

Digital Heritage: Digital Drawing and new Research Tools for Investigation in History of Architecture

Hypothesis of virtual reconstruction of Monchique Convent (Porto, Portugal)

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Abstract. This work aims to address the Digital Heritage topic in the light of the new investigation opportunities within History of Architecture, which have been brought by technological development. The protagonism assumed by digital drawing will also be addressed as a research, analysis, preservation and promotion tool of the cities' built heritage.

Our object of study - the conventual complex of Monchique (Porto, Portugal), which has suffered several transformations over time (both in form and function), serves as an example to show how digital tools contribute to the spreading of historical knowledge as a living memory, mostly to a wider audience and not only to experts in the field. The three-dimensional models, such as the one we propose to build, take on shapes capable of (non-destructively) reconstitute previous stages or the constructive evolution of the building, enabling its better understanding, within a both humanist and enlightened perspective.

Given that the digital cannot replace physical and phenomenological experiences of built heritage, it does however allow innovation in its holistic and multidisciplinary reading, providing new opportunities for its knowledge and fruition, as it is the specific case of the virtual tours and the augmented reality.

In conclusion, we fit in a wider vision which perceives that the combining of science, culture and education, together with the potential of digital and immersive technologies, can actively contribute to an improvement in learning and development of multiple perspectives on the built heritage and, consequently, on the shift of learnings between experiences, in a shared construction of knowledge.

Keywords: Digital Heritage, Digital Reconstruction, Monchique Convent.

1 INTRODUCTION¹

Today, cultural heritage faces a new reality due to the development of digital technologies and the Internet. If, on one hand, citizens are presented with the unprecedented opportunity of access to cultural materials, on the other, authorities within this domain are able to reach increasingly wider audiences, involving new users and developing creative content which will be accessible for both leisure and education. Thus, the usage of means such as augmented reality (AR)², virtual reality (VR)³ and mixed reality (MR)⁴ becomes more common regarding the access and promotion of cultural heritage. This combination with technological development also adds to a better understanding of our common past, increasing its appreciation, conservation and protection.

We based ourselves in these premises, gathering different methodological and analytical approaches, in a collaborative and multidisciplinary perspective, which allows the testing of new technologies within the History of Art and Architecture field. In the specific domain of Digital Heritage⁵, the creation of three-dimensional models, combined with its visualisation in different channels, enables the verification of the information obtained from documental, iconographic and archaeological sources, in a virtual dimension which allows the recreation of issues such as: urban settlement, scale, layout and interior and exterior design of constructions, as well as its environmental, spatial and landscape realities [6]. By extension, this methodology contributes to a greater awareness regarding the landscape and both the landscape and environmental framework of the built heritage. “To perceive the landscape is (...) to carry out an act of remembrance, and remembering is not so much a matter of calling up an internal image, stored in the mind, as of engaging perceptually with an environment that is itself pregnant with the past” [7].

One of the biggest obstacles in a state of nature as the one we suggest is in the conciliation of various sources, from several entities and that sometimes do not allow a

¹ This paper is part of an ongoing PhD. research project in Heritage Studies, with a specialisation in History of Art, at the Faculty of Arts of the University of Porto. The aforementioned paper is being developed under the supervision of Maria Leonor Botelho (FLUP - DCTP/CITCEM) and is co-supervised by Teresa Cunha Ferreira (FAUP – CEAU). The project is currently being financially supported by FCT and has the following reference: SFRH/BD/132302/2017. The journey to the USA is funded by "papers@USA grants" awarded by Luso-American Development foundation and has the following reference: VR/MV/2018-126.

² For more about AR application on cultural heritage appreciation, see: [1]; about the interaction between devices capable of AR and paper maps for exploring cultural heritage, see: [2]; about the virtual reconstruction of buildings, see: [3].

³ Example of virtual reality application in the reconstitution of Song's dynasty Chinese temple: [4].

⁴ Often referred to as hybrid reality, results from the combination of augmented reality with virtual reality in creating new visualisation environments.

