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Posted Date: 6 December 2024

doi: 10.20944/preprints202412.0547.v1

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 doi:10.20944/preprints202412.0547.v1

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OnlineLino—A Digital Platform on Architect Raul Lino's Built Heritage at *Médio Tejo*, in Portugal

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Abstract: The cultural context and values of twentieth-century architecture and construction confirm the need to preserve them for future generations, given the multiple challenges to overcome. Raul Lino da Silva (1879-1974) is a celebrated Portuguese architect who worked throughout the twentieth century and whose architectural legacy is scattered from the north to the south of the country. The aim of this paper is to present the development of the website OnlineLino related to the architectural and construction heritage by Raul Lino in the *Médio Tejo* region, an inland Portuguese territory with low demographic density. The work is focused on integrating documentary information dispersed across different digital funds, by aggregating it on a website that will be made available for public access in the future. To this end, data was collected from different funds, and the information was aggregated and systematised so that it could be included in the digital database developed, the OnlineLino website. The work was carried out by a multidisciplinary team in academic setting, involving the areas of Architecture, Civil Engineering, Computer Engineering and Design. Overall, this work highlights the importance of disseminating the twentieth-century architectural and construction heritage and presents an effective method to reach this goal.

Keywords: 20th century architecture; Portuguese architecture and construction; cultural heritage; documentary research; information technologies applied to heritage diffusion; heritage and territory; teaching and training

1. Introduction

Raul Lino da Silva (1879-1974), best known as Raul Lino, was an acclaimed Portuguese architect who worked throughout the twentieth century and whose architectural production is spread throughout Portugal. Raul Lino has been commissioned to develop a number of projects for the *Médio Tejo* region, including the construction of new buildings, extensions to existing buildings, urban plans, mausoleums and the plinth for a statue. While some of the constructed edifices remain in use, others have fallen into a state of advanced disrepair.

Despite its recent emergence within the historical context of architecture and construction, the twentieth-century architectural heritage is confronted with distinctive challenges and reveals inherent vulnerabilities. The buildings constructed during the twentieth century represent a relatively recent addition to the historical timeline of architecture and construction. This fact has resulted in a lack of recognition of their significance, which has in turn led to their abandonment, lack of maintenance, or even anachronic interpretations and alterations to the original architectural design [1]. The twentieth century witnessed a profusion of novel materials and techniques in the field of architecture and construction. These developments gave rise to significant shifts not only in the methods of construction but also in the procedures for repair, replacement and conservation. Such

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changes have frequently resulted in functional anomalies in materials and systems, or in obsolescence and adaptation [2].

An architectural object represents a symbol of cultural value for society at the time of its construction. It can also be a material sign of a particular socio-historical moment. It is essential that architectural objects provide comprehensive and multidisciplinary information, enabling a multidisciplinary understanding of their various dimensions. This should include details of the architectural style, identification of materials and construction systems typical of a certain time or place, the historical context of the construction, and biographical notes of the projects' authors. Furthermore, in instances where the architect in question is a celebrated author, some cities leverage his legacy as a catalyst for tourism [3].

From this perspective, heritage architecture and urban design are key factors in the development of tourist attractions and economic growth [3–6].

The condition and appearance of an architectural object are the result of a continuous historical process that has occurred over time. It is therefore crucial to document architectural objects as the layers of time accumulated [7]. The wealth of information can be made available in a variety of ways through digital technologies. The advent of new digital technologies has led to a surge in interest, media coverage and dissemination of heritage, while also driving growth and transformation in the tourism sector [8].

From a complementary point of view, according to [9] architectural heritage is an important asset for implementing and pursuing strategies aimed at promoting sustainability. The current demands for sustainable development require that any type of intervention carried out on existing architectural heritage must meet the principles of sustainability - environmental, social, economic and cultural - throughout its life cycle [9–13]. Properly preserving the materials of historic buildings in order to extend their useful life is an important conservation principle [14], which at the same time contributes to achieving the guiding principles of sustainable development for cities and communities (Sustainable Development Goal 11). By safeguarding architectural heritage, cities and communities can foster a sense of cultural identity, enhance their reputation, and drive sustainable urban regeneration.

Archival sources, including drawings and texts from the project, as well as information on construction techniques and materials, play a crucial role in the study of twentieth-century architectural heritage. These sources incorporate the essence of the design process, providing insights into its evolution. These sources should be used for the interpretation of the architectural piece by assessing the original design intent alongside the as-found physical state. It will also shed light on other historical settings that contribute to the site's significance and confirm its cultural value [15].

It is also worth noting that, with regard to Portuguese twentieth-century architectural records, a considerable number of written documents on the same building are distributed across a range of documentary collections. This is due to the national administrative organisation and the diversity of documentary funds that have been created with the objective of preserving and dematerialising sources, facilitating their dissemination and limiting physical archiving capacity. Furthermore, the lack of comprehensive information in the archives, such as architectural and engineering project details (e.g., due to document non-existence, deterioration, or disaggregation; or the working methods of the authors themselves), presents additional challenges [16].

