

# Documentary data collection: an initial step for information management in the conservation and restoration of cultural heritage

## Recolha de dados documentais: um primeiro passo para a gestão da informação em conservação e restauro do património cultural

JAIONE KORRO<sup>1\*</sup>   
JOSÉ M. VALLE-MELÓN<sup>1</sup>   
ÁLVARO RODRÍGUEZ  
MIRANDA<sup>1,2</sup> 

1. GPAC-Built Heritage Research Group, Laboratory for the Geometric Documentation of Heritage University of the Basque Country (UPV/EHU), Justo Vález de Elorriaga 1, 01006 Vitoria-Gasteiz, Spain

2. Department of Applied Mathematics, Faculty of Engineering of Vitoria-Gasteiz, University of the Basque Country (UPV/EHU), Nieves Cano 12, 01006 Vitoria-Gasteiz, Spain

\* [mirenjaione.korro@ehu.eus](mailto:mirenjaione.korro@ehu.eus)

### Abstract

Architectural heritage documentation is a preliminary step to address any heritage conservation and management problem. However, data collection is often isolated resulting in lack of communication between different data types and incomplete documentation. This text examines the wide-ranging collection of technical and administrative documentation concerning to the successive conservation-restoration works carried out in the monastery of San Millán de la Cogolla de Yuso (La Rioja, Spain) since its declaration as a UNESCO World Heritage site in 1997. The main objective is to propose a document management system which can support an efficient long-lasting safeguard and also allows new uses and additional values. This aim entails the consideration of information retrieval (when the documents are scattered across many archives), classification (a normalised and comprehensive classification chart is lacking for the documents generated in conservation-restoration), and description (a list of metadata needs to be benefit of future users and any other additional uses).

### Resumo

Documentar o património arquitetónico é um passo preliminar para resolver problemas de conservação e gestão do património. No entanto, a recolha de dados é muitas vezes isolada, faltando a ligação entre os diferentes tipos de dados e a documentação incompleta. Aqui analisa-se o vasto conjunto de documentação técnica e administrativa relativa aos trabalhos de conservação-restauro realizados no mosteiro de San Millán de la Cogolla de Yuso (La Rioja, Espanha) desde a sua declaração como Património Mundial da UNESCO, em 1997. O objetivo principal é propor um sistema de gestão documental que possa apoiar uma conservação eficaz e duradoura e que permita também ser reutilizado e valorizado. Isto implica considerar a recuperação da informação (quando os documentos se encontram dispersos por muitos arquivos), a classificação (falta uma tabela de classificação normalizada e abrangente para os documentos gerados na conservação-restauro) e a descrição (lista de metadados para benefício de futuros utilizadores e quaisquer outras utilizações).

### KEYWORDS

Document management  
Conservation  
Restoration  
Databases  
Conceptual modelling

### PALAVRAS-CHAVE

Gestão documental  
Conservação  
Restauro  
Base de dados  
Modelação conceptual

## Introduction

Knowledge and understanding are key factors when it comes to taking decisions, plan interventions, and run the management of a heritage element. Both depend on the availability of information, therefore, the collection of documents regarding all the previous conservation-restoration actions carried out becomes an essential process that will affect the subsequent procedures aimed at the development of the uses and the preservation of the historic buildings. Ultimately, it can be said that documentation is necessary for the maintenance of cultural heritage through its entire life cycle and should be a fully integrated part of the conservation process. In this regard, detailed recommendations can be found in ICOMOS [1-2] and Historic Places [3].

The present work deals with the compilation and classification in the form of a database of all the technical, administrative and background documentation produced during the interventions carried out in the monastery of San Millán de la Cogolla de Yuso (Figure 1), since its declaration as a World Heritage site in 1997. The goal is to propose a methodology for the preservation, recovery and management of documentation that will serve as a supporting element to ensure the safeguarding of the heritage element itself.

To a large extent, this article tries to adopt the concept of Collection Care Documentation (CCD) [4] – which refers to the recording, archiving and use of the actions taken to prevent or limit the deterioration of any moveable cultural heritage – for the management of the whole building. Indeed, an efficient CCD is called on to (1) to promote the impact of preservation activities, (2) to encourage greater understanding of the management processes, (3) is a reminder for periodic reviews of data, (4) to avoid the loss of institutional knowledge (for instance, due to the changes in the staff), (5) to helping the identification and analysis of risks, (6) to prevent the duplication of activities, as well as provide data for: (7) funding applications and (8) the generation of reports or other management functions.



**Figure 1.** Access to the church of the monastery of San Millán de la Cogolla de Yuso, from the West.

As stated in the general references on conservation practice – such as ICOMOS [5] or UNESCO [6], the design, implementation and monitoring of any conservation-restoration action must be carried out in the context of a master plan, which will string together the different works in order to make possible and enhance the defined aims and uses.

