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From Text to Model: Translating the *Estatutos da Província de Santa Maria da Arrábida*

J Rafeiro¹, A Tomé², João Luís Inglês Fontes³

¹ Carleton Immersive Media Studio, Carleton University, 1125 Colonel By Drive, Ottawa, ON K1S5B6, Canada

² CERIS, DECivil, Instituto Superior Técnico, Universidade de Lisboa, Av. Rovisco Pais 1, Lisboa, 1049-001, Portugal

³ Faculdade de Ciências Sociais e Humanas, Universidade NOVA de Lisboa, Avenida de Berna, Lisboa 26-C, Lisboa, 1069-061, Portugal

¹ jrafeiro@cims.carleton.ca

² anatome@tecnico.ulisboa.pt

³ joaofontes@fcsh.unl.pt

Abstract. A primary text for understanding the architecture of Franciscan convents in Portugal is the 17th century *Estatutos da Província de Santa Maria da Arrábida* that outlines rules to the construction of convents belonging to the Arrábida province. Beyond articulating the conduct of daily life within the convents, the rules also describe the required spaces of the building accompanied by maximum dimensions to maintain consistent austerity across the order. The research presented in this paper discusses ongoing approaches to visualize these rules from an architectural lens in order to better understand the contents of the document both in-themselves and to how they manifest themselves in specific instances of convents across the province. One approach of the study combines text analysis and visualization through digital modelling and 3D printing. By first visualizing the spaces and relations of the ideal convent as described through a set of volumetric digital models, a comparison was later made between the dimensions and arrangement of these ideals to specific instances found in convents of the same time period, region and Franciscan reform. Another approach of the study uses photographic and photogrammetric surveys of details and spaces found across four convents of the Arrábida province in order to compare and visualize the scale and configuration of common elements – both described by the text and not. Overall, the paper also aims to demonstrate how new tools in digital heritage can assist in the study and dissemination of the otherwise invisible dimensions of heritage buildings.

1. Introduction

The 17th century *Estatutos da Província de Santa Maria da Arrábida* outlines rules to the construction of convents belonging to the Arrábida province in Portugal. The 40th chapter of the text describes rules for a series of required spaces accompanied by dimensions to maintain austerity and consistency of the buildings across the order [1]. The research presented in this paper discusses ongoing work in visualizing these rules in order to better understand the contents of the document in-themselves as well as how they relate to specific instances of convents that used the rules at their outset.

The research uses two main approaches to conduct the study. The first approach combines text analysis of the 17th century Portuguese text and its visualization through digital modelling and 3D



printed models to attempt a representation of the spaces in their ideal form. By first visualizing the spaces and relations of the ideal convent as described in the rules through a set of volumetric digital models, a comparison was later made between the dimensions and arrangement of these ideals to the specific instances of two convents constructed in the same time period and Franciscan province: Caparica and Alferrara. The translations of the texts and measurements led to a series of volumetric digital models that were recorded into a physical document along with the original text in Portuguese, that served as the basis to insert field notes as the visits across the other Arrábida convents were made.

The second approach of the study uses photogrammetric surveys of details and spaces found across four convents of the Arrábida province (Alferrara, Arrábida, Caparica and Sintra) in order to compare and visualize the scale and configuration of common elements that were described by the rules of the *Estatutos da Província de Santa Maria da Arrábida* as well as those elements that appear consistently in all four of the studied convents despite not these elements not being described in the text.

2. *Estatutos da Província de Santa Maria da Arrábida*

The *Estatutos da Província de Santa Maria da Arrábida* provided a common set of rules governing the construction of new Franciscan convents in the province of Santa Maria da Arrábida and codes of conduct for the communal life for the friars who inhabited them. It was initially circulated in manuscript form after 1542 until it was printed in 1698 with what is thought to be a less strict set of rules than the original [2]. The first text was originally prepared after a visit in 1542 from the Minister General of the Strict Observance who designated Friar Martinho as the first custodian of the New Franciscan movement with the power to admit friars and found up to three or four convents [3]. Thus, Friar Martinho together with the support of St. Peter of Alcântara and Friar João de Águila – who had already been founding convents of the Strict Observance in Spain – prepared the document with inspiration from previous rules of 1540 [3]. Although the original version is lost, the second and refined print version, approved first by the Pope in May and by the Arrábida Chapter in July of 1697 provides us with its closest approximation. This account of history, we know through the chronicles of Fr. António da Piedade, who reports on this piece of history in *Espelho de Penitentes, Chronica da Província de Santa Maria da Arrábida* (1737), a document which contains a reference to the original document and its posterior publications [4].