Digitisation processes facilitate the management, storage and display of physical archives [17]. Digitisation technologies are active tools to facilitate the access to information in culture and heritage sectors [17–20]. The development of digital products is a complex process that requires the input of a diverse range of professionals from different disciplines [21,22] and teams with varying perspectives to ensure a comprehensive exploration of individual potential [23]. Cultural heritage studies, particularly those focusing on digital documentation, also require a combination of diverse skills, disciplines and domains of knowledge [20,23,24].

Raul Lino's architectural collection of more than 650 projects is available in digitised form in the Art Library of the Calouste Gulbenkian Foundation (ALCGF), and most of the technical documents are accessible to the public. However, a previous study [16] has shown that many documents are not

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only missing information, but are also disaggregated. This situation not only compromises, but can make it impossible to properly interpret and characterise the formal, spatial and constructive features of existing buildings, and thus to support decisions on their use and conservation, to promote the cultural object, or to enhance the local tourist offer by diversifying related products.

Under these circumstances, and given that there was no database linking the original projects to Raul Lino's material works/objects in the *Médio Tejo*, it seemed important to analyse the information in detail and to collect it in a digital database linking each building to the corresponding information scattered in different documentary funds. The information gathered in this way and displayed on a digital platform (website) can be easily accessed by anyone from anywhere. Through this work, we hope to contribute to the knowledge of the legacy of this important Portuguese architect of the twentieth century; but also to support technical interventions (e.g., the choice of the most appropriate materials and techniques) in his buildings, and to diversify the cultural offer of the region through a consistent knowledge base.

The goal of this paper is to present the work carried out in order to design and develop the digital platform, OnlineLino website. For this purpose, it was necessary to identify and locate, in situ, the projects built by Raul Lino in the *Médio Tejo* region and to collect digital archive documents and information on each building.

The proposed website will contribute to the dissemination of knowledge about the legacy of the architect Raul Lino in a sparsely populated area, promote greater awareness among the surrounding communities and public administrations, and encourage initiatives for the valorisation of cultural heritage for tourism purposes, as well as the conservation and restoration of the architectural and built heritage.

After the introduction (section one), a literature review on digital archives and websites on architecture is presented in section two; section three refers to the methodology, followed by an overview of Raul Lino's architectural legacy in the *Médio Tejo* region, in section four; section five presents the description of the website; section six refers to the discussion, and finally the conclusions are presented in section seven.

2. Digital Archives and Websites for the Dissemination of Architecture and Built Heritage– Literature Review

In the field of architectural heritage, the use of a thematic repository through digital methodologies has been seen as a way to communicate and open new research perspectives and insights through digital technology, as suggested by recent studies [25–27]. Academic studies in various scientific fields have incorporated the research methods and processes of the social sciences and humanities, while at the same time mobilising the tools of digital technology [28].

Digital archives contain important direct sources for the documentation and research of cultural heritage, especially of the twentieth century. Terras [17] provides an overview of the application of digitisation in the arts, humanities and archives since interest in its use in these fields began to grow in the 1980s. Digital media have opened up new ways of experiencing, interpreting and communicating heritage [29]. Their use has served different but complementary purposes: survey, documentation and archiving, and mediation and dissemination [30].

In general, there are two types of digital archives: conventional digital archives and digital exhibition/thematic platforms. Conventional digital archives refer to the almost direct transposition of analogue works into the digital realm to make information available to researchers in an unbiased way. Digital exhibition/thematic platforms display a collection of digitised documents from different sources, but usually accompanied by a scientific narrative, within the arrangement, layer, layout and combination of the documents, implying a chosen order more suitable to convey the message, and interpretive and descriptive texts on the objects represented. As Peyceré [31] claims, 'the creation of thematic websites and portals brings together and makes available materials from different sources, according to a rationale that is less archival than documentary' ([31] p. 104), thus working in a different and more fluid way. However, it is not uncommon to observe the combination of conventional archival practice with editorial methods and, as Rattenbury [32] argues about the

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presentation of Archigram's archives: "The methodology (…) was intended to be hybrid and reflexive, in that it combines elements of classic archival practice along with the academic editorial judgement required for the compilation of the 'oeuvre complet'(…)" ([32], p. 7).

One of the first architectural archives was established in France in 1968. The project for the foundation that would bear Le Corbusier's name was meticulously planned by the architect and comprises a multifaceted archive of drawings, writings, notes, travel notebooks, albums and other materials. The archive has been partially digitised and made accessible to the public online. Le Corbusier's oeuvre has been organised into four areas: architecture, furniture, art works and books, reflecting the diversity of his work. The projects/works are displayed in chronological order, and research boxes include a filter by year, city, country and type [33].