⁵ “Digital heritage is made up of computer-based materials of enduring value that should be kept for future generations. Digital heritage emanates from different communities, industries, sectors and regions” [5].

unified vision of the architectonic object: archive documentation, field archaeology, typological and artistic analysis and material culture study.

1.1 Object of study

Our object of study is Monchique Convent, already addressed by us in scientific meetings [8]. Taking into consideration the deep changes this conventual complex suffered throughout the times and the current state of ruin of part of the building, we find imperative the promotion of its awareness, seeking to reinscribe it in the memory and collective legacy of the city, of its inhabitants and of everyone who visits it. "The task of the historian is to rectify again, with all means he can reach, the gaps that nature's strikes have inflicted from the time of its original creation" (as for Monchique's specific case modifications are explained by other factors such as the change of function and ownership, among others) [9]. Given this, we resume Alois Riegl's challenge, which encourages the restitution of historical value of the built heritage. That being said, "(...) this cannot occur on the monument itself, but only in a copy or in sheer thoughts and words"[10]. Far from 1905, when these words were first published, and using the opportunities provided by technological development, we embark on this replacement by formulating a hypothesis of digital reconstruction of the built heritage.

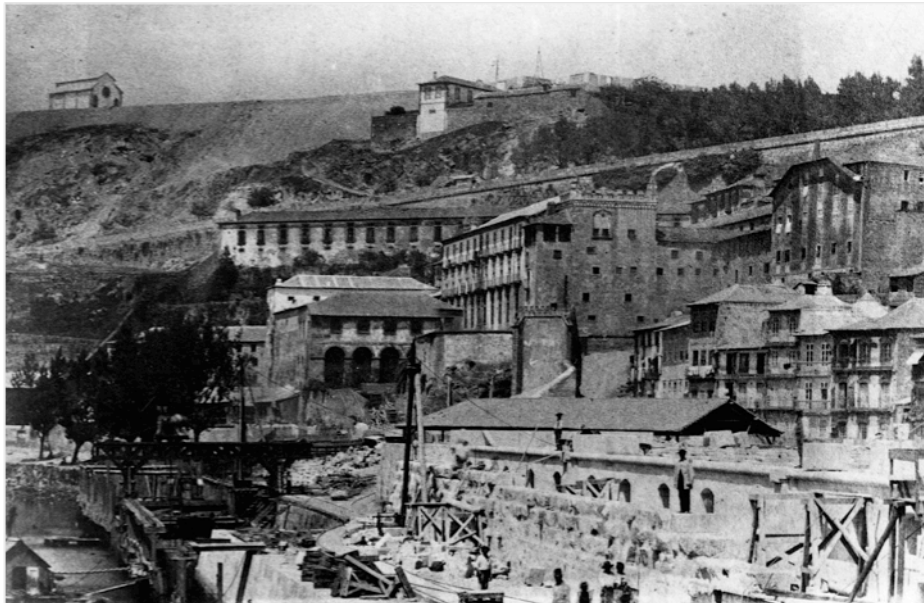


Fig. 1. General view of the Convent of Monchique (1862). In the foreground the Customhouse of Porto, under construction. Cliché from the collection of Vitorino Ribeiro. Historical Archive. Porto City Hall.

1.2 Objectives

The main purpose of this study is the digital translation of a lost historic and artistic environment: Monchique Convent in mid-16th century, emphasising the role of the new digital tools in this process.

It is intended, on one hand, to maximise opportunities brought by the digital platforms where it is possible to suggest a reconstitution, discuss it and update it in a timely manner and at a low cost. On the other hand, focusing on the narrative question is essential to understand digital heritage and its communication to a wider audience. As Maurizio Forte outlines “the new challenge in virtual environments is to develop advanced narrative mechanisms. The experience is the very new way of storytelling” [11]. The produced material will take into account this perspective.

It is intended that the final product, resulting from a collaborative and interdisciplinary research, can be (re) used in multiple platforms, being broadcasted in different channels, aimed at different audiences in different contexts, and may assume a more recreational or educational character.