2.1. Description of the Text

A common message throughout the *Estatutos da Província de Santa Maria da Arrábida*, whether in dictating practices of daily life or in the architectural rules, was to live with as little as possible, using the least amount and materials be the poorest and least worshiped available. The rules provided directives to the maintenance of a life of strict observance to the teachings of St. Francis that upheld poverty, silent contemplation, communitarian life and pastoral care as ultimate goods. The rules contain various chapters on separate aspects of life. For example: dictating political hierarchies within the community, the procedures of masses, practices of the chorus, rituals of fasting, rules of the wardrobe and the ornamentation of spaces among others. Beyond the internal community, the text also describes the necessary relations to the external public life, suggesting that the location of the buildings should not be too far or too near to the village or city and making other provisions, such as the necessity of a perimeter wall around the convent to make a clear separation of their territory.

Beyond these ways of life, the text also dictates architectural aspects of the convents, providing specific planar dimensions concerning a series of conventional spaces: the church, chorus, sacristy, the chapter, kitchen, refectory, pantry, dormitories, library and hostel. All of these spaces are articulated in the 40th chapter of the document, titled, “Dos Edifícios” – or in English – “About the Buildings.” This section was used as the primary section for our investigation as it is the chapter most concerned with the arrangement of spaces and articulation of the architecture. Although other chapters give hints as to how the spaces were used, the contents of these chapters are limited to details about what the rooms should contain. For example, to dictate furniture elements, their materiality and what tolerances were allowed for personal objects.

2.2. Translation Notes

A series of English translations of the 17th century Portuguese text were produced for the 40th chapter. Secondly, the measurement systems – using palms and fingers as units of measurement – were converted into modern dimensions using a conversion chart produced by Oliveira Marques [5]. These textual translations of texts and measurements then led to a series of volumetric digital models that, along with the original text in Portuguese were recorded into a physical document that served as the basis to insert field notes as the visits across the other Arrábida convents were made (Figure 1). When an observation was made in one of the neighbouring sites, notes and references could be added to concretize the findings as a way of record-keeping and means for asking futures research questions to other experts in the study.

While some spaces in the text were given strict dimensions and adjacencies, others remained vaguely described and without specific locations. In order to differentiate between the dimensionless and the dimensioned volumes written in the text, elements of the model were represented in different colours. The red pieces are spaces not defined by specific dimensions but that are mentioned as supporting spaces to other programs. For example, we know from the text that the chorus is meant to be situated in a porch-like construction outside of the main volume of the church, yet the size itself remains unspecified. Likewise, the confessionals are part of the church, but also without dimension. For these types of scenarios, where the dimensions are not given or cannot be inferred, the spaces are represented in red. Spaces with dimensions are in white and are modelled according to the actual dimensions in the original text.