The archives, especially on architectural funds, were one of the outcomes of digital humanities research projects and clearly address the problem of missing and scattered documents. By collecting and bringing together these documents on a single platform, it is hoped that not only will a wider audience be reached, including those without specialist knowledge, but that new approaches to historiographical research, interpretation and knowledge will emerge.

The incorporation of technology provides access to recorded knowledge and makes it intelligible by processing the original information and returning it in a new interpretative model with digital support. These new tools challenge traditional ideas about how heritage should be represented, interpreted and disseminated [29].

Nevertheless, digital archives are often grouped into collections, accompanied with metadata and simple descriptions, and are not driven by an interpretative or curatorial purpose: the Stanford University Library, in association with the 'Estate of R. Buckminster Fuller' (1895-1983) had organised a digital collection on the work of this architect and engineer, with the aim of enhancing the use and study of archival material from the university's digitised collection, and more recently, the Syracuse University library launched the digital archive of Marcel Breuer (1902-1981) that holds 80 000 drawings, photographs, letters and other materials related to the career of this North American modernist designer and architect.

The ALCGF holds the legacy of four renowned Portuguese architects of the twentieth century, including Raul Lino, and offers digital access to a wealth of documents.

Other projects in the field of digital humanities have recently sought to integrate research in architectural history with the utilisation of novel technologies. The 'Mackintosh Architecture' platform, which was launched in 2014, focused on the work of Charles Rennie Mackintosh (1868-1928), a prominent Scottish architect who was contemporaneous with Raul Lino. Its development was the result of interdisciplinary research in digital humanities.

The most significant outcome of the project was the creation and maintenance of a website by the University of Glasgow which contains 358 entries relating to the projects carried out by the architect's office between 1888 and 1920. The website contains documents from various public and private funds and organises the information by project including introductory data (address, chronology, clients, builders and other intervenient) with a description of the work and the associated archive items, namely photographs, perspective drawings, contracts, plans, sections, elevations and budgets [34].

Earlier, in 2010, the University of Westminster had created a website on the work of the British architectural group Achigram that promoted '(...) a new kind of digital academic archive, displaying material held in different places around the world and variously owned.' ([32], p. 1).The website features contemporary descriptive texts and others written by the researchers themselves including biographical notes and bibliography on the group and their work.

In their 2021 publication, De Brito et al. [17] present the collections of the Faculty of Architecture and Urbanism of the University of São Paulo and describe the implementation of an online interface for sharing and collaborating with organised and structured data and information. In this work, the authors discuss the importance of the design and architecture archives, including the history of the institution's catalogue and the value of its online dissemination.

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Abergel et al. [23] present a synthesis of the work done to build a collaborative platform that starts from reality-based 3D reconstruction and follows through to the analysis of cultural heritage data. The paper describes the main features of the platform and discusses the limitations and opportunities for cultural heritage studies. This platform offers a comprehensive, cloud-based solution for large-scale collaborative documentation, accessible via web interfaces from personal computers and mobile devices, online and on-site.

3. Research Methods and Area of Study

The development of the OnlineLino website was a collaborative process that involved different teams with varying skill sets and backgrounds, including those with expertise in architecture, civil engineering, computer engineering, and design.

3.1. Methodology

As this project was developed in an academic environment and intended to be multidisciplinary, collaboration was established with the master's degree in Editorial Design and the undergraduate degree in Computer Engineering, in order to involve these students in the project. Table 1 summarises the website development stages.

Table 1. The various stages and domains involved in the development of the website.

Stages/domains	Architecture and Civil Engineering	Design	Computer Engineering
Stage 1	Analysis Survey	-	-
Stage 2	Research Analysis	-	-
Stage 3	Organisation of collected data	-	-
Stage 4	Website framework	Website framework	Website framework
Stage 5	-	Development of the visual and graphic design for the website.	-
Stage 6	-	-	Website development
Stage 7	Testing	Testing	Testing

The documentary research (Stages 1 and 2) for this study was carried out by consulting primary and secondary sources deposited in digital funds and in local libraries.

As Raul Lino was a renowned Portuguese architect whose architectural legacy was donated by his family to the ALCGF and which the institution makes available in digitised form through the ALCGF catalogue, access to and consultation of the designs deposited there proved easy. Raul Lino's architectural legacy comprises more than 650 projects.

The study began with an analysis of Raul Lino's written work, namely the books he published between 1918 and 1933 [35–37] and the articles he wrote for national periodicals (Table 1, Stage 1).

Stage 2 involved the survey, research and analysis of a series of architectural structures designed by Raul Lino in the *Médio Tejo*. The documentary research of primary sources was carried out at the ALCGF and the Eduardo Campos Local Archive (ECLA) in Abrantes. The digital archive of the ALCGF was important for consulting the technical representations of the projects (plans, elevations, sections and detailed construction drawings and specifications). At the ECLA, documentary sources of both public and private origin were consulted, as well as digitised photographic records of the buildings' exteriors from different decades of the twentieth century. The secondary sources consulted included various types of publications: academic theses (doctoral and master's theses), scientific

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papers and books on the architect. Several photographic surveys were carried out during the site visits, which took place between March 2021 and July 2024.