Our proposal will focus on contributing to the expansion of knowledge, its preservation and promotion, at the same time that we digitally reconstruct the conventual complex. We hope that this investigation can add on – in a perspective of knowledge sustainability – to the emergence of new points of view or of renewed justifications regarding the architecture built during the “manueline age”⁶ both in this city and in the northern region of Portugal.



Fig. 2. Convent of Monchique (1983). Historical Archive. Porto City Hall.

⁶ The architecture known as “manueline” - safeguarding the older expressions - was developed and consolidated during the reign of D. Manuel I (1494-1521), still prevailing at the beginning of D. João III's reign (1521-1557). Seen as an unprecedented construction surge it was one of the richest times in History of Art in Portugal. Corresponds to the final phase of goth and, like other european art forms at the time (e.g.: “Tudor” and “Elizabethan”), it is commonly associated with the current monarch or dynasty.

1.3 Methodology

As a general procedure, this study, developed within the cultural heritage field, pursues and deepens a positioning framed in the principles established by the international doctrine (ICOMOS, Council of Europe, UNESCO). Namely, "Council of Europe Framework Convention on the Value of Cultural Heritage for Society" (Faro, 2005) [12]⁷, as well as, within the specific domain of digital heritage, the "Guidelines for the Preservation of Digital Heritage"[13], the "Charter on the Preservation of the Digital Heritage"[14] and the "Recommendation concerning the preservation of, and access to, documentary heritage including in digital form"[15], with the inherent recognition of the importance of the digital knowledge as a legacy for the future generations.

In turn, the success of the present investigation implies an effective understanding of values and meanings conveyed by architectural heritage and of its polysemic significances, achieved through historical knowledge, reading and interpreting material expressions of human action in the land. Seeking the accomplishment of a reconstitution hypothesis, we based ourselves in the application of the Crypto-History of Art method, assuming "an absolutely new concept to widen an old historiographic practice (...), to incorporate the study of lost heritage in the current methodology of this subject [of History of Art]" [16]. Specifically, "the analysis of a fragment of an artistic set almost inexistent these days, in order to unravel its possible initial structure", enables us – through a visual, documental, stylistic and iconographic analysis – the widening of the historiographical practice [17], which is one of the goals proposed for this study.

The investigation process has started with archival research, including pictures and maps, monastic funds and notarial documents, looking for the intersection between different sources, as for example: functional (fig. 3) and chronological (fig. 4). When analysing the sources, the reports of important city columnists, from different historical periods since the 16th century, were studied, in particular: João de Barros (1496-1570), Manuel Pereira Novaes (17th century), Agostinho Rebelo da Costa (18th century), Henrique de Sousa Reis (1810-1876) and Damião Peres (1889-1976). Regarding the digital reconstruction proposal, we focused on the London Charter (2009) [18], on the International Principles of Virtual Archaeology [19] and on the Berlin Charter (2015) [20]. These documents are perceived in its whole and seen as resulting from the need of a theoretical debate which offered heritage related organisations a better use of technology potential and the search for minimising the chances of more controversial usages.

⁷ This one stands out for the establishment of the founding concept of common cultural heritage and of the construction of the concept of shared responsibility: by gathering built tangible heritage, intangible heritage and contemporary creation.

2 DIGITAL HERITAGE: MONCHIQUE CONVENT

2.1 Monchique Convent's crypto-history

The place of Monchique has been subjected to a continuous "cultural-devotional occupation"[21]. We know that before the Christians appropriation of the convent, it might have been a Jewish quarter and a synagogue, and that it was on these very fields that nobles Dom Pêro da Cunha Coutinho and his wife Dona Beatriz de Vilhena have subsequently ordered the construction of the feminine convent of Monchique.

