious games, have become the new frontier of education and communication; in architecture, the virtual reconstructions of historical sites in their current state, in their original appearance and in their evolution over the centuries have contributed to the development of digital technologies (such as digital survey, Virtual Reality, and Augmented Reality). This chapter describes the potentialities of new digitization technologies as tools to communicate and disseminate Cultural Heritage (CH) starting from its digital survey and a scientific research of historical sources. This research finds a new way to effectively tell the history of a monument and to transmit its value as a witness of ages that no longer belong to us, bringing it virtually to life. Specifically, the research group focused on the test of a digital workflow of surveying and modelling of some rooms of the convent of Santa Maria delle Grazie in Milan, that contain wonderful witnesses of Italian Renaissance characterized by a troubled history.

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INTRODUCTION

In the last years, survey results have developed in terms of accuracy, allowing detailed 3D reconstructions of almost everything (Krusche, 2018) and giving the opportunity to trace architectural features and their transformation across the centuries. This opportunity proved to be fruitful for researchers, giving the possibility to virtually recreate existing environments from physical models, measuring them with great precision.

This chapter wants to testify how the new digital technologies and the devices connected to the industry 4.0 can promote the knowledge and the dissemination of Cultural Heritage, as well as the education to art and history. With a view to reaching this aim, the researchers developed a digitization workflow focused on some areas of the convent of Santa Maria delle Grazie in Milan.

Some of these environments (the Cloister of the Frogs, the Old Sacristy and the Small Sacristy) were built in the context of a major project to renovate the architectural complex at the end of the 15th century. They are therefore significant examples of Renaissance art for the beauty of their architecture and for the extraordinary art masterpieces they contain. Furthermore, the research focused on other environments of the complex, such as the Cloister of the Prior and the New Sacristy, that are particularly interesting for their troubled history and their evolution over the centuries, since they were subjected to demolitions and reconstructions before and after the events of the World War II.

All these very valuable places suffer the lack of attention of visitors due to the polarization of interests towards Leonardo’s Last Supper, in the northern part of the convent.

Specifically, the research group conducted a combined digital survey in order to create a Virtual Reality (VR) simulation to experience a part of the history of the convent in an innovative way. The aim of this VR experience is to promote the fruition of the complex from an unusual point of view, providing a visit route (alternative to the traditional one) that allows the visitor to cross places generally closed to the public or environments where distracted tourists just pass quickly, generally to reach the Refectory, where “Last Supper” is. Ultimately, the research tries to reverse this trend, increasing the visits in these less known places, stimulating tourist’s curiosity, bringing to life the history of the monument through a virtual reconstruction and an involving storytelling.

All studied environments have been surveyed through photogrammetry and terrestrial laser scanning and modelled in the form of NURBS (within a 3D modelling software) or reconstructed in the form of meshes (deriving from the point clouds).

The entire 3D model was imported in a game engine in order to create a realistic VR simulation (Tschirschwitz-Büyüksalih et al., 2019) as close as possible to reality.

BACKGROUND

In the last years, there was a turning point in the evolution of the representation techniques, when computer graphics first, and gaming then, met photogrammetry and laser scanner techniques (Verhoeven, 2017). From this point of view, new digital technologies, above all Virtual Reality, have started to develop, showing their extraordinary power to collect, analyse, enhance and disseminate the knowledge