

Cultural heritage objects: A model of the patrimonialization process

Carlos H. Marcondes^{1*}

¹ Graduate Program of Knowledge Management & Organization, School of Information Science, Federal University of Minas Gerais, Belo Horizonte, MG, CEP 31270-901, Brazil

Abstract

Patrimonialization is the process through which an object is integrated within a heritage institution's collection. More than a simple and bureaucratic process of listing an object, of registering it in the registry book, patrimonialization is the process through which a primary object has its cultural value recognized, is integrated into the scope of a specific discipline, and thus, to culture in general, becoming witnesses and representatives of the original context from which they came from, becoming secondary documents or objects. A conceptual model of the patrimonialization process through which an object became a heritage object is proposed. The model emphasizes the role of the Patrimonialization Justification, a paradata dossier in documenting the decisions, criteria, and justifications of a curator to assign to an object the status of a cultural heritage object and incorporate it in the collection of a heritage institution. The model reuses classes and properties of other ontologies to contextualize the patrimonialization process and the documents involved, including the references that support the curator's decision to patrimonialize an object and include it in a heritage collection.

Keywords

Digital Cultural Heritage Object, Patrimonialization, Conceptual model, Documentation, Heritage paradata.

1. Introduction

Digital collections of archives, libraries, and museums are increasingly available through the Web. Such collections have additional features that physical collections do not have. They have - an increased range, and can be accessed from everywhere, by everyone, at any time; and they have - an increased plasticity, their digital objects may be largely reused, integrated, combined, and mixed up with other digital resources available throughout the web, such as representations of authors, themes, events, periods histories, and places thus generating new, original and unpredictable resources.

Recently, the potential of such digital collections for Culture, Science, Education, and Citizenship has increased with their publication as Linked Open Data – LOD – [1] and the use of CHO 3D images. LOD enables heritage institutions to publish their content in an interoperable, machine-understandable way. This is a new step in the patrimonialization and curatorial processes developed by such institutions that enlarges social roles and actions. When published as LOD a digital CHO gains an IRI through what it can be directly accessed thus becoming independent of any holding institution. 3D images also have other additional potential to conventional images, they can be manipulated by the user, rotated to be seen from different angles, zoomed in and out. They promote a rich interaction with the user, as close as possible to what would be a digital clone, a digital twin, of the object; in fact, 3D images have been called “digital twins” [2, 3].

Proceedings of the 17th Seminar on Ontology Research in Brazil (ONTOBRAS 2024) and 8th Doctoral and Masters Consortium on Ontologies (WTDO 2024), Vitória, Brazil, October 07-10, 2024.

* Corresponding author.

✉ ch_marcondes@id.uff.br C.H.Marcondes)

🆔 0000-0003-0929-8475 (C.H. Marcondes)



© 2024 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

Many of such collections are thematically superimposed and complementary. LOD technology enables such heritage records to be interlinked, achieving interoperability and adding value to digital collections, thus empowering heritage institutions.

More than a simple and bureaucratic process of listing an object, of registering it in the registry book, patrimonialization is the process through which a primary object has its cultural value recognized, is integrated into the scope of a specific discipline, and thus, to culture in general, becoming witnesses and representatives of the original context from which they came from, becoming secondary documents or objects.

How does an object become a CHO? What is the role of patrimonialization in the process through which an object becomes a CHO? What is patrimonialization? What data is generated by the patrimonialization process?

Patrimonialization conceptualization helps understanding, highlighting its details and importance to heritage object management and lifecycle, and formalize such process. It is also a decision-making process. These decisions are neither random nor ad hoc. They should be taken based on scientific criteria and guided by a policy. The model emphasizes the role of the patrimonialization documentation of these decisions. Such a process may generate a large quantity of metadata and documents. It forms a dossier similar to the UNESCO World Heritage Nomination in documenting the decisions, criteria, and justifications of curators to assign to an object the status of a heritage object and incorporate it in a collection of a heritage institution. In this article we revisit the concept, presenting a broad view of paradata as in [4], suggesting an application different from documenting 2D/3D cultural heritage. Paradata is the metadata and documents associated with the patrimonialization process of a CHO.

Conceptual models can guide, and suggest standards for digital representation of CHO. It also draws attention to the need for standards. The aim of this research is to propose a conceptual model for the patrimonialization process through which an object becomes a CHO; the research also aims at identifying other models and ontologies that could provide standardized concepts that may be used in the scope of the proposed model, increasing its reuse and interoperability potentialities.