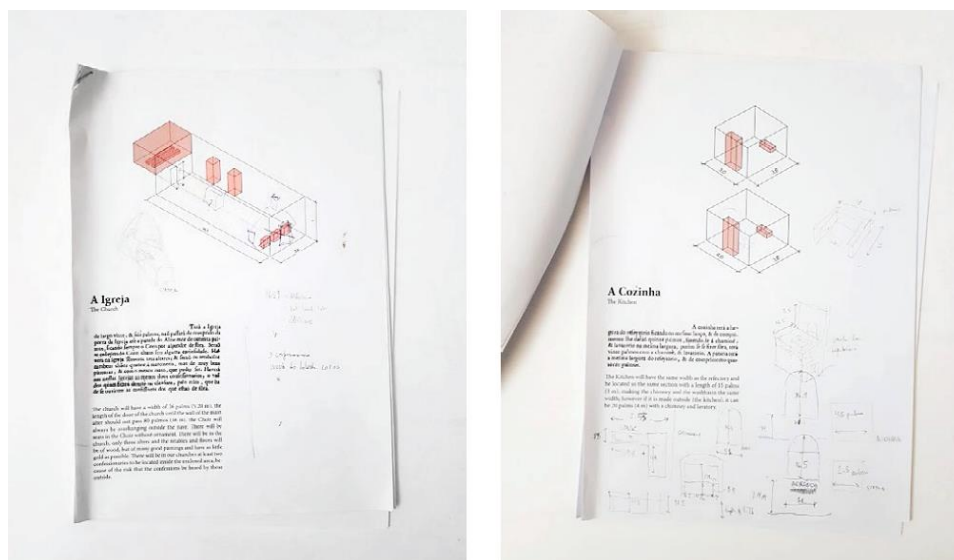


Figure 1. Examples of digital volumetric models along-side original 17th century Portuguese text and English translations with hand-written notes from site visits.

3. Comparisons between Alferrara, Arrábida, Caparica and Sintra

The translations of the rules contained in the *Estatutos da Província de Santa Maria da Arrábida* were an important departure point when going to individual convents by providing a common set of spaces and dimensions that could support evidence for or highlight missing or altered spaces. By investigating the relationship first between the ideal convent volumes as described in the rules and real convents in sites such as Alferrara, Arrábida, Caparica and Sintra – through drawings, photogrammetry and site visits – it was possible to ascertain what common grounds existed or not between the convents as a way to better understand what spaces from the text were given most priority and why. Figure 2 shows a list of all spaces described in the rules as observed at different convents.



Figure 2. A list of spaces mentioned in the *Estatutos da Província de Santa Maria da Arrábida* (with exception of Ministry and Cloister) and photographs of how they appear in the various studied convents.

The following paragraphs will make general observations regarding how the buildings and sites relate to the written rule in an organizational sense. Additionally, to refine the scope for this paper, the paragraphs will describe only the following observed conditions as they appear across each of the convents to illustrate the different ways the text was translated into buildings: firstly, the church and chorus – which is described loosely in the document; secondly, the kitchen – which is described precisely in the document; thirdly, the observance of a consistent ministry window between the kitchen and refectory – a detail which is not written in the rules.

3.1. Alferrara

The Convent of Nossa Senhora da Conceição dos Frades Franciscanos Capuchos de Alferrara, today in a state of ruins, remains one of the more discreet of the rest surveyed with very little known about the experiences and activities of the friars who had resided there and with little record keeping across history. As far as it is known however, the building has not undergone any major renovations since the extinctions of the order in 1834, other than the addition of a series of woodworks and treatments of the windows as a first phase of an eventual renovation currently underway by the municipality [6].

The major difference of the convent in Alferrara was the location of the spaces near a steep terrain on a narrow plot of land which caused a completely different configuration to appear between the cloister and the church than is seen in Caparica. This decision, it is assumed, was due to the importance of having adequate and natural waterlines for the site as a crucial element in the selection of all Arrábida convents [7].

3.2. *Arrábida*

The Convent of Santa Maria da Arrábida acted as the seed for other Capuchos communities of the region at the period of history. The land on which the convent sits was provided by the first Duke of Aveiro, D. João de Lencastre to Friar Martinho de Santa Maria, who founded the original convent in 1542 [8]. Originally, the Memória Shrine, which existed on the land prior to the original convent was also the destination of major pilgrimages and the place where the first four Arrábida friars lived for two years in dormitories that were carved into the rocky hillside [8]. Although today, the convent is defined by two sections, the old and the new, the growth of the convent would have been perceived more organically at the time, with the same basic lifestyle sought and maintained by an expanded community who sought a higher degree of isolation [8]. What today is known as the new convent, thus was simply a series of additions to make the isolation and autonomy of the community life possible. Much unlike the convents in Caparica and in Alferrara, the spaces of the convent appear much more intricately connected to the high slope of the landscape, with a more disperse allocation of rooms than being contained within one volume. The convent also maintains much of the woodwork intact, allowing us to see unique architectural elements such as the revolving wood door of the ministry window. Other spaces such as the sacristy are well kept, showing the woodworking of the cabinets and details such as the holy water font.