Nowadays, the complexity of the management and the number of disciplines and professionals involved in the interventions require the development of guidelines for their organization, where the information itself becomes essential for accurate diagnosis and the realization of coherent intervention proposals [7]. Unfortunately, the implementation of the conservation programs often neglects recording such or considers the documentation as an afterthought although, to ensure effective conservation decisions, record-keeping should be a main component at every stage. Indeed, the definition of the actions needs to be based on the knowledge of the previous interventions [8] – not only what was carried out but also how the treated areas responded since it is not unusual that current issues are consequences of past operations [9]. Additionally, there should be a careful study of the nature of the materials and the triggering factors of the pathologies to be reduced [10], as well as being in compliance with environmental standards and current legislation [11]. Likewise, it is necessary to develop a complete overview of the evolution of the state of conservation based on the information gathered through periodic reports [12].

The need of documentation is also evident if it is considered that the methodologies and criteria for the conservation-restoration change over time due to various factors such as the adaptation to new uses and laws or the replacement of techniques and products [13], but also due to shifts paradigms regarding the conservation of architectural heritage [14]; especially if we bear in mind that many interventions undertaken over the last part of the nineteenth century and most of the twentieth were driven by historicistic criteria, in which the authenticity of the visible result may have been compromised [15]. Therefore, as restoration criteria evolve over time according to the sensibility and leading tastes – as well as the available resources – each intervention has to be pondered over in the context of where it was carried out. On the other hand, these common grounds allow the establishment of patterns when analyzing interventions in different elements [16] and this emphasizes the importance of carefully scrutinising the conservation-restoration history of the different heritage elements.

Therefore, the management of the information regarding the conservation-restoration of cultural heritage elements is a very active research area with noteworthy international projects [17] and many interesting cases applied to relevant monuments, such as: the SIALH information system for the Alhambra in Granada [18], the Great Project Pompeii Information System (GPP-IP) [19], the n-Dame\_Heritage project about the open and reusable digital ecosystem to build knowledge of Notre-Dame Cathedral [20], the heritage documentation software of the Sandstone project for the restoration of the Pórtico de la Gloria in Santiago de Compostela [21] and the data acquisition system of Santa María Cathedral in Vitoria-Gasteiz [22], just to mention a few. However, although abundant literature exists, much work still remains.

It should also be noted that, often, when several authors highlight the importance of databases for the monitoring of cultural heritage and the planning of restoration actions, the focus is placed on the documentation techniques (photographs, drawings, 3D models, analytics, etc.) as the support on which the pathologies are represented and changes are analysed. Examples can be found applied to buildings [23], architectural decorations [24], mural paintings [25], rock art sites [26] and even to street art [27]. In all these databases, the importance of the archive information about previous interventions is mentioned; nevertheless, the way of including it into the management system is not always clear. Moreover, although many authors list the metadata for the documents e.g., [28], other fundamental aspects such as data collection [29] or the conceptual links between the different types of documents are usually overlooked which is why these matters will attract considerable attention in the case study developed in this text.

Therefore the following hypothesis is established as a starting point: that the recovery, proper formalisation and dissemination of knowledge related to previous conservation-restoration works carried out to a heritage element will enable a more effective management permitting the monument to be maintained in a sustainable way, and at the same time allowing for the incorporation of new uses and the generation of additional values.

The remainder of the text is organized as follows: herein below, the case study – the monastery of San Millán de la Cogolla – is introduced; in particular, the main characteristics of the site, its designation as a monument and the consequent establishment of a foundation for its management. Next, the objectives of the document collection and the purpose of a database adapted to the aims and daily work of the foundation will be explained. Then, the ensuing two sections will deal with the methodology for the generation of the database and the description of the results. This will be followed by a discussion and finally, a set of conclusions will be presented.

### Case study

The valley of San Millán de la Cogolla is located in the southwest of the Autonomous Community of La Rioja, in the region of Nájera (Spain). It is made up of the towns of Berceo, Estollo-San Andrés and San Millán de la Cogolla-Lugar del Río, where the monastery of San Millán de la Cogolla de Yuso is located (coordinates: 42° 19' 33" North and 2° 51' 53" West). The valley contains two monastic complexes (the early medieval settlement of “Suso” on the hills and the group of buildings of “Yuso” near the river bank with buildings dating back to the sixteenth and successive centuries).

The site was recognized as a national historic-artistic monument in 1931 and included in the UNESCO list of World Heritage sites in 1997. The main values appointed in the registration were related to the testimony of the continuity of the Christian monasticism from the sixth century to the present day, as well as the broad variety of artistic styles present in the architecture and the importance of the origin of the Castilian (Spanish) language. The protection of the natural area and the buildings of the two monasteries, as well as the socio-economic development of the valley was entrusted to a specifically established foundation (Fundación San Millán de la Cogolla, set up in October 1998). The aims of the foundation also include the research, documentation and outreach of the Spanish language.