On 18 July 1533 papal approval was asked to found the convent, and a contract was signed (even before papal approval) with the architect Diogo de Castilho (1490-1574) for the church construction. Meanwhile, the transformation of Coutinho de Monchique family's noble house into conventual residence was initiated⁸. In 1534, the papal Bull "Debitum Pastoralis Officii", by Paulo III [(1468- 1549) – (pap. 1534-1549)], gives permission to the foundation of this convent of the Saint Francis Order, in Monchique, at the time located outside the city walls of Porto [22].

According to several sources, the construction of the convent covered many building periods. It results from an irregular layout along the hill, adapting to the field's topography, in different plans, which communicate by stairs. It spread from the top of Monchique to the river, like a waterfall, in a sequence of phased volume bodies that completed each other.

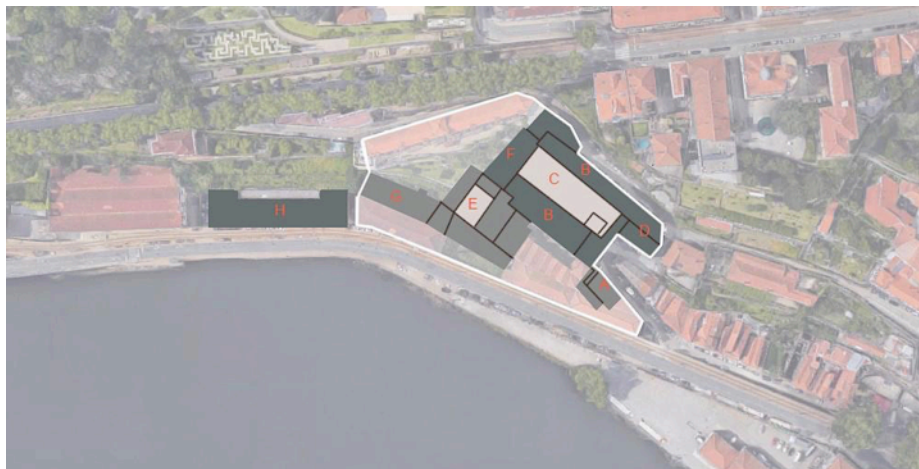


Fig. 3. Scheme of the functional distribution of the Monchique Convent (A – Old Chapel, B – Convent, C – Cloister, D – Chaplain's House, E – Demolished Cloister, F – Church, G – Demolished Structure, H – Wines Warehouse). Elaboration by the author.

⁸ Before, Diogo would have taken part in his brother João de Castilho's next constructions: Viseu Cathedral's vault (1513) and Jerónimos Monastery (1517-1518).

It had two cloisters, each with its own fountain, watersheds, gardens and home gardens. The convent's church, with a longitudinal floor plan, single nave and rectangular main chapel, displayed the gallery and the choir, which are connected with the nave through two overlaid arches; it owned a sacristy and the bell tower was located between the church and the conventual building. It had a rectangular floor plan, with three floors crossed with a stone arch. The two upper floors accommodated the dormitory and the lower floor contained the refectory- This was about forty metres long, with three naves formed by two column rows, with eight on each row. These columns support the stonework arches which in turn support the vault of the building, limited by another tower, whose function was to serve as a recreational viewpoint for the nuns. These two towers, of rectangular layout and hip roof, were topped by battlements.

The main cloister was located behind the church choirs, at the kitchen's arcade level. The second cloister, of smaller size, also with arches and columns, was made of brick, with a stone fountain at the centre. The chapel of Senhor dos Passos was situated next to this cloister. Over the dormitory, facing North – South, it is believed there might have been an extension, widthwise, on the river facing side (possibly in the 18th century), "from which has resulted the construction of a gallery as well as the reduction of both turrets built at the time of the foundation of the convent" [23]. By the river there was the chaplains' house and a lodge to host the families when visiting the nuns.

