Interoperability among the digital repository Tainacan and the information networks Wikidata and Wikimedia Commons: A case study of FILE ARCHIVE

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Abstract

The article proposes the development of a service that facilitates publication and monitoring of editions and collaborations made by users of memory institutions digital archives in environments such as Wikidata, Wikimedia Commons and Wikipedia. Therefore, it presents a technical modeling for a feedback service called roundtripping, which evolves the information networks from the wiki environment and Tainacan free software. Tainacan has been configuring itself as an important free software for the management and dissemination of digital collections from a network composed of Brazilians memory institutions. There are considerable technical and operational challenges for the implementation of a service that not only allows the publication of collections from a digital repository of a memory institution, but also the monitoring of the reutilizations, editions and collaborations of users in other information networks. By allowing the connection among Wikidata, Wikimedia Commons and Wikipedia information networks for the publication and encouragement of reuse of digital collections from institutions already published in Tainacan, this research aims to expand the circulation of heritage collections, makes the knowledge generated about them relevant and, thus, values Brazilian material culture in the network society. The objective of this research is to present in a case study format, how the roundtripping process has been modeled and implemented in partnership with the FILE Archive initiative.

Keywords

Tainacan, Roundtripping, Wikidata, Wikimedia, File Archive.

Introduction

The Wikipedia, Wikidata and Wikimedia Commons information networks currently constitute a set of important informational resources available free of charge on the Internet to the public, being widely used by society. The importance of these resources can be better understood when the numbers related to their operation are made explicit. Wikipedia, for example, works as an encyclopedia open to the collaboration of any user, with policies and governance rules that establish collective moderation dynamics, expanding the quality and informative potential of the content produced. Currently available in 310 active languages, with more than 56 million articles produced, more than 96 million users and more than 3,800 administrators worldwide [1], Wikipedia is constituted as a diverse and comprehensive source of information, appearing as a one of the first pages in search engines, such as Google, for various topics of interest. Users access Wikipedia, in 65% of cases, from a Google search, in which the search engine presents a link to references on the first pages or in its lateral information boxes, thus becoming a of the 5 most visited websites in the world [2]. For example, in the last year (data from June 2020 to May 2021) only the Portuguese language Wikipedia (https://pt.wikipedia.org/) had more than 391 million views and 228 thousand edits made by approximately 3,000 active editors on the platform [3].

Wikimedia Commons, in turn, works as a repository of licensed media files in order to allow its free reuse in other sites and projects on the web, currently counting with more than 740 million published files [4]. Finally, Wikidata works as a free knowledge base, allowing the structuring of semantic data through statements in the form of subject-predicate-object, currently presenting more than 93 million published items and becoming a central node for the viability of the semantic web on the Internet [5].

The 3 services together are integrated in order to provide an ecosystem of circulation and collaborative information production. Among its integration possibilities, the following three stand out. The images published on Commons can be used to illustrate entries published on Wikipedia, helping to provide informational resources of a pedagogical nature for a better understanding by its users. Structured data on Wikidata can be easily retrieved and presented as information boxes on Wikipedia entries, which facilitates the consumption of quantitative, temporal and categorical data. Files published on Commons can be described in terms of media, content and origin from metadata organized into semantic models that are integrated into Wikidata, favoring the cataloging process and expanding its search, recovery and reuse potential by other information systems. The article's objective is to discuss how the impacts of the integration between a digital repository of a cultural institution, and the wiki information networks, could benefit the interoperability strategies and

dissemination of collections of this institution. Also, to present the concept of roundtripping as a way to develop such functionality and how this has been thought and modeled in the specific case of FILE Archive.

Memory institutions and the wiki information networks

Some recent research has shown that memory institutions such as archives, libraries and museums have become important providers of data for the wiki ecosystem, obtaining results of considerable impact by disseminating their collections in these information networks. Villaespesa e Navarrete [6], researching the English language Wikipedia, identified that 8,104 paintings from 785 museums in 59 countries around the world were used in 10,008 articles on Wikipedia. These articles altogether averaged more than 94 million monthly views during the year 2017. In a second survey, Navarrete and Villaespesa identified 224,374 items cataloged as paintings in Wikidata, of which 89,637 (40%) had metadata and 27,501 (12%) had an image [2]. Studying the use of these images outside the context of pages and articles specific to the art world, the researchers identified that the 3 themes that most received paintings from museums to illustrate Wikipedia entries were "history" (3,034 paintings), "religion" (924 paintings) and "geography" (600 paintings). This study manages to show how the museums' published digital collections become data providers for various themes and support the construction of its entries. Ferriter (2019) reports a case study focused on Wikidata initiated by the American Library of Congress, in which more than 650,000 references to identifiers from the authority control systems maintained by the library were recognized, namely the Name Authority File (NAF) and the Library of Congress Subject Headings (LCSH) [7]. During the execution of the case, the library carried out an experiment whereupon the user could browse more than 66,000 images, which represented 13,300 entities described by bibliographic metadata from Wikidata. The Association of Research Libraries [8] published a report pointing out recommendations and opportunities for the adoption of Wikidata by libraries. One of the main highlights mentioned by the report in its conclusion is the possibility of using Wikidata for the integration of several systems, maximizing its interoperability potential based on its role in providing meaning to the organization of information from different authority control strategies.