The board of the foundation comprises representatives of (1) the national, regional and local administrations, (2) cultural institutions and royal academies tied to the language, history and fine arts, (3) the university of La Rioja and (4) the monastic community represented by its prior. Nevertheless, the day-to-day operation is vested in a reduced team consisting of the director and a few administrative staff, the ones dealing with the overall management, design and supervision of the works, outreach activities, accounting and so forth.

### Objectives

The paper proposes a methodology for recovering the available information concerning conservation-restoration actions carried out in the Monastery since its declaration as a World Heritage site and organizing them in the form of a database adapted to the uses and goals of the foundation in charge of the management of the monument. The objectives can be detailed as follows:

O1. Gathering all documents concerning conservation-restoration interventions developed at the monastery of San Millán de la Cogolla de Yuso from the different archives wherein these documents are scattered.

O2. Establishing and implementing a classification chart that identifies each document within a semantic structure representing the different stages of the intervention.

O3. Create an ongoing information registry, focused on a relational database that enables logical and intuitive information organization, access and analysis.

## Methodology

The documentary data collection is developed through a set of phases: 1) analysis of the situation, 2) data acquisition, 3) model generation, 4) data entry and 5) evaluation of the results. Moreover, the phases 1 to 3 are further divided into specific subphases (1.a, 1.b, 2.a, etc.) (Figure 2).

Of the five phases, the second one (model generation) is the only one that will not need to be repeated in successive works (with other monuments) as, when a suitable model for the database is available, it may be re-used after the application of some adjustments suggested by the analysis of the scope of the work as well as the sources (phase 1).

Hereunder is a brief description of the different phases shown in the Figure 2.

### Phase 1 – Analysis of the current situation of the information about conservation and restoration interventions

- a) Definition of the scope of the work (types and rationale of the documents that will be considered in the management system, as well as the time span). In particular, the starting point was established in the declaration as a World Heritage by UNESCO in 1997, since this is the period under the direct responsibility of the San Millán foundation.
- b) Survey of the possible sources of primary and secondary information that may contain relevant documents for the database, i.e. the identification of the archives (namely: General Archive of La Rioja government (AGLR), Archive of the monastery of San Millán (AMSM), Archive of the San Millán Foundation (AFSM) and Archive of the town council of San Millán (AASM)) as well as the access to their catalogues so as to gather knowledge about the information contained in them.