This is ongoing research. The model is part of broader one which addresses the goal of making the curatorial work on digital heritage objects of archives, libraries, and museum collections that are published over the web as linked open data into permanent, authorial, and reusable resources [5]. The research specifically reported in this paper aims at develop a conceptual model of the patrimonialization process to be integrated within more general models or metadata schemas related to cultural heritage.

This paper is organized as follows. After this Introduction, section 2 presents the methodology used. Section 3 conceptualizes and discusses the patrimonialization process based on texts collected in the bibliographic and documentary research. Section 4 discusses ontological questions posed in the previous section. Section 5 highlights specific characteristics of the modeling process applied to cultural heritage domain, presents and discusses the proposed model of the patrimonialization process. Section 6 presents conclusions, future directions for this research, and concluding remarks.

2. Methodology

A bibliographic and documentary research was carried out with the aim of identifying concepts of cultural heritage objects, their patrimonialization and possible conceptual models and ontologies that could be provide concepts to the modeling CHO and processes involving them, such as the CIDOC CRM [6], EDM [7], LRM [8], RiC-CM [9]. There are some ontologies to represent documents and processes involving documents, as D-Acts – Document Acts Ontology – [10] and IAO – Information Artefact Ontology – [11]. There are also consistent theories describing the construction of social reality and the role of collective intentionality in assigning social-cultural values, rules, and conventions [12].

To develop such a model of patrimonialization process of CHO such models, ontologies, and descriptions, as well as conceptual and theoretical bases found in the literature are considered and

used as sources for the development of the proposed model. Such concepts are then synthesized and used as requisites to the modeling process.

3. The patrimonialization process

According to Van Mensh [13] heritage objects are: "... objects separated from their original (primary) context and transferred to a new, museum reality to document the reality from which they were separated". Subsequently, the same author complements: "As documents museum objects (in the sense of primary museum material) are direct (authentic) witnesses of cultural and natural phenomena".

Patrimonialization is so defined by the InfoScinpedia [14]: "A process by which a material or immaterial element became a constitutive part of a community's identity that imbues said element with meaning and significance". In the words of Rus [15] it is:

"... the process through which a cultural object belonging to a specific cultural system (peasant customary, in our case) is extracted and integrated into another cultural system by means of morphological adjustment and re-semanticization. In other words, patrimonialization takes place when certain cultural phenomena, behaviours and representations, are taken out of their genetic context and moved into a different one, undergoing an external intervention. From this perspective I define patrimonialization as a process of resemanticization."

Heritage objects have a dual nature, they are primary objects (natural or man-made) in addition to secondary objects - artifacts -, descriptions of the primary object with the aim of adding a semantic function and enriching its role as documents and testimony of natural and social facts.

The document nature of CHOs had previously been highlighted by Suzanne Briet [16], one of the pioneers of Documentation, when stating that an antelope cataloged in a zoological collection is a document. Briet also distinguishes between the antelope itself, which would be a primary object, and the antelope cataloged in a zoological collection, which would be a secondary object, i.e., a document.

Although CHOs are objects in the strict sense of the word, they have other properties that go beyond those of objects that are not considered CHOs:

"Museum objects are "ontologically coincident with objects in general, but as to their semantic, they have a new function, i.e. the function of authentic witnesses, documents, and/or the testimony of natural and social facts. [17]."

"... an authentic historical piece of evidence [which] is any object that enjoys a specific perceptible existence and therefore bears genuine, authenticated, undoubtable witness to, or [which] provides immediate testimony of, certain temporarily and locally defined state of being of a natural or social phenomenon, which it stems from. [18]."

CHOs are carriers of cultural values, and traditions and are part of the identity of a community, as Franchi (n.d.) [19] points out:

"First of all, let's have a look at the meaning of the words. "Heritage" is a property, something that is inherited, and passed down from previous generations. In the case of "cultural heritage," the heritage doesn't consist of money or property, but of culture, values, and traditions. Cultural heritage implies a shared bond, our belonging to a community. It represents our history and our identity; our bond to the past, to our present, and the future."

How does an object become a CHO? What are the possible kinds of provenances of a CHO? The paths through which a CHO becomes part of the collection of a heritage institution are diverse. In areas such as Archaeology, Botanic, Zoology, Entomology, and Mineralogy, field research collects primary objects. Acquisition, donation, and exchange are other very usual sources too. Despite all these kinds of provenance patrimonialization is the process through which an object is integrated

into the collection of a heritage institution and becomes a HO. These objects are selected by collection curators because they have recognized and attributed a scientific, cultural [20], and symbolic value in them: “Cultural heritage objects are symbolic. They represent identities in terms of culture and natural surroundings.” [21]; in the words of Lima [22], these objects go through a process of

“...attribution of value, a judgment made by the cultural field that consigns it as an element with a differentiating character. And by distinguishing it in this way, it makes it ‘special’ and in a prominent position compared to other objects of the same nature, giving it a sense of exceptionality.”