In Brazil, Martins and Carmo studied how the museums' pages linked to the Brazilian Institute of Museums (IBRAM) were built on Wikipedia [9]. Pages from 20 museums edited by 555 collaborators who carried out 1,108 editions were identified through the survey. The research points to a dynamic of collective construction of networked information about museums, showing an expressive collaborators agency in the construction of public interest

information. Carmo and Martins also studied the presence of Brazilian museums in the community led project that collaborates on Wikimedia Foundation called "Sum of all paintings", an initiative that aims to gather data on paintings worldwide in Wikidata [10]. The survey identified data from 30 countries and 56 collaborators. The research focused on identifying the presence of Brazilian institutions in this environment, finding 19 collections from 14 museums, representing a total of 3,583 paintings. Carmo and Martins also studied the presence of collections from museums linked to the Brazilian Institute of Museums on Wikimedia Commons [11]. In this study, they identified that 9 of these museums were present with 629 images of paintings. The research draws attention to the total number of views received by the published images from the Museum of the Republic, which had more than 4 million visits in 2019. Images from the museum's collection were used to illustrate historical entries of great public interest, such as, for example, President Prudente de Morais' Wikipedia page. Oliveira and Martins carry out an exploratory study to reconcile metadata from the digital collection of the Museu Histórico Nacional with Wikidata [12]. The researchers demonstrate that from the chosen metadata, only the "author" obtained significant reconciliation results, evidencing the lack of Brazilian cultural heritage vocabularies on the Wikidata platform. The mentioned surveys and the reported numbers show the potential for the circulation and collaborative production of networked information on wiki environments. The surveys also highlight the low participation of Brazilian cultural institutions, which allows inferring a potential yet to be explored.

Based on the above, it is recognizable that the presence of collections from cultural institutions in the wiki ecosystem generates a virtuous cycle of data reuse in different contexts, expanding its potential for cultural appropriation. In addition, there is the potential for feedback on data arising from the original cataloging of objects, based on suggestions, corrections and revisions made by users of these integrated knowledge networks. As Monteiro points out [13, p. 72]:

"Wikimedia projects collaborate in creating new hypertext links to such content, allowing them to be reedited, remixed and placed in new interpretive logics. In other words, it is possible to say that partnerships can enable the openly sharing of cultural collections through wellknown popular platforms, such as Wikipedia. And museums can only enjoy all the benefits of this openness to the world."

Roundtripping: conecting digital repositories and the wiki information networks

Once the social and cultural potential aroused by the presence of these institutions' collections in the wiki ecosystem is understood, it is worth asking how these collections should be published on this environment and, especially, how institutions could monitor their published objects, considering the ability to receive and evaluate the relevance of suggestions for improvements, corrections or revisions in the object's documentation made by Wikidata and Wikimedia Commons users and robots, as well as monitoring the number of views and the entries in which their images are used on Wikipedia. According to Vilaespesa and Navarrete, the key to dealing efficiently with this problem is to integrate the technical solution into the organizational workflow of the memory institutions' documentation [6]. For this, the authors propose the flow shown in figure 01. Note, highlighted in red, the museum's database from which, on the right, a segment whose branch leads to the arrow for metadata publication in Wikidata and another for publication of media related to the item in Wikimedia Commons. This data, once published, can be used by users on Wikipedia to illustrate entries, as seen at the top of the figure highlighted in blue. It is interesting to note that it returns to the museum, originating from the wiki ecosystem, information related to translations, data improvements and exploratory tools.

Figure 01. Flow of data production and feedback between a museum system and the wiki ecosystem.