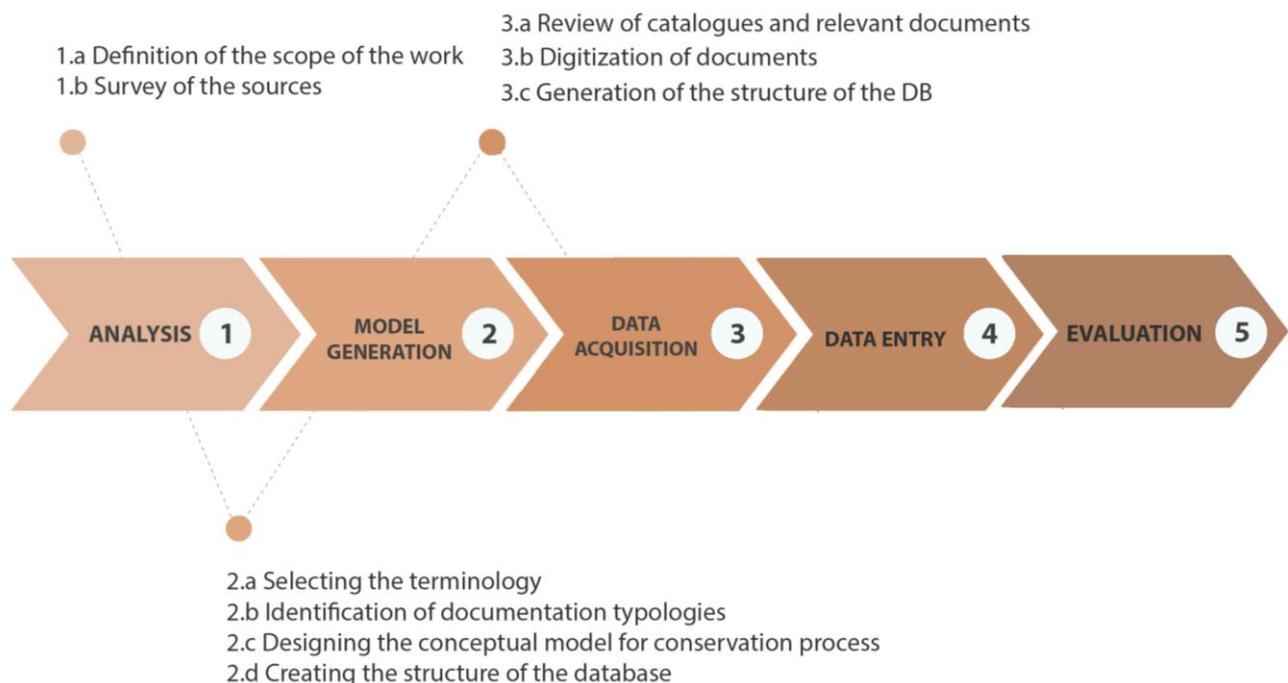
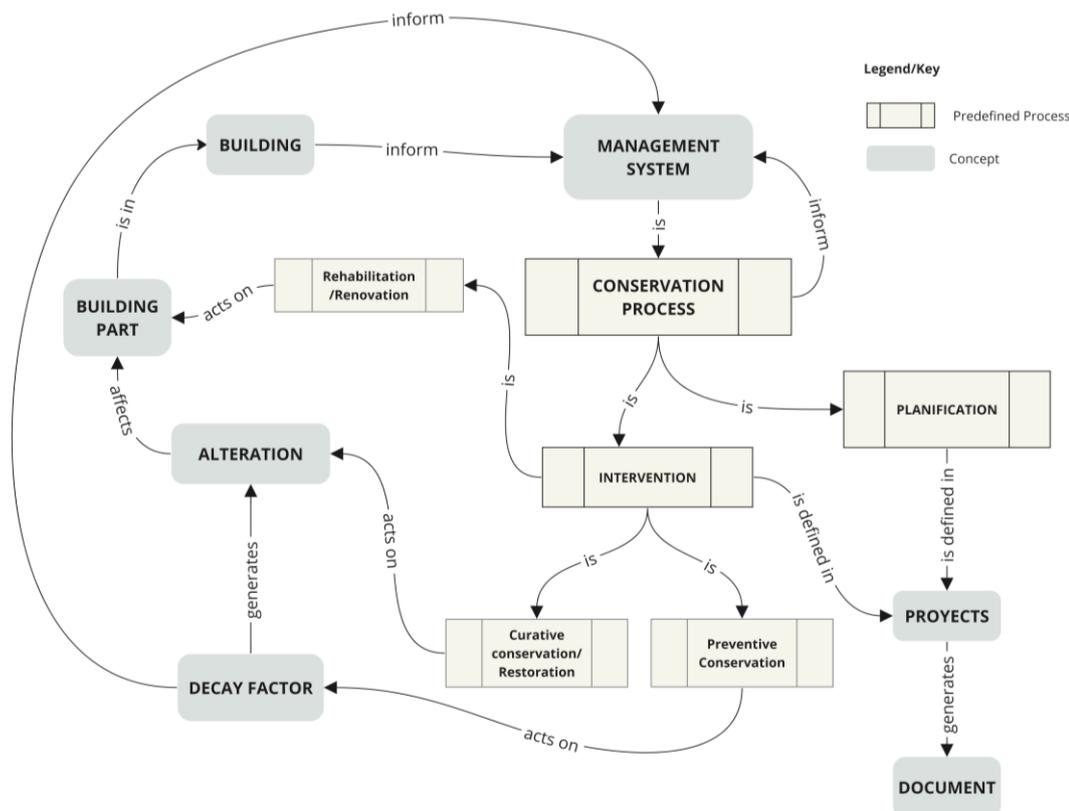


Figure 2. Methodological framework for documentary data collection.

**Phase 2 – Model generation**

- a) Selecting the terminology to be adopted. In the particular case of the monastery, the following thesauri were reviewed: *Tesouro MECD* (Ministerio de Educación, Cultura y Deporte) [30], *Tesouro del IAPH* (Instituto Andaluz de Patrimonio histórico) [31], *Getty Art & Architecture Thesaurus* (AAT) [32], *EwaGlos glossary* [33], as well as CEN-16853:2017 and CEN-15898:2019 [34-35].
- b) In the case of conservation-restoration, there is currently no uniform agreement concerning the documentary typologies created in an intervention, although it is deemed necessary for the documentation management. The identification of typologies carried out in this work is based on best international practices, such as Document Management and Records Management Model [36], the application guide for archive classification [37, p. 20], the CEN-16853:2017 standard [34] and a review of documents and new reference protocols in conservation-restoration for its standardization, [1, 38-40] among others.
- c) All the documents generated in an intervention are part of the same information unit and are linked by the logic generated by sequence of the events (e.g. a notice informing about an alteration that triggers a project to plan a corrective intervention which, once finished, is described in a report of activities) [41-42] (Figure 3). This semantic conceptual model provides an additional way to navigate between the documents, which facilitates fast and efficient handling and consultation.
- d) The structure of the database was created by searching and analysing databases in use in similar heritage elements. In addition to the design of the internal structure of the database – i.e., the selection of pieces of information to be collected for each intervention, the generation of database structures after the conceptual model was based on the systematization and organization of the information sources according to archival standards ISAD(g), CIA [43]. In total, 20 items were implemented in a spreadsheet generated in *Excel* (Microsoft Office 2016) (Table 1).