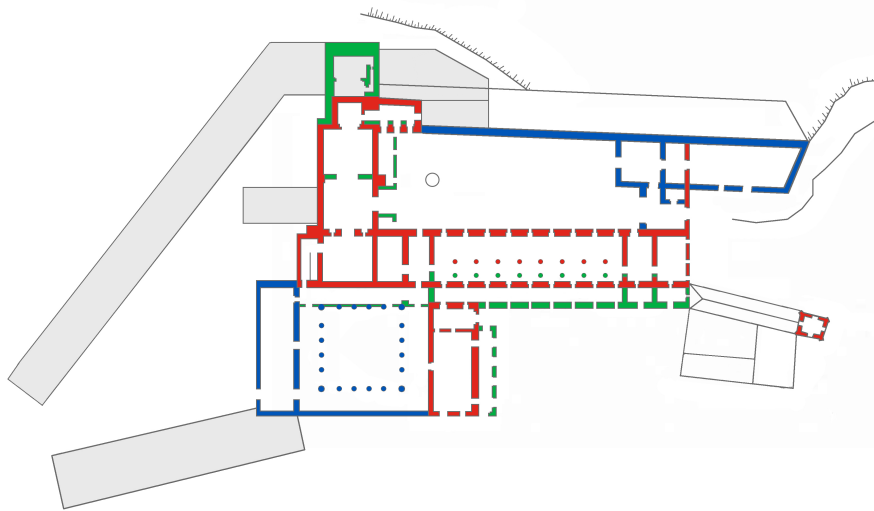


Fig. 4. Phases of construction of Monchique Convent (Phase 1 - Red, Phase 2 - Blue, Phase 3 – Green). Elaboration by the author from the owner's Plants [25].

The convent would have had a manelino portico [24]. Currently, this can be found at the National Museum of Soares dos Reis in Porto. The first construction stage, finished in the 16th century under the supervision of Diogo de Castilho, displays features associated with manelino constructions. In the 17th and 18th centuries, the whole building was extended with the aforementioned cloisters with gardens and other dependencies.



Fig. 5. Manelino portico (1983). Historical Archive. Porto City Hall.

In 1681 a new dormitory was added and in 1699 a new main chapel. The chaplains' house was built between 1761-67 in order to increase the convent's income. Its conclusion meant to turn it into a wine warehouse. In 1958, after DGEMN intervened, the building receives the Commands and the Fiscal Guard. The frontispiece shows the coat of arms of Saint Francis Order. The warehouse of the new dock is incorrectly acknowledged as part of the convent. It was built by the same General Company to serve as a deposit and thus to extend its headquarters in Miragaia. The current Ignez Neighbourhood corresponds to the third stage of the convent construction, in the back of the fence, and might have been erected to accommodate the servants. Later it became property of the counts of Burnay, a sawmill, woodwork and nail factory, a working-class neighbourhood with affordable houses and also a student residence. Following the extinction of religious orders in 1834, as part of the church general Reform, the convent fell into decline and its goods were assigned to several landlords [26]. Subsequent occupation always had an industrial nature. Today, part of the com-

plex, divided by different owners, is in ruins, and some of the buildings, such as the church and the main building, are coverless.

2.2 Hypothesis of Digital Reconstruction

For the last 20 years computer-generated imagery (CGI) production in archaeology and in the visualisation of historical contents for the public has greatly increased, in such a way that computer visualisation assumes itself, gradually, as an integral part of archaeological and cultural heritage representations. Mastering digital tools enables progress in the knowledge of objects of study and its scientific update to directly feed the didactic, recreational and promotion dimension of investigation projects linked to the heritage field. “In a technologically literate society, tool-using is assimilated to the operation of artificial systems, much as speaking is assimilated to writing” [27].

Digital reconstruction processes are shown as a viable solution, non-intrusive, versatile and totally reversible within the processes of knowledge of built heritage, in its diachrony and synchrony. Likewise, this reading brings innovation in the translation of a precise and framed description of knowledge, seeking to dilute the barrier between scientific research and its interpretation and presentation to civil society.