The work carried out in step 3 consisted of organising and systematising the data and its sources. In this phase, 38 architectural projects by Raul Lino were analysed. Some of the architectural projects did not indicate the exact location, therefore it was necessary to identify the buildings on site. The map in Figure 1 shows the *Médio Tejo* region and the location of the buildings surveyed.

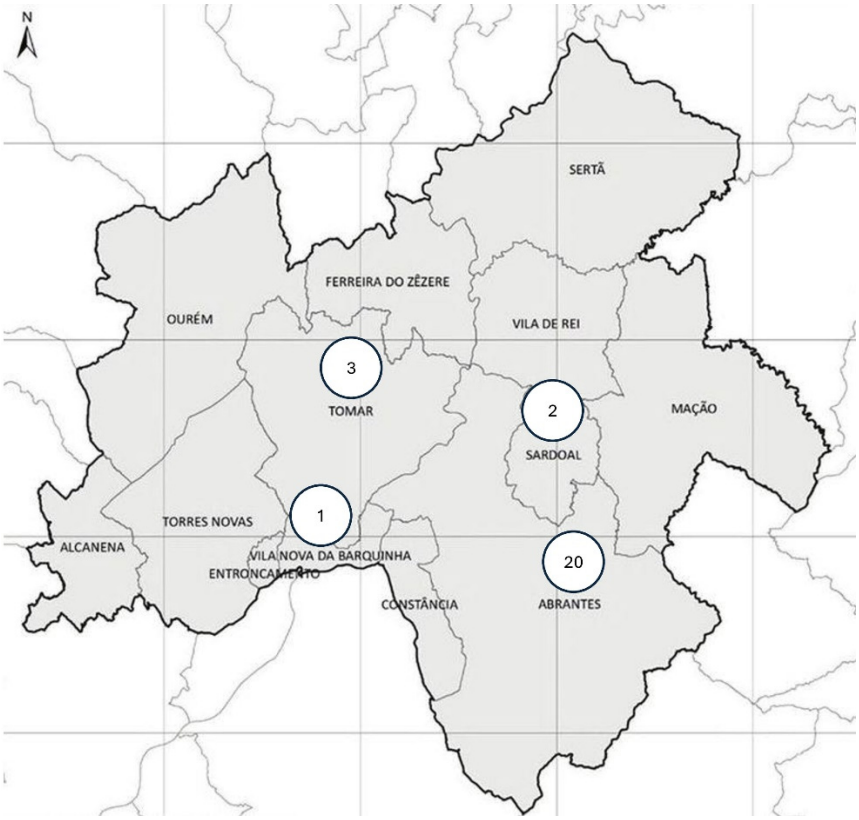

Figure 1. Study area and location of the buildings surveyed at *Médio Tejo* region.

As shown in Table 2, 12 construction projects could not be identified or located on the site due to the absence of completed or built plans, or because the construction was built but subsequently demolished. It should be noted that the fieldwork was made more challenging by the scarcity of data on the precise location of the buildings in some projects, by the evolution of the urban layout, and by the change in the designation of places over time.

Table 2. Number and location of architectural projects by Raul Lino at *Médio Tejo* region.

Location	Archival survey identification	Non-identified buildings (on site)
Abrantes	25	5
Alcanena	2	2
Constância	1	1
Mação	1	1
Ourém	1	1
Sardoal	3	1
Tomar	3	0
Torres Novas	1	1
Vila Nova da Barquinha	1	0
Total	38	12

Stage 5 concerns the development of the visual and graphic identity of the website and has been carried out as part of a training course in the Masters in Editorial Design. The development of the graphic aspect of the platform was preceded by design studies [38,39]. Stage 6 concerns the

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development of the website and is therefore integrated into the course of Project of the undergraduate degree in Computer Engineering. Section 3.2 briefly presents the work done by the design and computer engineering teams.

Stage 4 and 7 correspond to the integration of the work into the multidisciplinary team through the organisation of the website structure (step 4) and the implementation of tests (Stage 7) to detect and correct website errors. As the latter is still under development, the website is not yet available to the public.

3.2. Interface Design and Website Architecture

The design team developed the visual and graphic identity of the website. This task was proposed as part of a Master's degree in Editorial Design and was developed by students and researchers from the Design area. This work led to the creation of the visual identity guidelines, which defined the use of colours, fonts and typography, as well as other visual elements such as icons and banners.

The online site can be accessed through any browser (Figure 1), and its usability has been tested on the most common browsers, such as Microsoft Edge, Google Chrome, Safari, Mozilla Firefox and Opera [40]. With the exception of Safari, which only runs in the Apple ecosystem, all the others have versions for PC and mobile devices, thus covering most of the universe of potential visitors to the portal.