Research is one of the three activities of the museum’s PRC model -Preservation – Research – Communication – [23]. Patrimonialization also involves a research process and the documentation of this research. Whether the object is collected directly through field research activity, whether it is a historical or artistic object, patrimonialization may involve consulting different information sources to rescue, and reconstruct the CHO original context and also to integrate the CHO within the heritage institution collection’s context. The CHO and its documented context are in turn sources for posterior research, curatorial, communication, and collections management activities. During the patrimonialization process, the object receives an accession number as “the act of recording/processing an addition to the permanent collection by assigning a unique number that allows the museum to connect an object to its documentation” [24].

Becoming a CHO is, therefore, a socially attributed characteristic [12], consigned to an object by an agent, a curator, or an information professional, on behalf of an archival institution, a library, or a museum. This agent makes this decision based on his institution's collection policy and inscribes the object in the inventory, thus patrimonializing it in the institution's collection.

Heritage objects, especially museum objects, do not speak for themselves. Metadata is essential for their interpretation. The process of Patrimonialization aggregates important metadata to a CHO. Patrimonialization carried out by collection curators is the first stage of a broader process through which CHO became valuable input to Science, Culture, Education, and Citizenship. The next stage is the use of CHO in exhibitions. According to O’Neil [25], since the end of the 20th century, curatorship in culture has shifted its focus from collections to exhibitions. Such a focus gained greater importance with the possibility of virtual exhibitions [26].

Through exhibitions enters the scene another important actor, the curator, which has a fundamental role of interpreting and contextualizing a set of CHOs, showing their mutual interrelations and also their relations with Science, Culture, History and Society. Curatorial activities are enhanced as CHOs become digital, especially through the use of Linked Open Data technologies.

Digital collections have new potentialities that physical collections don’t have. They have a larger reach, and can be accessed by anyone, from everywhere at any time; and they have plasticity, and can be recombined, remixed, and mashed up thus creating new digital resources of unpredictable value. Digital CHO published as LOD can be directly accessed throughout the web, thus becoming independent of their physical location and the limitations of belonging to a particular institution.

4. Patrimonialization process: modeling requirements

The revised literature indicates some possible ontological questions to be answered based on the initial questions posed in the Introduction section. Such ontological questions are: - the question of dual nature of CHO, a primary object (the object itself) and another secondary [16], [17], - the question of a CHO being a document; - the issue of procedural nature, in which the primary object is the input of a patrimonialization process [22], [14], which has a CHO as its output; - the characteristics of being a CHO as socially attributed [12]. What conceptual models or ontologies account for such characteristics? These characteristics point to models or ontologies that represent various points of view about a given entity, how an entity can be represented according to different biases or contexts, or how an entity can be represented by more than one ontology.

Grenon and Smith [27] propose a dual view of reality, that is, reality can be seen either as a snapshot or photograph of a given situation, or as a set of states of things at a given time, called by the authors of the SNAP ontology, or this same reality because it is seen as a process that develops over a certain period, the SPAN ontology: “Accordingly, we distinguish two main types of ontologies, called SNAP and SPAN, one for continuants, the other for occurrences. Relations between continuants and occurrents are thus trans-ontological – they transcend the SNAP-SPAN divide”. A CHO seen as such, as a document that refers to a certain type of heritage object, would be within the scope of the SNAP ontology; a patrimonialization process that has a type of heritage object as input and a CHO as output, would be within the scope of the SPAN ontology.

In some scientific disciplines such as Archeology, Paleology, Ethnography, Ethnology, Entomology, Botanic, Biology, Ecology, and Intangible Heritage, information about the site where the object is collected is of superb importance. Patrimonialization process should include such information. An illustrative case is Archeology. The CRM_{Archeo} [28] is an extension of the CIDOC CRM model to document archeological sites. According to [29]

the model provides the ability to document the various aspects of an archaeological excavation process, including the technical details concerning different methods of excavation, the reasons for their application and the observations made by archaeologists during their activities in the field in a transparent way. This approach allows the creation of objective documentation that guarantees the scientific validity of the results, making them revisable following further investigations and reusable in different research contexts, in order to answer further (and potentially different) research questions.

According to the literature revised a summary of the ontological characteristics of the patrimonialization process is in the sequel. Such characteristics are used as requirements in the development of the proposed conceptual model.