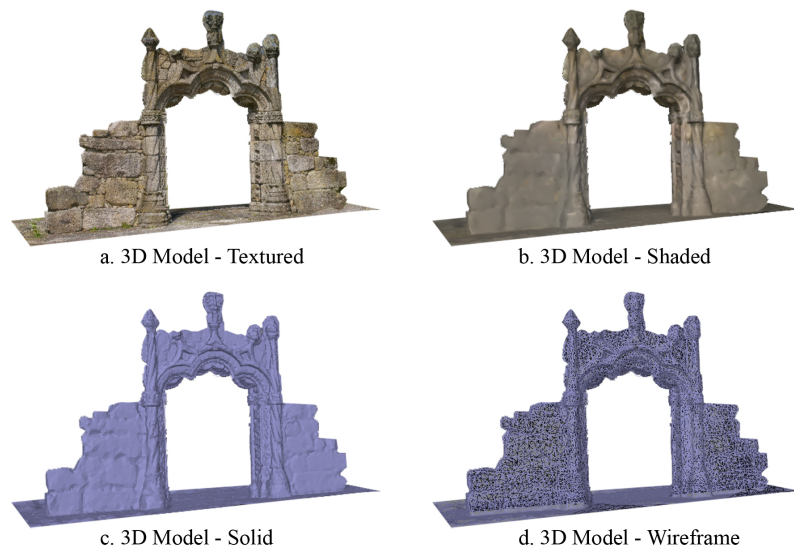


Fig. 6. Three-dimensional representation of the Manueline portico. Experimental development made by the author with the permission of the National Museum of Soares dos Reis in Porto.

Through an accurate bibliographic and historical research and through a systematisation and analysis of existing archival, cartographical and iconographical documental material, it is possible to reach identification, recognition and documentation of past identities associated with buildings and urban environments (changed over time).

Despite the likely character of the sources we collected, the reconstruction work we propose is developed within the hypothetical field. As mentioned before, this complex has been object of many additions, usage modifications and functional reconversions seeking the adaption to new activities that have been continuously taking place in the different buildings. These modifications involved deep changes in its volumetric configuration and in its interaction with the environment.

3 Final Considerations

The complex debate between the concrete data and the materials provided by the Histories of Art and Architecture and by Archaeology (based on evidence and empirical observation), and by virtual reality/cyber-archaeology, have led to the development of new models, based essentially in the human interaction rather than pure observation. Thus, individual participation in this increasingly complex process of knowledge and acknowledgment of built heritage is progressively requested.

Augmented reality, where synthetic images, text or voice overlap real images, and virtual reality, together with the creation of new alternative worlds - framed in a vast set of unprecedented opportunities for the cultural material access -, demand the strengthening of the discussion regarding the quality, quantity and diversity of information generated by these processes. In turn, the most recent investigation methods, such as high-resolution ground-penetrating radars and digital photogrammetry also create new perspectives in the interpretation of the existing reality. Scanning an object implies giving it a new meaning. It is, therefore, necessary to promote the development of a set of tools that allow thinking of this technological development and these changes, evaluating and discussing them, while contributions are made in the development and sedimentation of a critic and constructive thinking, topped with a spirit of competency, discipline, orientation and method.

In what concerns the dissemination of the knowledge and the understanding of digital heritage, in its need for transversal communication to a wider audience, it is essential to take into consideration the user experience and storytelling. As Maurizio Forte states “the new challenge in virtual environments is to develop advanced narrative mechanisms. The experience is the very new way of storytelling” [28]. The promotion of cultural heritage is also the telling of a story, making it appealing and attractive, never forgetting the higher levels of historical rigor.

In short, the implementation of investigation projects in the Digital Heritage field – based in the Histories of Art and Architecture – lead us to explore approaches aiming to recover, analyse and interpret the lost or invisible/transformed heritage within the urban landscape. This implies and assumes what was already addressed here regarding a shared interdisciplinary development with the local population, who desirably should have an active role in the whole process.

The final product, resulting from a multidisciplinary research, should be able to be (re) utilised in multiple platforms, anticipating the possibility of spreading it in several channels aimed at different publics and in different contexts.

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