3.3. *Caparica*

According to various historic documents, the Convent of Nossa Senhora da Piedade da Caparica experienced several adjustments and extensions throughout the sixteenth to eighteenth centuries [3]. Most of the information from Caeiro & Fontes (2013) is given by the chronicles of the Province, mainly the one of Friar António da Piedade (1737) since the archive of the convent had disappeared after 1834. In 1834, an imperial decree ordered the extinction of religious orders in Portugal, with many convents being closed. It is speculated that within the space of closure for over 100 years, many informal settlements of farmers could have used or modified the space until eventually, the Municipality of Almada purchased the convent, reconstructing it, without documentation over the span of two years ending in 1952. Major interventions would have included the new roofs, the grandiose landscape interventions, the omission of walls to open spaces as in the case of the original dwelling cells. Much of this intervention was of course, far out of keeping with the secluded Capuchos community that originally resided there and little documentation other than a few newspaper articles with exterior photos can be found regarding the as found condition of the building prior to this 1950 intervention. Given this high degree of intervention, the convent in Caparica is perhaps the most difficult to ascertain which spaces today belong to their original foundations in the rules.

3.4. *Sintra*

The Convent of Santa Cruz da Serra de Sintra, was founded in 1560 by D. Álvaro de Castro, a counselor of the State of King Sebastião. Like the other convents, it was also abandoned in 1834 as a result of the extinction of the religious orders but was soon acquired by the first Viscount of Monserrate Fran-cis Cook in 1873, and later in 1949, by the Portuguese State [9]. Today the convent is part of the Cultural Landscape of Sintra, and since 1995 was classified by UNESCO as a World Heritage Site. As part of this continuous ownership, the building remains in a well-maintained state with much of its woodwork and cork-work, still intact.

Unlike the other convents in the study, the convent in Sintra was built without the intention of public access by any means which severely altered the arrangement and proportions of some spaces such as the chapel and choir. This aspect also resulted in the omission of other features that would normally appear in other convents such as confessionals. Furthermore, it is known, more than the other convents for its higher degree of poverty, as evident in the close relationship of the building to the natural terrain and due to the smallness of the spaces and corridors that were the result of a less exuberant use of materials. In this convent, the difference between human-made and natural is often confused as the building literally situated within the rocks, used the natural formations of the interior

spaces in the rock to guide the planning of the spaces. This led to a much more extreme arrangement of the spaces described in the rule in-situ with the landscape. This is evident in the many levels and spaces between levels that can't be found in the other convents.

3.5. Comparing the Church, Chorus, Kitchen and Ministry Window

The *Estatutos da Provincia de Santa Maria da Arrábida* states that the chorus is to be always overhanging outside the nave in a porch. Across the convents in Alferrara, Caparica and Arrábida there was a clear relationship between the church and chorus whereby the chorus is situated above the front entrance on a second level that faces into the church. The chorus in Arrábida however is made much more private with woodworking to hide view of the choir members and the public. Since Alferrara is in ruins and Caparica has been completely remodeled, it can't be ruled out that this integration of woodwork wasn't once a common detail across all of the convents considering the necessary privacy described throughout the rules stating that the public and friars should have no visual contact. In Sintra, however, because there are no spaces for public functions, the conditions for the chorus arrangement were different. There, the chorus instead enters the church diagonally at a level above and enters more through the centre of the space than the edge as in other convents.