- R1- A CHO is a document.
- R2- Patrimonialization is a process.
- R3- Patrimonialization process is guided by documents expressing the heritage institution patrimonialization policy.
- R4- Patrimonialization is a social value attribution process. It attributes cultural and heritage value to an object. The agent of this attribution is a curator on behalf of a heritage institution as archives, libraries, and museums.
- R5- Patrimonialization process has as input a primary heritage object and generates a document, a secondary heritage object, the CHO.
- R6- Patrimonialization process also generates various data/metadata that document the creation of a CHO, forming not only a set of documents/data/metadata, i.e., a dossier documenting the patrimonialization process but also various sets of specialized metadata as the attribution of a TypeOfHO to the CHO, the ChainOfCustody, AuthenticityIntegrity, and Appellation sets of metadata.

Within the CIDOC CRM conceptual model the class E5 Events and its subclasses were examined such as E63 Beginning of Existence, E85 Joining, E12 Production, and properties involving such entities; there is not a patrimonialization process such as described previously in such a model. Within EDM were examined the edm:Event class and the properties that connect such class to objects and situated it within space and time: edm:wasPresentAt, edm:happenedAt, and edm:occurredAt. The conceptualization that resulted is similar to the patrimonialization process in situating the process in space and time but it does not represent some of the specialized metadata sets created during it as mentioned in R6-.

5. Conceptual model of CHOs patrimonialization process

This section discusses and presents a proposed conceptual model of CHO patrimonialization process. We begin by discussing in section 4.1 the role of conceptual modeling in the Cultural Heritage sector and its differences from ontological and conceptual modeling in Computer Science.

5.1. On conceptual modeling in the Cultural Heritage

Usually descriptive and metadata practices are local, ad hoc and lack standardization within heritage institutions. Conceptual modeling in Cultural Heritage is quite distinct from that which is usual in ontological modeling in Computer Science [30]. Heritage institutions use conceptual models to standardize concepts, terms, and descriptions of objects in their collections to achieve interoperability between their databases, provide different access points to Cultural Heritage records, rather than to achieve formal reasoning. In the example by Stead [31] a religious object, a Holy Bread Basket, is classified both as a Canister type and as an Ecclesiastical item. Classification and taxonomic schemas serve as retrieval rather than reasoning aids. The dual heritage is a means to aid retrieval and also accommodate and integrate local cataloging practices. Curators and information professionals play a fundamental role in providing context to CHO by assigning rich metadata. Such primary curatorial work provides access points [32] to facilitate user access.

Frequently within the practice of Library and Information Science, access points are not an attribute of the object being described but contextual and cultural properties assigned to the object's catalog record by information professionals to facilitate user access and retrieval. They are called facets, a concept coined by a librarian pioneer, Shiyali Ramamrita Ranganathan [33].

Within the Cultural Heritage sector, the interpretations of the objects, events, and different clues of the past play a fundamental role. There may be diverse and even distinct interpretations of the same heritage object or past event [34]. There are few consensual views or paradigms as in Science but rather distinct views and interpretations. Curators, as agents who interpret past events, play a central role in this process. CHO databases are curated. Such aspect is emphasized e.g., by the CRM [6] since such databases as sources for scientific research within the scope of Digital Humanities: "The term "scientific documentation" is intended to convey the requirement that the depth and quality of descriptive information that can be handled by the CRM should be sufficient for serious academic research".

5.2. Modeling the CHO patrimonialization process

The model of the patrimonialization process of CHOs is called HOPatr. Although HOPatr inherited concepts of several conceptual models and ontologies, it is mainly based on D-Acts Ontology [10], [35], [36]. D-Acts ontology in turn is based on BFO and IAO. Document acts, as conceptualized in D-Acts Ontology, are means by which values and cultural background of an Agent (a cultural and heritage curator, on behalf of a heritage institution) concerning an object, are manifested through the patrimonialization process; such process makes social, i.e., cultural and heritage values into permanent entities, as the CHOs.

In the model proposed (Figure 1) the entities from each model or ontologies are identified by their possible namespaces, with letters preceding the entity's name as described in the sequel: Dublin Core Terms (dc:) [37], D-Acts Ontology (da), IAO (iao), CIDOC CRM (crm), Ric-CM (ric), AAT – The Art & Architecture Thesaurus [38] - (aat), EDM (edm), TOP (top) – Type of Heritage Object [39]. Both D-Acts and IAO are based on the top-level ontology BFO – Basic Formal Ontology [40] (Smith 2005).