The website was developed in React, a framework that speeds up Single Pages Applications (SPA), a web development trend that has become popular in recent years with the emergence of different JavaScript frameworks such as React, Angular, Vue, among others. Figure 2 shows the evolution of Google searches for single page applications. Created by Facebook in 2013, React is one of the most widely used JavaScript frameworks today [41].

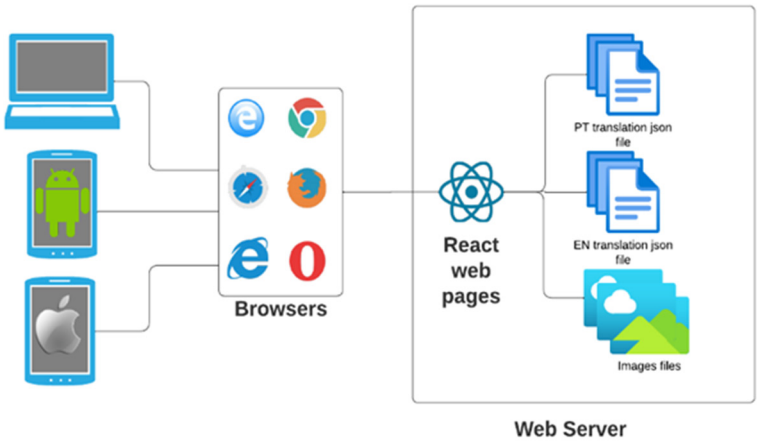

Figure 2. Schematic representation of OnlineLino's architecture.

The OnlineLino website is bilingual, with all content in Portuguese and English. However, the information displayed through hyperlinks (videos and texts) is only available in Portuguese. There are two files with structured data in JavaScript Object Notation, JSON, format, which allow the website to be completely dynamic, meaning that it is possible to add other projects by Raul Lino through corresponding files. As the information added to each project is closed (i.e., for editing the information added), there is no BackOffice.

4. Raul Lino and the Projects Designed for *Médio Tejo*

Raul Lino (1879-1974) was an architect best known for his studies on the 'Casa Portuguesa', a house in the national style, a theme that dominated much of his theoretical work [35–37] and practical production. He studied in England until 1893 and then in Germany, where he attended the School of

 doi:10.20944/preprints202412.0547.v1

Arts and Crafts. During this period he worked in the studio of Albretch Haupt (1852-1932), an academic and architect who wrote 'Renaissance Architecture in Portugal' (1890). The reform of domestic architecture promoted by the Arts and Crafts movement in England, later reflected in the Deutscher Werkbund in Germany, is likely to have sparked Lino's interest in the subject and the way in which traditional building features, local materials and landscaping could be incorporated into domestic design [42]. Raul Lino advocated the use of traditional materials and Portuguese building systems (e.g., Portuguese style eaves in roofing systems). The buildings designed by Raul Lino include local materials and construction systems that the architect associated with traditional Portuguese construction (e.g., the *Assembleia de Abrantes* Headquarters building).

In the *Médio Tejo* region, his activity developed over a period from 1919 to 1965, with a total of 38 projects, 12 of which have not been identified or built (Table 2). His first commission was for Abrantes, a municipality with a current population of around 34,000, for which he designed a house and artist's studio in the town centre in 1919. In the *Médio Tejo*, the municipality of Abrantes has the largest number of projects, 25 in total, which has justified the recent interest of scholars in this series of works [16,43–46].

A significant part of Raul Lino's work was devoted to domestic architecture, including new buildings, reconstructions and modifications of existing buildings. In this context, non-residential buildings were of particular importance: the headquarters of the *Assembleia de Abrantes*, commissioned by a local cultural association (1923), the two school buildings of the *Escola Primária João de Deus* in Tomar (1945), the mausoleums in the cemeteries of *S. Miguel do Rio Torto* (1924), *Abrantes* and *Santa Maria do Olival* in *Tomar* (1945), and the technical infrastructure projects of two substations in *Alcanena* (between 1932 and 1934).

The urban interventions he carried out for *Sardoal* (1933) and *Mação* (1934), both commissioned by these municipalities, are still a less explored aspect of the architect's activity, despite recent studies [47,48].

5. Results

The main result of this project is the website OnlineLino, for now delimited at the geographical level of the *Médio Tejo* region.

The Online Lino website is structured as a thematic digital catalogue of Raul Lino's works and projects in the *Médio Tejo* region, defining an indexed inventory matrix to optimise, classify, analyse and disseminate the architect's built heritage legacy in this region (Figure 3).