In the rules, specific instructions state that the widths of the sink and chimney must be equal. Across all convents where both elements appear, this rule has been maintained. Despite that no detail is written as to how these two elements should be arranged within the space, there is also a consistency across all convents. The kitchen space in Alferrara is less visible than the other convents, given its state of ruin. The sink is almost fully buried and the chimney is partially collapsed. What we do know from these remains however, is the locations of both and that they are consistent in arrangement as in the other four convents where the sink is placed against a wall with a window in its center and is perpendicular to the chimney. This correlation has been maintained across all observed instances despite that these specific arrangements are not detailed in the document. Likewise, despite there not being a specific dimension for the sink or chimney, the sizes of each instance remain the same – even in Sintra where the overall religious population was much smaller. Furthermore, the relationship between the kitchen and refectory across all convents are the same. In the rules, it is stated that the kitchen should have the same width as the refectory and be in the same section of the building. The rules also detail that the refectory should have only a low and humble seat on which the lesson of the table can be read. This detail is absent in all convents except for Sintra where a low seat separate from the dining table is build into a wall facing into the space.

The ministry window, a window that is designed to pass food from the kitchen to the eating space of the refectory appears in all convents despite no articulation of this detail in the rules. But the examples found in each of the mentioned convents have a unique configuration. Each minister is unrepeatable in its form. In Alferrara a detail of the design suggests a place to hold a fire where food could be kept warm. The ministry window in Arrábida is unique in that it maintains woodworking with a revolving door and is also uniquely arched rather than rectangular in shape. In Sintra, the window is much smaller in scale and without woodworking to hide views into the kitchen. A low bench on either side is also present for one to sit and pass the food across – a detail unique to this convent. Following the permanent exhibition and publication of the catalogue in 2013 by Caeiro and Fontes, the location of the ministry window, between the kitchen and refectory was found in Caparica. This detail confirms the consistency of this type of window although we have little information as to what the design was like, since the opening was infilled with stone in a previous stage of reconstruction. Below, an image of a series of photogrammetric surveys studying the configurations of the sinks and chimneys between Sintra and Arrábida (Figure 3) and a 3D printed comparison made from photogrammetric surveys to show the scale difference between Alferrara and Sintra in the ministry windows – which, again are not described in the *Estatutos* (Figure 4).

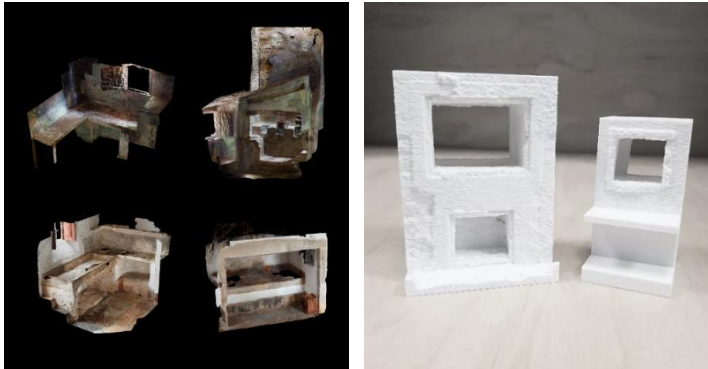


Figure 3. (left) Photogrammetric surveys of sinks and chimneys of Sintra and Arrábida.

Figure 4. (right) A 3D printed comparison of the ministry windows of Alferrara and Sintra.

4. 3D Printing the Spaces of the Ideal Convent

As a final output, a series of digital models of the main spaces described and dimensioned by the *Estatutos da Província de Santa Maria da Arrábida* were 3D printed in order to visualize how the spaces of the ideal convent – as described in the text – related to two of the existing convents. The models were used both as a tool to help determine the original arrangement of spaces in Caparica (prior to extensive reconstruction works) and to better understand the convent in Alferrara as a public dissemination artifact in light of recent efforts to stabilize the ruins. The hypothesis of this exercise was that the physical model could allow a more inclusive platform of exchange between architects, historians and other publics in proposing hypothetical arrangements of the convents in their primitive forms as well demonstrating visually, the gaps of information about each unknown space in the building. Furthermore, the models also allow cross comparisons to identify consistent arrangements of spaces or other patterns. Figure 5 shows a comparison of how the volumetric models were integrated into the plans of the building to predict the locations of spaces and visualize dimensions.