Briet [16] stressed the documentary nature of a CHO. A significant part of its information content is gained through the patrimonialization process. The IAO is used to model the CHO as an `iao:Information_Content_Entity`. A CHO, a secondary object, - `Sec_HeritageObject` - then is associated with at least, one type of a primary object, `Pri_HeritageObject`, as one of its components,

forming since its patrimonialization, an inseparable whole. A CHO, according to the IAO, `iao:is_about` a `Pri_HeritageObject`.

As a document, as an `iao:Information_Content_Entity`, a CHO is also an artefact. There is a vast discussion in several disciplines concerning the nature of artefacts. According to Borgo and Vieu [41], “artefacts are essentially the result of an intentional act of their creator”. In the model proposed this “intentional act” is expressed by the patrimonialization process.

Due to the identification of patrimonialization of a CHO as an intentional process, the D-Acts ontology is used to model it. D-Acts ontology model intentional acts performed by agents, guided by documents, and that result in a social convention expressed also by a document. The D-Act of the patrimonialization process of a CHO is the `HOPatrimonialization_Proc`. It is guided by the `Heritage_Institution Policy`, the `Patrimonialization_Policy` expressing the Heritage Institution scope, values, and criteria to constitute its collections; it also specifies all subprocesses carried out throughout by the `HOPatrimonialization_Proc` such as the assigning of an accession number, assessment of conservation status, research and assignment of different and specific metadata [42]. This `Patrimonialization_Policy` in turn is the result of a D-Act, the `Patrim_policy_Creation`, which `da:has_agent` a `Heritage_Institution`. In Brazil, this document is called a museum plan and it is a national policy that all museums must have a museum plan. Accordingly, patrimonialization is a `da:Document_Act` guided by a document, the `Patrimonialization_Policy` of a `Heritage_Institution` (a `da:Organization`). Such `Heritage_Institution` takes on, i.e., `bfo:inheres` in two different roles, the `da:Doc_temple_creator_role` and the `da:Decl_templete_role`. The `da:Doc_temple_creator_role` is the agent, i.e., is `bfo:realized_in` the creation of `Patrimonialization_policy`. The `da:Decl_templete_role` is `bfo:realied_in` creation of `Patrim_Policy_Creation`, which is a `da:Document_Act`. The `HOPatrimonialization_Proc`, which is also a `da:Document_Act`, is guided by the previously created `Patrimonialization_policy`, resulting in, i.e., `has_Product`, `da:has_specified_output`, another document, the `Sec_HeritageObject`, one tied to and dependent of the `Pri_HeritageObject`, to which it is `iao:about`.

The `HOPatrimonialization_Proc` also produces, i.e. `da:has_specified_output`, a document which is the core of the `HOPatr`, the `HOPatrimonialization_Justification`, a dossier of paradata and `Doc_Sources`, maybe bibliographic ones’, that justifies and `crm:P70_document(s)` the `HOPatrimonialization_Proc`. The `HOPatrimonialization_Justification` has other paradata sets and documents as CHO’s `ChainOfCustody`, metadata concerning its `AuthenticityIntegrity`, the CHO’s `Appellations history`, etc. A concrete example of a `HOPatrimonialization_Justification` is the previously mentioned UNESCO World Heritage Nomination [43]. The `HOPatrimonialization_Justification`, as a dossier containing metadata and documents, is a `ric:RecordSet`.

When talking about the publishing of heritage collections over the web, naturally one of the outstanding features a digital CHO must have a digital surrogate of the physical object. In the `HOPatr` model, this is represented by one or more `DigitalView(s)` related to the `Sec_HeritageObject` by the property inherited from the Europeana Data Model [7] (EDM) `edm:hasView`. Such a property represents the rendering of an image file. Such a `DigitalView` may be a digital static or moving image, or a 3D image. Such `DigitalView(s)` may have `DigitalViewParadata` associated with it. The `att:site` from where the object came from may also `edm:hasView` `DigitalView(s)`. Any of these `DigitalView(s)` captured during the patrimonialization process, as they may be reality-captured, must be connected to CHO metadata by the property `edm:hasView` (EUROPEANA 2024) [44].

Besides its tie to a `Pri_HeritageObject`, a `Sec_HeritageObject` is constituted by different and specialized sets of metadata and documents, most of which are gained through the patrimonialization process. Such metadata sets provide a wide context to the CHO. They concern the assignment (`dct:type`) of a HO type, the `top:TypeOfHO` from the TOP classification schema; this is the first stage in curatorial and collections management procedures. In the case of some types of CHO, information concerning the place, the `att:site`, where the CHO was `att:fieldCollected` is also recorded; such information can be constituted by metadata concerning the description of the `att:site`’s geolocation where the CHO was collected, details concerning the collect process, `DigitalView(s)` of the `att:site`

with additional paradata, etc; - such paradata may ric:R135 has_member(s) (the same as crm:P70 documents) other documents previously mentioned that are parts of the patrimonialization dossier, the HOPatrimonialization_Justification, as well as bibliographic and documentary sources that crm:P70 documents the patrimonialization process. During the CHO lifecycle, such specialized sets of metadata and documents will be parts of CHO and will be linked to the CHO; however, as the HOPatr models the patrimonialization process, such relationships are not represented in the model.