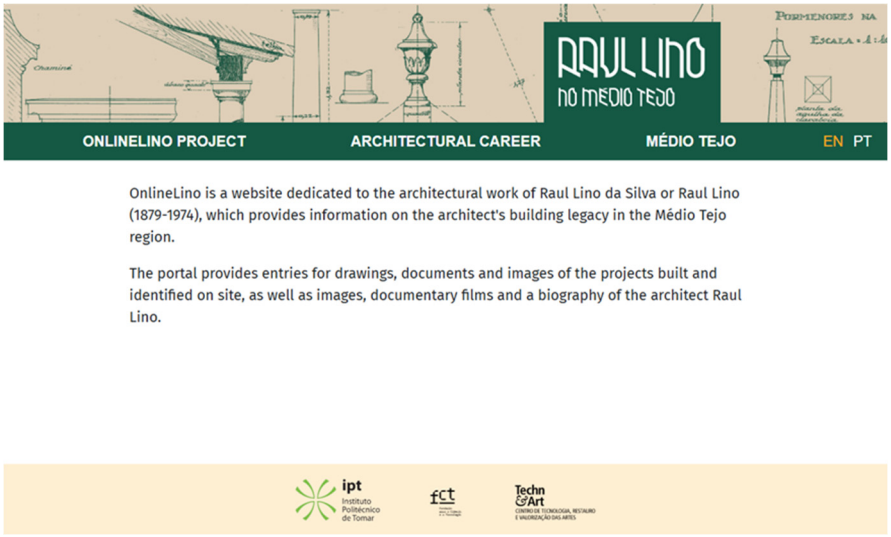

Figure 3. Home page of the OnlineLino website with main menu.

The project's guiding premise for the platform was to integrate the collection of architectural drawings and related information (technical texts and drawings, photos, videos and press releases)

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of the buildings designed by Raul Lino for the Portuguese region of *Médio Tejo* into the same system, preserving the specificities of each section with different access interfaces: mobile devices and PCs.

The technical drawings, design specifications, photographic records and three-dimensional models are organised and accompanied by texts (descriptive and interpretive texts), source references and bibliographies that reflect the findings and insights of the research team into Raul Lino's life and work. The documents made available on the website are of two types: architectural project documents held at the ALCGF, namely texts (specifications and correspondence between the architect and the client) and technical drawings; and other documentary material (current and old photographic records, press articles and videos), made available through hyperlinks from different and the original digital sources. In addition to this information, the website also includes a short biography of Raul Lino.

5.1. Content and Organisation of Online Lino

The information on the website is divided into three categories: 'OnlineLino', 'Biography' and 'Buildings' (Figure 4). Table 3 shows the content of the website and how it is organised.

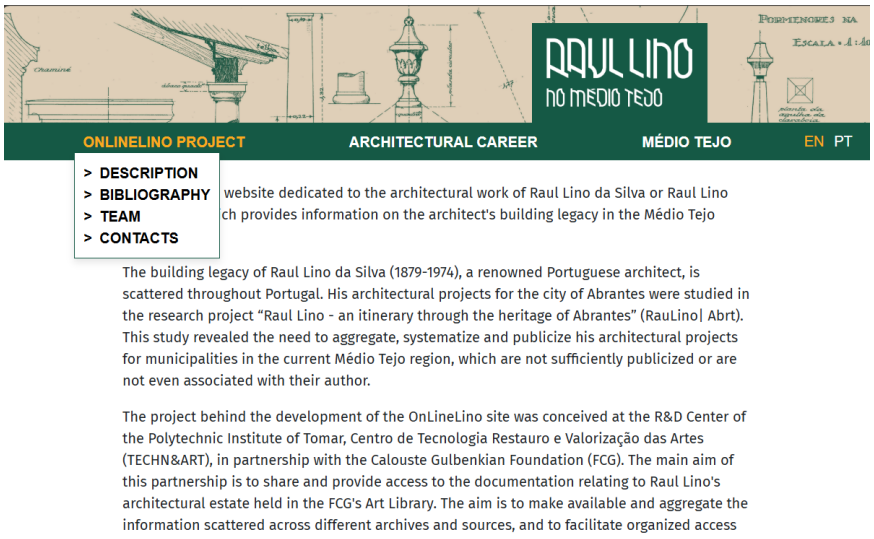

Figure 4. Layout of the 'OnlineLino Project' category.

The 'Online' category includes the four subcategories relating to the main description of the project, bibliography, team members and contacts (Figure 4 and Table 3).

Table 3. Number and location of architectural projects by Raul Lino at *Médio Tejo* region.

Category	Sub-category	Content
OnlineLino research project	Description	Description of OnlineLino project
	Bibliography	Main bibliography of the research project
	Team	Identification of the team members
	Contacts	Contact information
Architectural Career	Overview	Biographical notes on Raul Lino.
		Videos (hyperlinks)
		Academic papers (hyperlinks)
		Press articles (hyperlinks)

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	Materials	Description of preferred materials and construction techniques
	Iconic buildings	Brief description of some iconic buildings by Raul Lino, in Portugal
		Videos (hyperlinks)
		Press articles (hyperlinks
Médio Tejo	Buildings	Buildings in the *Médio Tejo*
	Chronology	Search by project date
	Map	Search by location (on map)
	List	Search by name and date

The 'Architectural Career' category is divided into three sub-categories: 'Overview', 'Materials' and 'Iconic Buildings'. These sub-categories include an overview of Raul Lino's professional career as an architect, his preferences in materials and construction techniques, and some of his iconic residential buildings. The information is presented through descriptive texts, videos and press articles. The videos and press articles are taken from various web sources (e.g., Portuguese National Television, local press articles, Sintra Town Hall, etc.).