The most prominent element in figure 01, which seems to
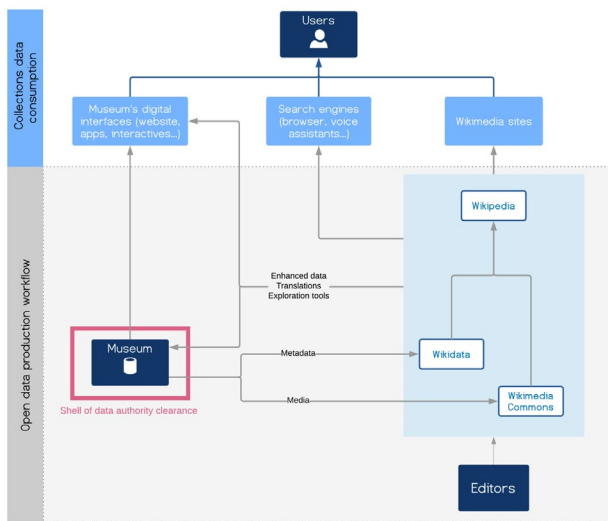
be the key to the process of automating the operational flow of publication and data feedback from the wiki ecosystem, is the museum's database system. It is presumed that this system has the technical possibility, based on associated annotation standards, to interoperate with Wikidata and Wikimedia Commons in a manner that such flow becomes operational and automated. Such an approach ensures that the intended meaning of the semantics linked to the

museums' databases can be shared among different applications within the scope of the wiki ecosystem. In addition to semantic sharing, the conceptual model linked to the museums' databases must provide means of transmission in some syntax agreed upon by the Wikidata community, which, in this case, would be through formats compatible with the semantic web infrastructures such as RDF/OWL, for example [14].

In another attempt to illustrate the concept of data feedback between a cultural institution's database and the wiki ecosystem, known in English as "roundtripping", a term that will be used throughout this project, researcher Sandra Fauconnier produced the illustration shown in figure 02 [15]. The image highlights the cultural institution expected actions, that is, the publication of new items, the inclusion of new metadata in already published items and the insertion of corrections made by the institution in the already published metadata. On the other hand, the image also highlights what is expected from the collaboration offered by Wikidata and Wikimedia Commons to the institution's database, that is, translations, new metadata suggested by users and corrections made to existing metadata.

Figure 02. Data feedback flow between a cultural institution's database and Wikimedia Commons and Wikidata.

Aware of this problem and the potential of this type of service for cultural institutions, the agency responsible for
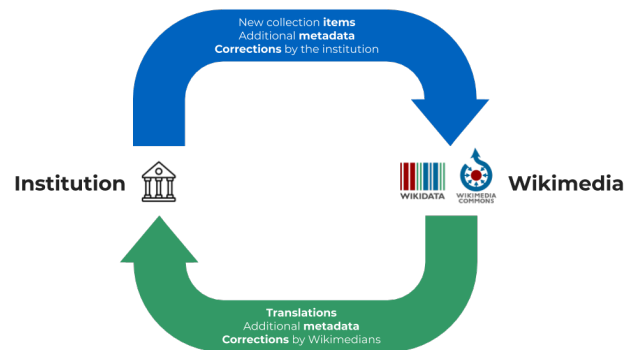
the Swedish government's cultural heritage policy, the Swedish National Heritage Board, began research the implementation of a service to give back to source institutions the metadata enhanced by users in the Wikimedia Commons environment [16]. In the published report with the first results of the research, Zeinstra affirms that the main interest identified in cultural institutions for this type of service would be the possibility of benefiting from the following functionalities: receiving new types of metadata that can be included in their databases, receive and assess the relevance of information on altered metadata (syntactic correction, identification of errors), receive metadata translated into other languages, receive and assess suggestions for new categorizations and thematic classifications of their media files, receive and assess digital alterations in their media (improvement of quality, contrast, noise, among others) [17]. At the end of the report, the

author recommends that, in order to make this service viable, it is necessary to reduce the technical barrier, by creating new simple functionalities for exporting data from the institutions' databases, and the adoption of APIs (Application Program Interface) for communication among systems and Wikimedia Commons. In the final research report, Larsson, Ånas, and Zeinstra point that one of the greatest difficulties encountered in the case studies carried out with Swedish institutions was the fact that they use different database systems, in which the process of data import and export had to be done in a customized way for each one of them [18]. This procedure increased the technical complexity of each stage, requiring customized solutions for each database, thus reducing the scalability capacity of the found solutions. The authors suggested a standard adoption, either for a collection management system to cultural institutions or for a data communication interface between systems.

Digital cultural archives in Brazil and the free software Tainacan

When reflecting on the Brazilian scenario and the possibility of enhancing the presence of collections of cultural institutions from this country on the wiki ecosystem, some boundary conditions must be taken into account. Initially, there is still a relatively low number of institutions that use specific software for cataloging collections. According to the 2019 ICT Culture survey by the Internet Steering Committee, only 31% of museums, 36% of libraries and 30% of culture points in the country use some type of collection cataloging software [19]. Better positioned in this ranking are archives, with 63% of them. It is noticed that most of the equipment still lack more systematized data management strategies for their documentation regarding the cultural objects in custody. Recognizing the structural fragility of the cultural sector in relation to the internet in Brazil, there were several initiatives and projects that tried to propose policies and governance models for digital cultural collections in the country [20]. Among the various Brazilian initiatives, the Tainacan project stands out for this proposal.