Once a CHO is patrimonialized and included in the collection of a heritage institution other transitional metadata are added forming a dossier of the CHO lifecycle, such as records of the exhibitions in which the work was part, restorations undergone by the CHO, its loans, publications where the CHO is mentioned, etc. Such transitional metadata are also not represented in the model.

An initial version of the model of the patrimonialization process for a CHO is shown in the following Figure.

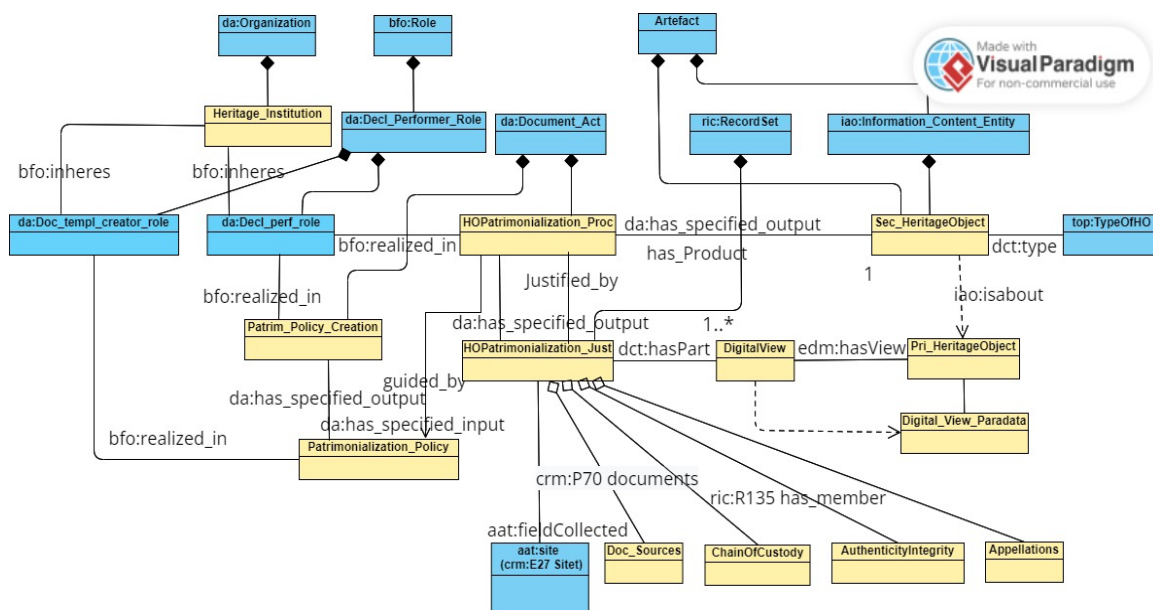


Figure. 1: Conceptual Model of a CHO patrimonialization process.

6. Concluding remarks

Patrimonialization is a mandatory process through which a CHO passes. It is the entry point to a chain through which it is appropriated by Culture in general, by a Heritage Institution and becomes fit to successive curatorial activity, both within the institution that holds it, and, as it is published over the Web, by digital curators. Due to its importance, patrimonialization should be guided by institutional policies.

Patrimonialization also assigns to an object metadata that supports curatorial activity throughout CHO whole lifecycle. Images have always been important in the patrimonialization and documentation of CHO. Today, 3D images are incorporated into these processes to document the condition and appearance of a CHO as it is incorporated into a heritage institution's collection, as a digital twin.

The concept of paradata is very useful and should encompass not only CHO images. Patrimonialization generates a lot of paradata. Although such paradata may not be directly accessed by the general public, they are essential inputs to curatorial and collections' management. Richly documented digital CHO collections increase their plasticity and reuse potential for Culture, Science, Education, and Citizenship.

Scientific Community worldwide are evolving to adopt standards for scientific digital data (FAIR Digital Object Framework) [45] that make such data Findable, Accessible, Interoperable, and Reusable, as suggested by the FAIR Principles [46]. CHO data must be reliable to support scientific

research. Such reliability must rest on carefully documented processes throughout the whole CHO lifecycle, beginning with patrimonialization.