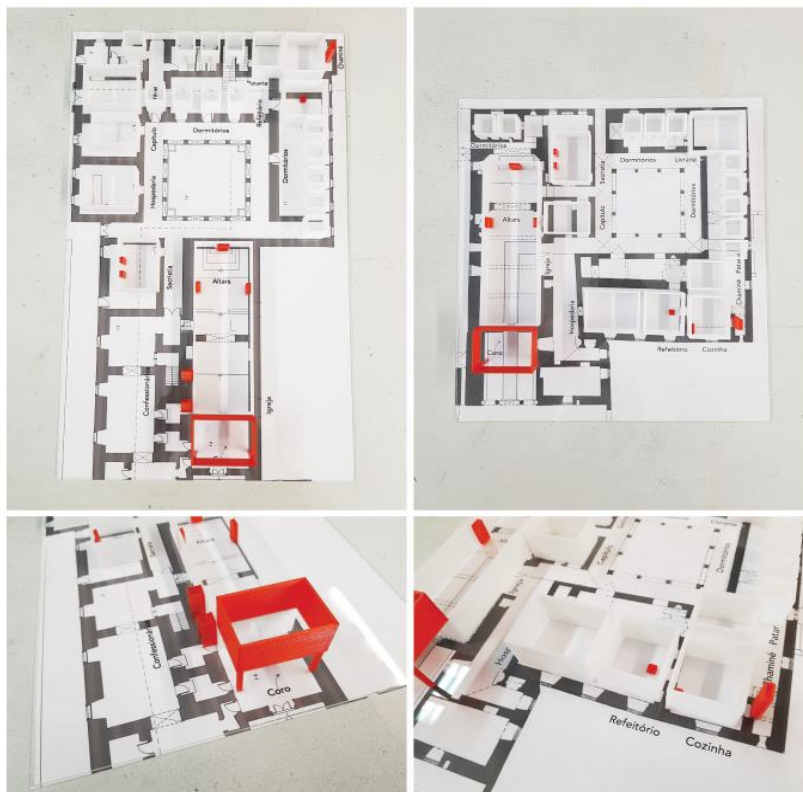


Figure 5. 3D printed models of the ideal spaces of *Estatutos da Província de Santa Maria da Arrábida* overlaid onto the current plans of Caparica (left) and Alferrara (right).

5. Conclusions and Future Work

This paper outlines an approach to using new tools in digital heritage to assist with the study and dissemination of otherwise invisible dimensions of heritage buildings. In this case, the tools have been used in an ongoing effort to visualize the *Estatutos da Província de Santa Maria da Arrábida* to better understand the contents of the document in-themselves and how they relate to specific instances of convents that used the rules. The research uses two main approaches. Firstly, combining text analysis of the 17th century text and its visualization through digital modelling and 3D printed models to attempt a representation of the spaces in their ideal form and secondly, using photogrammetric surveys of details and spaces found across four convents of the Arrábida province (Alferrara, Arrábida, Caparica and Sintra) to compare and visualize scale and configuration of common elements that are both described and not described by the rules.

Upon completing this phase of research, it appears that the physical terrain in which the convent is built and whether public access is granted to the convents dictates foremost the overall arrangement of spaces. Furthermore, there has been noticeable consistencies and inconsistencies observed between the language of the text and their translation into the built architecture. In cases where specifics are given, such as the correspondence between sink and chimney width, we see the rule consistently translated into the building. Curiously despite mention of what this dimension needs to be, the same dimension appears across all observed convents. In cases where there is no textual rule however, a similar element, such as the ministry window – appears consistently yet in various typologies.

In future work, the study will continue to reveal these differences in the same systematic approach so far explored. The research also aims to continue to make the research tangible to non-expert audiences through the concretization of findings in 3D printed materials. In the future, the research will study more examples of convents belonging to the Arrábida province in order to find examples of some of the spaces that are described in the rules but not yet found in any of the four convents studied. The work will also extend the work done in comparing the ideal to the real in 3D printed models of the other two convents in the study: Sintra and Arrábida.

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