The *'Médio Tejo'* category refers to Raul Lino's architectural production on *Médio Tejo*. The category introduces this production with a descriptive text. The *'Médio Tejo'* category is divided into four sub-categories (Buildings, Chronology, Map and List), through which the user can search for projects and buildings designed for the *Médio Tejo* region by the date of the project (Chronology), by the location of the building (Map) or by the date and name of the project (List).

Figure 5 shows the chronological search page. In Figure 5, the empty squares (no image) correspond to buildings that do not exist or that could not be identified during the course of the project. By selecting an image of a building, the user has access to the file description of the building (Figure 6), which shows the date of the project, the identification and location of the building, a description of the main characteristics of the building, and the drawings of the project (available through hyperlinks to the ALCGF website).

Figure 5. OnlineLino website: Chronology page, accessible from the *'Médio Tejo'* menu.

Figures 7 and 8 refer to the List and Map pages and can be selected from the tabs of the same name. In Figure 7, the green pins indicate the location of the buildings. By selecting the building pin (Figure 8), it is possible to access the information corresponding to the building (Figure 6). Similarly, by selecting the building name in the list (Figure 7), it is possible to access the information corresponding to the building (Figure 6).

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Figure 6. OnlineLino website: Information about a residential building located in *Abrantes*.

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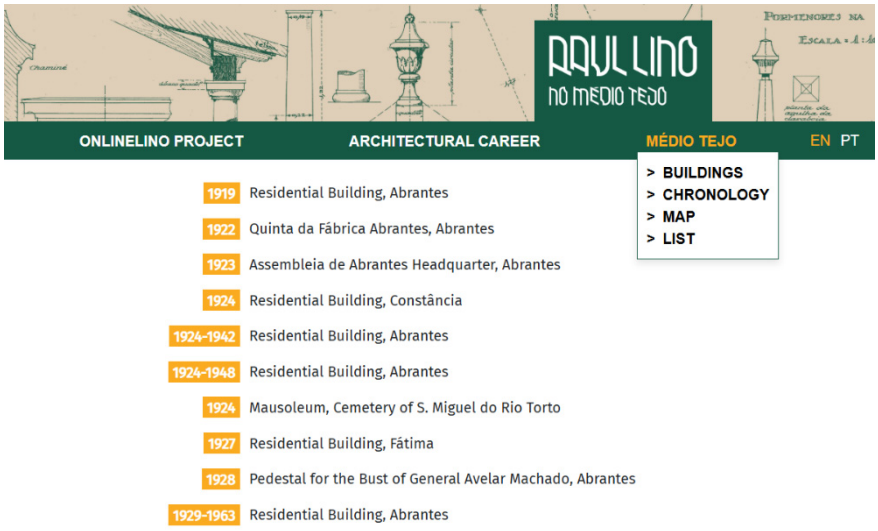

Figure 7. OnlineLino website: Partial view of the 'List' page that can be selected from the *'Médio Tejo'* menu.

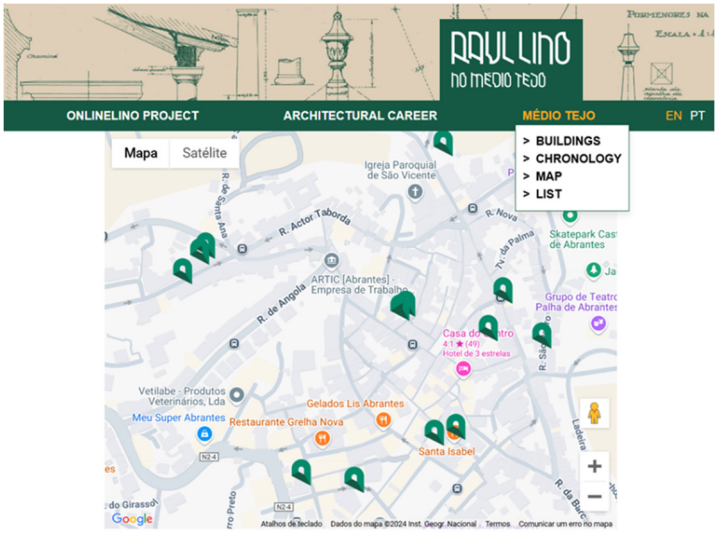

Figure 8. OnlineLino website: Map page that can be selected from the *'Médio Tejo'* menu.