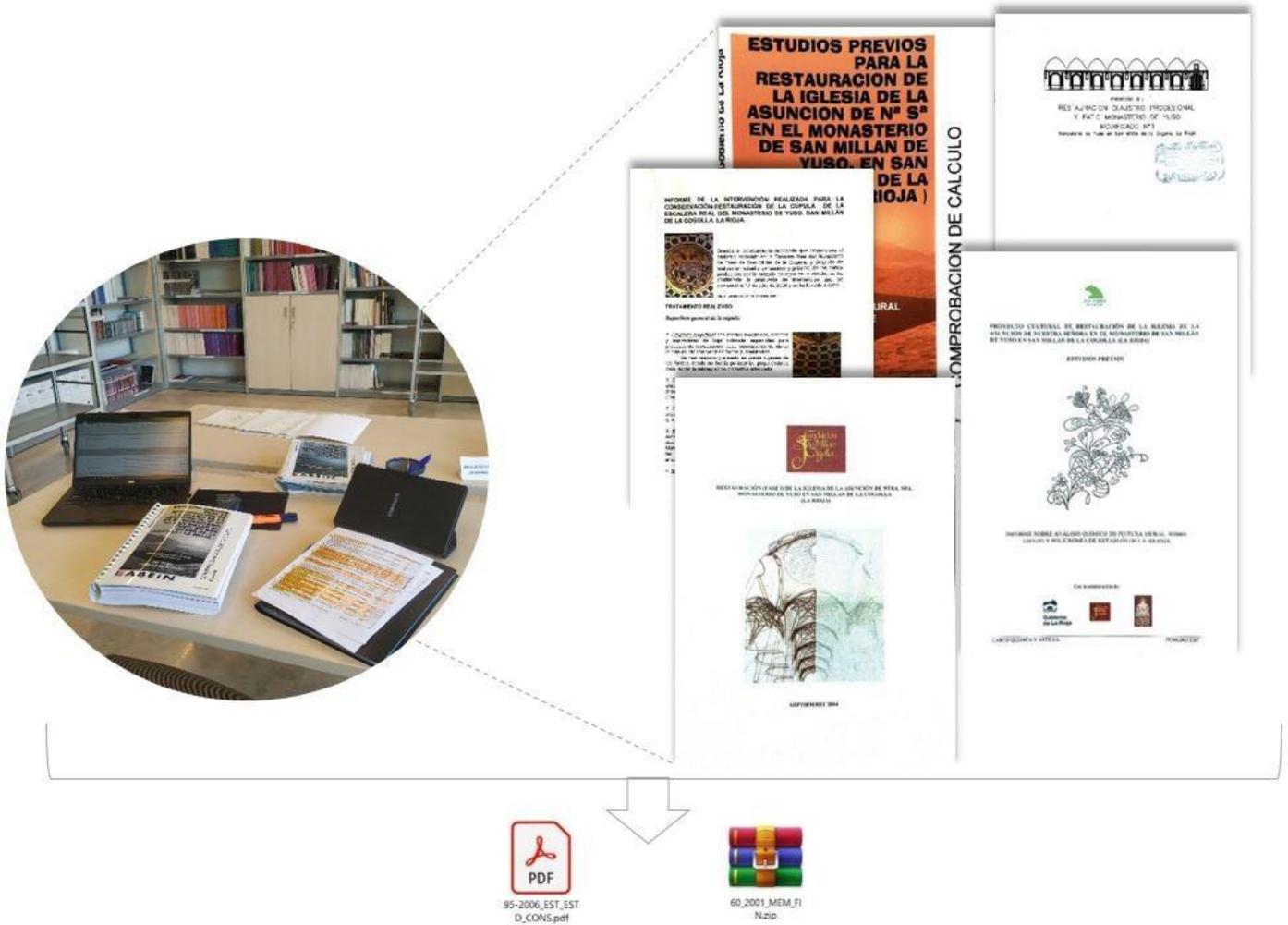
**Figure 3** Conceptual modelling of the conservation process.

**Table 1.** Fields used in the database of the monastery (BD\_SMCY), description adapted from CIA, and relation with ISAD (g).

