

Digital dissemination to support the rebirth of a neglected built heritage

The case of the St. Augustine complex in Fabriano, Italy

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Introduction

Architectures may be considered as the result of a series of interventions over time, where humanity has built, demolished, rebuilt, repaired, restored, reused and sometimes even forgotten the spaces it has created. The Church of St Augustine and the Oratory of the Blessed *Becchetti* are two of the many examples in Italy missing a proper intervention after a disaster. In this case the baleful event was the earthquake that struck central Italy in August 2016, leaving these places to oblivion and making them easy prey for further abandon and decay. In fact, the earthquake made the complex inaccessible due to the risk of structural collapses, a first intervention put in safety the most damaged parts, but the whole building was left without significant intervention and closed to the public since then. It was therefore necessary and required to create a new virtual accessibility to allow visitors to learn about these places through the dissemination of contents and information in order to stimulate preservation and protection for this built and artistic heritage.

The research presented here was initially based on the digital survey of the complex, with a classic graphic restitution and it was then integrated with the creation of a virtual tour and the development of a simple APP that, through the use of AR, allows the user to perceive the relationship between the rich mural paintings and the architectural space in which it is located.

Historical background

The Church of St. Augustine and the Oratory of the "Beati Becchetti" (Blessed Becchetti, the name indicates the surname, Becchetti, from a family of devouts who dedicated themselves to Christianity so to be considered blessed) are located in Fabriano, a town in the central Apennines that experienced a cultural and artistic flourishing in the Middle Ages thanks to the presence of various Gothic painters such as Gentile da Fabriano, Allegretto Nuzi and Maestro di Sant'Emiliano.

The church, also known as *Santa Maria Nova* -to distinguish it from *Santa Maria Castri Veteris* within the city walls- was founded in 1216 by Gualtiero di Ruggiero Chiavelli; the subsequent expansion

and incorporation into the city walls was the achievement of his son Alberghetto. Various interventions have changed the original structure. What remains are the single-arched windows, now filled in and surmounting the Romanesque-Gothic portal that was the entrance to the church and the gateway to the adjacent convent. The violent earthquake of 1741 compromised the structure and brought a restoration that distorted the interior appearance of the church, which assumed 18th century forms. During these interventions, the two side chapels of the church were spared, the one on the right, dedicated to Saint Augustine, and the one on the left, dedicated to Mary Magdalene. They were frescoed in the 1320s by Maestro di Sant'Emiliano and others, they received a restoration in 1933. Both chapels have a square plan and are covered by cross vaults with ribs. The frescos present scenes from the lives of both the saints, with large frames and a significant level of details. The church was closed and reopened for worship several times, used as a warehouse during the First World War and almost hit by bombing during the Second World War. As mentioned, since 2016, it has been permanently closed.

From the quadriporticus in front of the church, it is possible to access the Blessed Becchetti Oratory, commissioned by Pietro and Giovanni Becchetti after their pilgrimage to Jerusalem. Since the abolition of the convent in 1861, the rather damp and dark surroundings have been affected by decay. The oratory consists of three compartments; access is through a door leading to the first level of the building, a staircase leads to the hypogean section, possibly dedicated to the Virgin, another staircase flanked by two aedicules - the Gothic one on the right, the neo-Gothic one on the left - leads to the Mount Calvary section, where the mural *Lignum Vitae* takes place. This very impressive painting, which is however in such an advanced state of decay that the painting technique is no longer discernible (scholars argue about whether it is fresco or dry painting), shows a large tree with twelve branches, at the end of which are just as many clipea, representing twelve prophets with white scrolls. At the top centre is a pelican tearing open its chest to feed its newborns, a metaphor for Christ sacrificing himself for humanity, flanked by two circular openings that originally lit and ventilated the room. The oratory was completed by a group of wooden statues that can be dated to the late 14th and early 15th centuries and are now kept in the *Pinacoteca Civica di Fabriano* (Fabriano Civic Art Gallery). The visit to the oratory was probably a sort of virtual visit to Jerusalem, a valuable experience of faith in times when visiting the Holy Land was not possible. A solution quite common in religious complex and present in central-northern Italy and with various similar interventions around Europe.