6. Discussion

The cultural context and values of twentieth-century architecture and construction confirm the need to preserve them for future generations, especially in the current context climate change. For the architectural objects of this period, there are multiple and interrelated challenges to overcome: the interruption of industrialised production series, the loss of traditional knowledge, difficulties in repair, replacement and conservation procedures, functional anomalies in materials and systems, obsolescence and adaptation to the effects of climate change, among others [1,2].

In this respect, original archival sources play a key role, as they are the source of the original essence of the author and his interpretations, and current technology facilitates the management, storage and display of physical archives through digitisation processes.

However, with regard to the primary documentary sources produced in the twentieth century, a large part of them are not always intact because they were developed on paper (as paper is easily damaged), or sometimes the technical documents related to the building are scattered in different documentary funds, making it difficult to interpret the architectural object. These circumstances, combined with other threats facing twentieth-century architecture, reinforce the urgency of using

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digital technologies to document and systematise data on this important heritage of humanity [8,13,15,17,19,30].

One of the main objectives of digital archives is the legibility of the documents collected. The most common way of organising archives is to organise access by individual objects. This can work satisfactorily, especially in the case of objects that have their own internal cohesion, such as a magazine or a journal, which "contain all the necessary information to be read, analysed and understood" ([49], p. 336). However, when the archive is made up of heterogeneous objects (iconographic elements - drawings and photographs - and textual elements), the logic of organisation is based on the relational link between these documents - the archival bond.

On the OnlineLino website, the relational linking of archival documents is the architectural project, a unit that can bring together and relate the different types of documents - graphic and textual representations. This option makes it possible to manage the cohesion between digitised documents of different origins and formats and to 'establish or re-establish the original intellectual and physical order of records in a collection' ([49], p. 336).

In this sense, for the OnlineLino website, the conception of a narrative structure was fundamental to establish how the data should be organised and displayed, and it should be emphasised that narrative strategies also function as sense-making and cohesion [50].

Given the nature and objectives of the project, it was decided to group the documents and data into one unit: the single object - project/work. Interpretive and descriptive texts were then written about the projects and works (buildings), accompanied by a specific bibliography, in the form of text files that will become indexed entries in the database.

The project had three distinct but interrelated objectives: firstly, to identify and present Raul Lino's projects and works for this region; secondly, to stimulate a reflective discourse on Raul Lino's work, based on a broader knowledge of his work in a regional context; and thirdly, to develop an online archive without ownership, suitable both for specialised academic research and for interaction with a wider public, without losing sight of the comprehensiveness of his work as a whole.

The archival arrangement was underpinned in tree levels:

1. Establishing how the data should be organised, since we are dealing with heterogeneous digital documents (conceptual level);
2. How this organisation should be displayed more efficiently (design level);
3. Outlining the more appropriate website architecture to respond to both conceptual and design framework.

The process was developed by multidisciplinary teams who shared their work at several working meetings throughout the process. In this regard, it should be emphasised that the involvement of students in the project development team has enabled to develop their academic skills as part of a work that brings together different areas of knowledge and therefore different perspectives.

7. Conclusions

This paper describes and presents the development of the website OnlineLino on the built legacy of the renowned Portuguese architect, Raul Lino da Silva or Raul Lino (1879-1974) for Portuguese *Médio Tejo* region. This region is an inland and sparsely populated area in the centre of mainland Portugal. *Médio Tejo* is an administrative region, for which the architect Raul Lino designed several architectural projects between 1923 and 1965. These projects included residential buildings, schools, public buildings, two mausoleums, a building for cultural activities and even two town plans.

The work carried out contributes to the methodological dimension in the field of Cultural Heritage, Architecture and Construction, and Information Technologies by presenting a descriptive study of the development of a website on the built heritage of architect Raul Lino. The results contribute to the dissemination of knowledge about the legacy of architect Raul Lino in a sparsely populated area, promote greater awareness among the surrounding communities and public administrations, and encourage initiatives for the valorisation of cultural heritage, as well as the conservation and restoration of architectural and built heritage. It is expected that further

developments of the research project will enable its extension, with the addition of more records related to Raul Lino's architectural projects, outside the physical limits of the designated area, the *Médio Tejo* region.

Author Contributions: Conceptualization, A. M, I. S.; methodology, A. M., I. S.; software, P. S., A. G.; investigation, A. M., I. S., R. D., P. M., A. X.; resources, R. D., A.X.; data curation, P. S.; writing—original draft preparation, A. M., I. S., P. S.; project administration, A. M.; funding acquisition, I. S. All authors have read and agreed to the published version of the manuscript.

Funding: Please add: This research was funded by national funds through the Portuguese National Funding Agency for Science, Research and Technology (FCT), grant number UID/05488/2020. The The APC was funded by FCT through the Technology, Restoration and Arts Enhancement Center (TECHN&ART).

Data Availability Statement: The OnlineLino website demo is available on http://onlinelino.ipt.pt/

Conflicts of Interest: The authors declare no conflicts of interest.

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