BD_SMCY	ISAD (g)	Description
ID	Reference code	Unique identifier of the description unit.
DOC_TECN_SM	Title	Name of the description unit. The original name of the document.
PARTE-EDIFICIO_ESTANC	Scope and content	Refers to activities in which the product is the outbuildings or functional parts of the building (church, cloister, refectory...). In this case it is divided by means of spatial partitioning according to the number of construction phases. In total, 16 construction phases have been determined.
TIP_DOC	Level of description	Level of organisation of the description unit: fund, series, unit. A documentary unit produced by an organisation in the development of a specific competence, constituting the material evidence of one or more activities, and which is distinguished by having a number of physical or intellectual characteristics in common with other units.
SUBTIP_DOC	Description tools	Identify any type of description instrument related to the unit of description. An organised unit of documents (several single units) that expresses the division of the documentary type according to the subject or variants of the subject according to the tasks and areas of action that they define and that refer to the same subject, activity or matter.
VOL_SOP_UNID_DESCRP	Volume and support of the unit of description (quantity, size or dimensions).	Number of physical or logical units (15 folders, 3 boxes, 8 photographs and a plan...), the number of linear metres of shelving occupied may also be recorded.
FECHA	Date(s)	Date corresponding to the description unit. May be a range or include approximate dates if exact dating is not known.
AA_DOC	Name of the producer	Identify the producers of the description unit.
PROM_DOC	Producer Name	Identifies the Promoter of the document and/or of the conservation-restoration intervention (administrative unit that supported the emergence of the documentary type in accordance with its corresponding competences).
SIG/COD.REF	Reference code	Sequential numeric value automatically generated by the database system that is associated with a particular entity and query file (AGLR, AMSM, AFMSM, AASM).
ORD	Reference code	Sequential numeric value automatically generated by the database system that is associated with a particular entity and query file (AGLR).
UBI_REAL	Existence and location of original documents	In case the description unit consists of copies, indicate the existence, location, availability, or disposal of the originals.
FORMT	Physical characteristics and technical requirements	Report any significant physical characteristics or technical requirements that affect the use of the description unit. It refers to the digital preservation and conservation that must be taken into account according to the different media and formats.
UNID_DOC_SIMPL	Scope and content	It refers to the smallest archival documentary unit that exists; this unit cannot be divided into smaller parts, such as a photograph, a plan, a text, etc. It records five types: 1) textual documents, 2) graphic documents in images, 3) audio documents, 4) graphic documents in video, and 5) graphic documents in 3D models.
CARACT_DOC	Scope and content	Identifies the nature and original function of the document: 1) Technical documentation, 2) Administrative documentation and 3) Informative documentation.
FASE_INTERV	Date(s)	It explains the context of creation, throughout the life cycle of the extended intervention: 1) Start documents, 2) Project drafting documents, 3) Documents of administrative procedures and work awarding, 4) Documents of work execution. This may allow in the future the establishment of timelines that point out significant events or the evolution of the monastery.
ABREV	Title	Specifies the name of the document within the DB and provides a guideline for the identification of the documents within the same DB in accordance with the file nomenclature standardisation bases.
DENMN_FICH	Reference code	Standardisation of the files through three blocks of information.
CARP	Existence and location of copies	Indicate the existence, location, and availability of copies of the description unit.
ENLA/VINCL	Existence and location of copies	Direct location of the generated folder directory for quick access to the content described in the DB.
DOC_RELAC	Related description units	Indicates the documents related according to their substantive content, related to the context of the intervention: subject producer, function, room to which it belongs, functions related, etc., to the document analysed.

**Phase 3 – Data acquisition: collection (including digitization) and organization of graphic and textual documents concerning conservation-restoration interventions of the monastery**

- a) Review of the catalogues of the four selected archives and identification of the relevant documents as well as their support (paper or digital), completeness, duplication (original versions or copies), etc., in order to select the most suitable sources to be indexed into the database.
- b) Digitization (or copy if they were originally in digital formats) of the documents about interventions (Figure 4).



**Figure 4.** Process of digitizing documents about conservation and restoration works.

**Phase 4 – Data entry**

In this phase, the fields of the database are filled in with the respective data extracted from the consulted documents. Data loading is the most time-consuming phase, requiring objectivity and systematization of the information processed.

**Phase 5 – Evaluation of the results**

Revisions and corrections, study of possible extension options, analysis of models, support for future work and further applications.

## Results

The documentation of conservation-restoration processes includes manifold data formats either quantitative or qualitative. The variety also concerns a wide range of purposes and the many kinds of stakeholders who may be interested in accessing the information.

After the analysis of the documents, it was possible to draw up a catalogue of documentary typologies that is intended to be a versatile and generic tool, in which the types of documents generated in any intervention are duly recorded. For this purpose, the conservation-restoration process has been divided into four stages that help explain the context of creation throughout the life cycle of the intervention:

- 1) Initial documents: those that initiate an intervention or inform about alterations, decay factors, new uses, etc.; in summary, any document that may unleash future actions regarding the conservation-restoration of the building.
- 2) Project drafting documents, i.e., any document that defines and justifies the characteristics of the intervention.
- 3) Documents for the administrative processing and awarding of the contracts, including any document generated by organizations in charge of the supervision of the works during their administrative work.
- 4) Documents regarding the execution of the work, such as intermediate and final reports.

Thus, the previous four stages reflect a significant part of the context and links of each type of document that can be included in the database. This catalogue of typologies constitutes a tool to represent the traceability of the information and, therefore, to ensure the veracity, fidelity, legality and impartiality of the documentation generated in each action. Moreover, it helps to detect knowledge gaps about the projects, at the same time it facilitates the processes of description, classification, organization and dissemination of the information.