Acknowledgments

This work was carried out with the support of the Brazilian funding agencies CAPES - Financing Code 001, and CNPq, grant number 305253/2017-4. Many thanks to Prof. Linair Maria Campos for her comments on the model.

References

- [1] C. Bizer, T. Heath, T. Berners-Lee. Linked data: The story so far. Semantic services, interoperability and web applications: emerging concepts, IGI global, 2011, pp. 205-227.
- [2] Foundational Research Gaps and Future Directions for Digital Twins. National Academies of Sciences, Engineering, and Medicine. NATIONAL ACADEMIES PRESS, Washington. (2023).
- [3] F. Niccolucci, A. Felicetti, S. Hermon. Populating the data space for cultural heritage with heritage digital twins. *Data*, 7(8), 105. (2022).
- [4] I. Huvila. The unbearable complexity of documenting intellectual processes: Paradata and virtual cultural heritage visualization. *Human IT: Journal for Information Technology Studies as a Human Science* 12.1 (2013)
- [5] C. H. Marcondes. A curatorial model for digital heritage collections as linked open data and named graphs. *Scire*. 29 (2) (2023) 85-95
- [6] CRM – Conceptual Reference Model. Version 7.1.3. (2024). ICOM/CIDOC - International Council of Museums, International Committee for Documentation. https://www.cidoc-crm.org/html/cidoc_crm_v7.1.3.html, last accessed 2024-04-24.
- [7] EUROPEANA DATA MODEL, URL: <https://pro.europeana.eu/page/edm-documentation>.
- [8] Riva, P., Le Boeuf, P., Žumer, M. IFLA Library Reference Model: A Conceptual Model for Bibliographic Information. IFLA, 2017. URL: <https://www.ifla.org/wp-content/uploads/2019/05/assets/cataloguing/frbr-lrm/ifla-lrm-august-2017.pdf>
- [9] RiC-CM - Records in Contexts–Conceptual Model. International Council of Archives. <https://www.ica.org/resource/records-in-contexts-conceptual-model/>, last accessed 2024-04-24.
- [10] M. Brochhausen, M. B. Almeida, L. Slaughter. Towards a formal representation of document acts and the resulting legal entities. In C. Svennerlind, J., Almäng, R., Ingthorsson. *Johanssonian Investigations*, Ontos-Verlag, pp. 120-139. (2013).
- [11] W. Ceusters, B. Smith. Aboutness: Towards foundations for the information artifact ontology, 2015. URL: <https://philpapers.org/archive/CEUATF.pdf>
- [12] J. Searle. *The Construction of Social Reality*. New York, The Free Press, 1995.
- [13] P. Van Mensch. *Toward a methodology of museology*. Unpublished Ph.D. dissertation. Zagreb, Croatia, University of Zagreb, 1992.
- [14] Patrimonialization. InfoScinpedia. URL: <https://www.igi-global.com/dictionary/?p=patrimonialization>.
- [15] A. Rus, B. Neagota. Patrimonializarea – Procese, Tendințe, Curente și Aspecte. (Patrimonialization – Processes, Tendencies, Currents and some other Aspects). *Sinteza* 33 (Octombrie): 106–17, (2016)
- [16] S. Briet. *Qu'est-ce que la documentation?* vol. 1. Éditions documentaires, industrielles et techniques, Paris, 1951.
- [17] Z. Stránský. Originals versus substitutes, in: *ICOFOM Study Series*, 9, 1985, pp. 95-102.
- [18] K. Schreiner. (1985). *Fundamentals of Museology: On the Theory and Methodology of Collecting, Preserving, Decoding, and Utilizing Musealia* Waren, GDR: n.p. (1985)
- [19] E. Franchi. What is Cultural Heritage. Khan Academy. URL: <https://www.khanacademy.org/humanities/special-topics-art-history/arches-at-risk-cultural-heritage-education-series/arches-beginners-guide/a/what-is-cultural-heritage>.