The digital survey

Creating the digital twin of St. Augustine complex, took three days of digital survey, documenting the elevations, the quadriportico, the interior of the church, the chapels and the oratory, and the wooden statues that formed the original setup of the sanctuary. The organisation of the work was designed to make the most of the performance of each instrument according to the architectural context in which they were used. The survey work was carried out with two phase-shift 3D laser scanners: the Cam/2 Focus 70S and the Z+F Imager 5016. A full photogrammetric survey was operated for all the mural paintings/frescos and for the statues. The photogrammetric images were taken with a medium format digital camera, a Fujifilm GFX-50s with a resolution of 50 megapixels with two high quality lenses, a Fujinon 32-64mm F4 and a Fujinon 23mm F4 (equivalent to a 25-50mm and to a 18mm on full-frame format) and the help of two strobe units, which were essential to avoid the creation of

deep shadows and dark areas that may have caused problems in the photogrammetric calculations and may have brought partial documentation. To allow an easy creation of a virtual tour of the whole complex, the panoramic images were taken with an Insta360 Pro II camera, which has six fisheye lenses and allow the capture of pictures and video up to 8K resolution.

The registration of the scans and the alignment of the point cloud in a single reference system resulted in a complete and trustable model of the whole building. The point cloud model, together with the photogrammetry results, enabled the subsequent graphical outputs, creating the first full detailed documentation of St. Augustine. The high quality textures obtained from the data processing allowed a clear and practical reading of all the sacred stories frescoed on the wall surfaces, with the option of enhancing specific parts and include them in the multimedia contents of the virtual tour.

Virtual access

The Sant'Agostino complex is one of the many Italian episodes that would need to be protected, restored and upgraded as they are unusable due to the earthquake and the delayed interventions, and them passing from the state of a neglected shame to valuable artistic patrimony to a public attracted by the unique beauty of a collection who survived centuries of difficult decay.



Fig. 1. Screenshot from Oratory's virtual tour (source: https://www.didalxr.it/Fabriano_SantAgostino/index.html)

At the present state of development this research proposes a new usability that takes advantage of contemporary technologies, in particular using VR and AR solutions, in order to bring as many people as possible closer to the complex and fascinate them, while being a valuable and new study tool for students and scholars.

An early version of a full virtual tour has been created, it allows visitors to navigate these sites, move through the different overviews and give them the freedom to linger, participate and interact with the sensitive areas (fig. 1). The tour is composed of 360-degree photos, multimedia contents and additional information. Especially in the case of the side chapels, this tool was essential to restore an overall reading of the fresco cycle that was lost with the construction of the two wooden staircases that dominate the rooms. In order to promote the popularisation of this cultural asset, it was also decided to create a tangible 3D model and a digital model of the Mount Calvary Chapel, which together create a third model that testifies to its current precarious and problematic state, to serve

as documentation and a source for popularisation and study. The aim is to recreate the suggestion of this place through the perception of the real proportions of the space and the wall painting that it contains. The 3D digital model was created by merging the material information of the photographic images and the metric information of the scans made with the 3d laser scanner using Capturing Reality Reality Capture software (RC). The subsequent optimisation, scaling and thickness assignment were the key workflow to 3D printing the model, which was overlaid with the processed high-resolution texture. The APP (fig. 2), currently only available for iOS devices, allows the creation of a reality overlay that adds digital content to enrich the perception of the real space, which is then accessible in a simple and intuitive way.



Fig. 2. AR App and 3D printed model of the oratory combined in a specific digital tool for learning and dissemination

Conclusion

At the present state of development the research proposed here has shown how a fragile and changeable Cultural Heritage can be addressed to new recovering starting from his digital twin, creating proper bases for restoration intervention and at the same time proposing new ways to access and enjoy these assets, and to seek strategies to enhance and publicise these currently forgotten and abandoned places. The goal to be achieved is an ever-increasing awareness and the creation of different approaches that allow heritage to be explored in the educational field, facilitating study and knowledge.

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