Through the assessment of the documentary production of conservation-restoration interventions carried out in the monastery of San Millán, a total of 118 documents were located and added to the database. As a first step, these documents were arranged by projects (considered as the basic work unit that contextualize and organize the individual documents). The analysis shows that, since 1997, 40 projects have been carried out all over the monastery. The projects can be subsequently grouped according to the part of the building to which they belong, so as to be able to relate the parallel and derived interventions, as well as to see the timeline of the interventions in a particular area. Analysed from the perspectives of the amount of documents generated by project (quantitative) and the documentary typology (qualitative), the following graph (Figure 5) helps to complete our understanding about the contents of the database, which also reflects the available knowledge (sometimes richer, other times incomplete) about the complete set of interventions.

Summing up, the previous graph makes it possible to obtain a broad overview of: 1) the availability and needs of the documentation of conservation-restoration projects, 2) the criteria that could be established in the future to complete the information more efficiently, and 3) the examples of both good and bad practices.

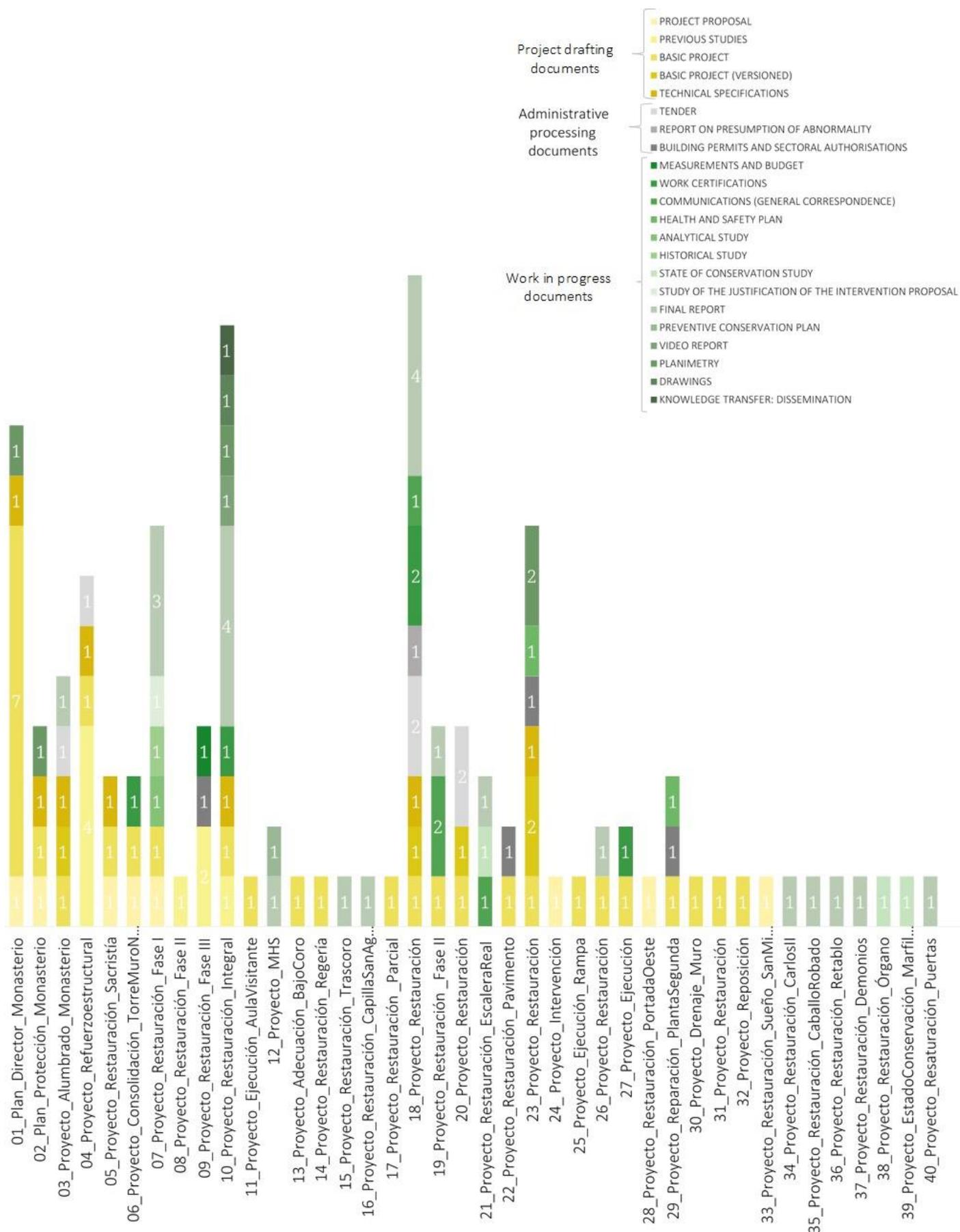


Figure 5. Number of documents – also showing their types – regarding the intervention projects in the monastery of San Millán de la Cogolla de Yuso.