- [20] N. Brodie. Cultural Heritage Objects and Their Contexts. In: Smith, C. (eds) Encyclopedia of Global Archaeology. Springer, New York, NY. (2014)
- [21] CENTRAL EUROPEAN UNIVERSITY. The Concept and History of Cultural Heritage. URL: <https://culturalheritagestudies.ceu.edu/concept-and-history-cultural-heritage>.
- [22] D. F. C. Lima. Herança cultural (re)interpretada ou a memória social e a instituição museu: releitura e reflexões. *Revista Museologia e Patrimônio*, Rio de Janeiro, 1(1) 33-43 (2008).
- [23] F. Mairesse,; E., P. V. Eeckaut. Museum assessment and FDH technology: a global ap-proach. CORE Discussion Papers; 1999/38 (1999) <http://hdl.handle.net/2078.1/4050>
- [24] A. Mohamed Atef. Acquisition and Disposal Policies in Museums. *International Journal of Multidisciplinary Studies in Architecture and Cultural Heritage* 4.1 39-57 (2021)
- [25] P. O'Neil. The curatorial turn. In J. Rugg and M. Sedgwick (eds), *Issues in curating contemporary art and performance* (pp. 13–28). Bristol: Intellect. (2007)
- [26] S. Foo. Online virtual exhibitions: Concepts and design considerations. *DESIDOC Journal of Library & Information Technology*, 28(4), 22 (2008).
- [27] P. Grenon, B. Smith. SNAP and SPAN: Towards dynamic spatial ontology. *Spatial cognition and computation* 4.1 (2004): 69-104.
- [28] CRMarcheo. URL: <https://www.cidoc-crm.org/crmarchaeo/home-3.AAT> - Art & Architecture Thesaurus, 2021. Getty Foundation. URL: <https://www.getty.edu/research/tools/vocabularies/aat>.
- [29] E. Christaki, et al. Definition of the CRMarcheo. (2024). https://www.cidoc-crm.org/crmarchaeo/sites/default/files/CRMarcheo_v2.1%28site%29.pdf. Last accessed 2024-04-27
- [30] G. Guizzardi, G. Wagner, J. P. A. Almeida, R. S. Guizzardi. Towards ontological foundations for conceptual modeling: The unified foundational ontology (UFO) story. *Applied ontology*, 10(3-4), 259-271 (2015).
- [31] S. Stead. The CIDOC CRM, a Standard for the Integration of Cultural Information. ICS-FORTH, Crete, Greece, nov. 2008. PPT presentation. URL: https://www.cidoc-crm.org/sites/default/files/crm_for_imperial_2009%20%281%29.ppt.
- [32] LIBRARIANSHIP STUDIES & INFORMATION TECHNOLOGY. Access Points, 2019. URL: <https://www.librarianshipstudies.com/2016/06/access-point.html#:~:text=Access%20points%20are%20the%20indexed,the%20record%20searchable%20and%20identifiable>.
- [33] S. R. Ranganathan,. *Prolegomena to a Library Classification*. Bombay, Asia Publishing House, 1967.
- [34] M. L. Campos. Classification of frontier objects in the knowledge organization and the role of ontologies. *Liinc em Revista*, 14 (2) 475-490 (2018)
- [35] B. Smith. Document acts. Institutions, emotions, and group agents: Contributions to social ontology, in: Volume: Anita Konzelmann-Ziv and Hans Bernhard Schmid (eds.), *Institutions, Emotions, and Group Agents. Contributions to Social Ontology, Proceedings of Collective Intentionality VII*, Dordrecht: Springer, 2014, pp. 19-31, 19-31.
- [36] M. B. Almeida, M. Brochhausen, F. B. Silva, R. B. dos Santos. Ontological approach to the normative dimension of organizations: an application of Documents Acts Ontology. *Ciência da Informação*, 46(1), (2017).
- [37] Dublin Core Terms, 2020. URL: <https://www.dublincore.org/specifications/dublin-core/dcmi-terms/>.
- [38] AAT - Art & Architecture Thesaurus, 2021. Getty Foundation. URL: <https://www.getty.edu/research/tools/vocabularies/aat>.
- [39] Marcondes, C. H. Integrated classification schemas to interlink cultural heritage collections over the web using LOD technologies. *International Journal of Metadata, Semantics and Ontologies*, 15(3) (2021).
- [40] B. Smith. Basic formal ontology for bioinformatics. *Journal of Information Systems* 1 (2005)

- [41] S. Borgo, L. Vieu. Artefacts in formal ontology, in: Handbook of philosophy of technology and engineering sciences, (2009), pp. 273-308. URL: <ftp://ftp.irit.fr/IRIT/LILAC/BV-HBPT09.pdf>
- [42] R. C. Padilha. Documentação museológica e gestão de acervo. Florianópolis, FCC, 2014.
- [43] UNESCO. UNESCO World Heritage Nomination. URL: <https://whc.unesco.org/en/preparing-world-heritage-nominations/>.
- [44] EUROPEANA. Review of EDM to support 3D, 2024. URL: <https://pro.europeana.eu/post/review-of-the-europeana-data-model-to-support-3d>
- [45] FAIR Digital Object Framework. URL: <https://www.go-fair.org/today/fair-digital-framework/>.
- [46] FAIR Principles, <https://www.go-fair.org/fair-principles/>. Last accessed 2024-05-02.