Tainacan is a free software for the management and dissemination on the internet of cultural institutions' digital collections developed by the Federal University of Goiás and the University of Brasília. It is currently supported by the Brazilian Institute of Museums (IBRAM), the National Arts Foundation (FUNARTE), the National Historical and Artistic Heritage Institute (IPHAN) and the Government of the State of Espírito Santo. The software is build as a plugin for WordPress, allowing the system to become a complete digital repository for managing and disseminating collections. Tainacan has been increasingly used for cataloging, managing and disseminating digital collections from Brazilian cultural institutions on the internet. One of

the factors that stands out in its growing adoption is that it is a free software developed within the scope of various cultural public policy initiatives. Another factor, no less important, is the fact that it is developed with a technology that is widespread in Brazil, the WordPress environment, widely used in the country for the development of websites. This knowledge generates a shorter adoption curve, given the greater number of professionals across the country who know and have experience in customizing websites on the WordPress platform.

According to the software download statistics provided by the WordPress distribution repository, Tainacan has been downloaded more than 9,000 times and has more than 400 active installations [21]. From the 30 museums that are officially linked to IBRAM, 20 of them already use Tainacan and make more than 15,000 items of cultural objects available on the internet [22]. The software has also been arousing university institutions interest for its use in collection management. Martins and Martins present a study in which they identified 17 university institutions in Brazil, Mexico and the United States using Tainacan to manage their collections, representing 63 collections with more than 11,890 items cataloged [23]. In addition, there are several recent reports in the Information Science specialized literature describing case studies of the implementation and migration of other digital collection management systems to Tainacan. Martins et al. present the case of Filme e Cultura magazine, an important magazine in the field of Brazilian cinema edited by the Ministry of Culture whose first issues date back to the 1960s, that was made complete available online with Tainacan [24]. Martins, Carmo and Germani also describe the migration of the Museu do Índio collection, an institution based in Rio de Janeiro and linked to FUNAI, in which more than 18,000 items from the PHL software were migrated to Tainacan [25]. Oliveira and Martins report the case study about the migration of the Fundação Nacional das Artes collection, in which they detail the steps of analyzing the information from the existing collection, processing the data and implementing 7 collections with more than 2,500 items available for public access with Tainacan [26]. The academic interest on research and implementation of Tainacan in various scientific projects can also be perceived by the number of documents mentioning the software on the Google Scholar platform.

At the time this research project has been in development, the platform already mentions 151 indexed documents, whereas in 2015 there was only one document and in 2019, 45 documents mentioning the project. From what was presented, it is possible to acknowledge that Tainacan has become a software widely used by cultural institutions in Brazil, becoming a platform with a broad base of cultural collections already available on the internet. This makes Tainacan a potentially viable software to work as a starting point for expanding the presence of Brazilian cultural collections in the wiki ecosystem. It is from this context that the problem to be worked on in this research project

becomes evident: how to implement in Tainacan free software the technical functionalities for the publication of metadata from its items cataloged in Wikidata and of the representative media of this items in Wikimedia Commons? Reciprocally, how to generate indicators and metrics in a way that edits made on Wikimedia projects can be monitored, collection managers notified about them through Tainacan itself and, if considered valid, these edits eventually be integrated into the local base?

FILE Archive case

In summary, the aim of this case study project is to present the research, the modeling, and what has been done to implement all the functionalities for carrying out roundtripping between the digital collections of cultural institutions made available in Tainacan and the wiki ecosystem. Methodologically, the project intends to carry out a case study based on the roundtripping functionalities that will be implemented in the Tainacan software, with the FILE Archive collection. The team of this important International Electronic Art Festival in Brazil already has an experimentation project with Tainacan, carried out since 2021, when FILE implemented a database composed of different collections and their respective items, which can be added in bulk or individually, directly from the computer or through importers. According to each collection needs, it is possible to configure taxonomies, metadata and specific filters. All activities carried out in the plugin are registered and listed and can thus be verified by the digital collection managers. The final structure of the digital repository is composed of 8 collections, each containing specific metadata of different typologies. FILE also established a partnership with Wikimedia platforms, being inserted in the GLAM system (Gallery, Libraries, Archives and Museums), which aim to make historical and cultural collections accessible in an open and free way, through the wikidata identifier (QID) as a disambiguation tool for artists names inserted in different archives, seeking to guarantee that the same artist inserted in a determinated New Media Art Archive, will also be in other New Media Art Archives. With the QIDs registered in the collections, it is then possible to create the necessary reference to experiment interoperability and connections with other New Media Art Archives. A series of new functionalities are being modeled at the current moment of the research; to demonstrate how this relationship between the links of a digital object in Tainacan and the Wikidata QID, can establish a lasting connection that works as a basis for the construction of interoperability solutions between information systems.

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