## Discussion

Although the preferred situation is that the documentary base about all interventions starts with a preliminary project (which will describe the issue being tackled, the methods, the budget and the time period) and finishes with a final report, the actual situation is quite different. Indeed, among the 40 interventions identified, there are only 24 implementation projects and even less – just 19 – count on final intervention reports. These numbers make it evident that not all conservation-restoration interventions are properly documented with final reports that justify and detail the interventions carried out. This may be due to the fact that the Spanish Technical Building Code (CTE) [44] does not specify at any time the need for a final report detailing the intervention, as well as because the permissibility and lack of established criteria of some administrations. Nevertheless, international reference documents for cultural heritage, such as the 1972 Restoration Charter [45] or the Krakow Charter of 2000 [46], state the importance of being aware of both the study and the action to be defined, planned and carried out on a heritage asset; highlighting the importance of a final report detailing the intervention. This core idea is currently one of the basic principles of intervention in cultural heritage regardless of its character – movable or immovable [47, p. 228]. For all that, it is believed that the CTE should not be the only (partial) basis for the documentation of an intervention of conservation-restoration of historic buildings, since major shortcomings are detected in the treatment and conceptualization of an intervention of immovable heritage [39].

The general procedure to approach cultural heritage through documentary sources, includes successive steps consisting of the definition of the database (taking into account the available information, expected users and goals, as well as the common standards and technology solutions), data ingest and, once the system is operational, checking users' response in order to progressively improve the performance [48]. Therefore, the processing of the collected data should not stop with the generation of the database. On the contrary, we must bear in mind that the pursued objective is the use of the information for the benefit of the management of the heritage. Therefore, a logical step forward will be the development of a decision support system which will present all the information in an interactive and easy-to-read manner to the people in charge of the maintenance of the architectural heritage [49].

In fact, data management entails the necessity to handle efficiently large amounts of internal and external information, overcoming the complexity, superabundance and decontextualization of the data. Current challenges are oriented to get the most out of the semantical content and the links between digital resources so as to provide powerful management tools without neglecting user-friendliness and an attractive visual appearance (e.g. via interactive dashboards showing interconnected tables, links to documents, interactive graphs, timelines, maps and so forth) [50].

Likewise, it should be noted that periodic reports on the situation of the monastery are sent to UNESCO in the context of the World Heritage element, which should not be a mere formality, but a means of clarifying the strategic development plan.

As far as the objectives of the organization responsible for management are concerned, the cultural elements are listed as protected heritage sites, and the main purposes usually refer to conservation and tourism, as well as other compatible cultural events. However, other models that meet social needs are also proposed particularly for buildings without legal status protection, which must find other ways to be useful.

Whilst, although well-structured and rich databases need to be a main part of the decision-making processes, we should not consider that conservation-restoration actions can be driven by fully deterministic basics. On the contrary, conservators need to be trained in order to cope with different levels of uncertainty and also take into account the emotional aspects of the decisions made.

## Conclusions

A comprehensive data collection provides solid grounds for information management, it also reduces the risk of errors, gaps and duplicate information, as well as facilitates the participation of experts in different areas. This paper tries to summarize these ideas in the context of the case study of the monastery of San Millán de la Cogolla, offers an overview of the current state of the art and takes some steps towards establishing a framework that can be used for documentation, conservation, renovation and maintenance purposes of cultural heritage.

With regard to the the catalogue of the document types which are part of the conservation-restoration interventions, it is understood that this ordered classification of documents should help to link future conservation-restoration projects to be carried out in the building with previous ones thus providing an efficient management of the information. The order and logical disposition of the documents is presented according to the stages of an intervention; therefore, depending on the type of intervention, it will be necessary to identify the minimum necessary documentation to be included in the database.

The analysis carried out in the case of the monastery of San Millán revealed some interesting challenges that may also appear in many other elements of heritage.

Many users – both public and private – need to be more aware of the benefits of the documentary record in the support of decision-making processes. Improved awareness ultimately needs to be translated into substantial budget allocation in management planning and projects.

It is important to ensure that conservation policies and programs provide both adequate conditions for encouraging managers to develop and maintain project documentation and integrated systems for sharing and effectively storing information within databases. In order to address this problem, a documentation process should be established and maintained.

Heritage documentation may need to be archived, managed, and used over long periods of time. This fact – coupled with the short lifespan and rapid development rate of digital software – means that the documents that, at present, are stored on current data formats are unlikely to be readily usable in the future, unless specific actions (e.g., periodical migration, software upgrading, etc.) are taken. Evidence of this may be seen when data collected before the introduction of modern software is not easily adaptable. Consequently, more research and development efforts are needed to create more stable and standardized formats for present and future users.

On a final note, it must not be forgotten that although some innovative attempts have been made in relation to the adequacy of technical proposals and analyses of the functionality of data integration, further research is required. Additionally, the consideration of new ideas could improve our approaches to the documentation of architectural heritage to establish common guidelines that not only focus on the information available, but also its beneficial use. Succinctly, this proposal, if accepted will broaden our understanding of heritage in respect to improved planning for their conservation and management. This methodology should be useful and should be tested in other heritage elements, being open to its free use.

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