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02 DIGITALIZING DATA: FROM THE HISTORICAL RESEARCH TO DATA MODELLING FOR A (DIGITAL) COLLECTION DOCUMENTATION

Noemi Mafrici, Elisabetta Caterina Giovannini

Abstract

European cultural institutions hold an extraordinary tangible and intangible heritage not always accessible by the public for several reasons e.g. spaces, conservation, exhibition choices. Digitisation gives the opportunity to make heritage permanently available by scientists and by a wider public, placing replicas of artefacts of museums' collections in a virtual context.
This chapter is part of the B.A.C.K. TO. T.H.E. F.U.T.U.RE. project, coordinated by Massimiliano Lo Turco and presented in the preface of this volume. The research focuses on fifteen wooden architectural models of the early 19th century, part of the collection of the Museo Egizio of Turin. The maquettes are here denominated 'expedition models of Egyptian architectures', by referring to their original production. These artefacts suffered several movings, outside and inside the museum. The aim of the research is to connect virtual replicas of the models to narratives and the historical documents gathered during the historical research.
The chapter presents the collection as a whole, pointing out its historical and cultural value. With the aim to provide an exhaustive documentation and to create connections between artefacts and their documentation, the structure of the build database is here described. Starting from data and metadata available through the Museo Egizio database, a complex system has been created, following the CIDOC-CRM standars for the information modelling. A specific attention has been paid to the strategy developed for the 3D web-publishing, considering the presence of a centred information management system as fundamental.

Le istituzioni culturali europee posseggono un incredibile patrimonio tangibile, che spesso non può essere presentato al pubblico per motivi differenti, di spazio, di conservazione o per scelte espositive. La digitalizzazione dà la possibilità di riprodurre copie di artefatti che sono parte di collezioni museali, inserendole in un contesto virtuale, rendendole fruibili permanentemente non solo dagli studiosi ma anche da un pubblico più ampio.
Questo capitolo si inserisce all'interno del progetto di ricerca B.A.C.K. TO. T.H.E. F.U.T.U.RE., coordinato da Massimiliano Lo Turco e presentato nella prefazione di questo volume. L'oggetto della ricerca sono 15 modelli architettonici lignei di inizio Ottocento, parte della collezione del Museo Egizio di Torino. Con riferimento alla loro produzione, le *maquettes* sono qui denominate 'modellini di viaggio di architetture egizie'. Questi oggetti hanno subito moltissimi spostamenti, fuori e dentro il museo e l'intento della ricerca è quello di connettere le copie virtuali dei modelli a una serie di narrative e documenti storici raccolti durante la ricerca storica.
Il capitolo presenta la collezione nel suo complesso, sottolineandone il valore storico e culturale della serie completa. Con lo scopo di provvedere a una documentazione esaustiva e di creare connessioni fra gli oggetti museali e la loro documentazione, viene qui descritta la struttura del database costruito. Partendo dai dati e metadati disponibili attraverso il database del Museo Egizio, si è creato un sistema complesso, seguendo gli standard CIDOC-CRM per la modellazione di informazioni. Particolare attenzione è posta sulla strategia sviluppata per il 3d web-publishing, considerando come fondamentale la presenza di un sistema di gestione delle informazioni centralizzato.

Introduction

'Expedition models of Egyptian architecture' (EMEA) refer to a series of fifteen wooden architectural models, originally including fourteen models of temples or parts of the same, and one of an obelisk. The collection is conserved at the Museo Egizio of Turin but only a few items are displayed to the public. The rest of the models are stored in the depots of the museum or, in one case, currently undetectable[1]. Consequently, each model is as a single item with its distinctive catalogue number and the reference to the whole is barely perceivable.

At the beginning of the 19th century, expeditions in Egypt were a practice linked to the conscious discovery of the 'far away' to bring closer[2], and people going there wanted to record all the aspects and features their eye could frame. In the 1810s, the sculptor Jean Jacques Rifaud[3] joined the expedition of Bernardino Drovetti through Nubia and Egypt aiming to bring to Europe not only a valuable collection of memorabilia but also an unknown knowledge of architecture, botanic, folklore and features of the Egyptian population still not familiar to Europeans at that time[4]. Their journey took place within the European expeditions whose goods collected constituted the most important European museum collections of Egyptian objects[5].

The collection of the Museo Egizio of Turin has been largely formed by the 'Drovetti Museum'. The goods taken by Drovetti have often been literally reported with the word 'museum', first by William Turner in 1815[6]. The models were comprehended within Drovetti's collection that was transferred from Alexandria to Turin via Livorno and Genoa and considered for this reason already a museum collection of items. Even if nowadays the most part of the series is conserved in the museum's depots, as a part of the collection it continues travelling over the world, but the last moving of the whole series was more than fifty years ago[7].

The peculiar craftsmanship of the models is evidence of a practice that finds a rare example in the models. The wooden models, covered by plaster and painted, were assembled with different kinds of waste wood, and fixed with wax or nailed down, and they suffered different restorations in recent years. The conservation of the models has been taken lightly also during the first years at the museum, considering that they were among the few – probably the only ones - not original items produced by the Egyptian culture, but manufactured through a European expedition. Window cases for the models' preservation were only considered later[8]. These objects are evidences of an attempt to represent something new not only with drawings, sketches or more accurate iconography but they were also intended as a mean to reproduce an image, at that time still unknown in Europe. That image was vehiculated by the models, even more associating them with the other representations deriving from the same expedition. If each model gives the chance so that people could have an idea of the architecture and proportions of the monuments, their main value lies in the collection itself, particularly considering the poor accuracy of the same objects. A significant aspect is that the series represents something that is materially far from the museum and it provides an added value considering that several of the architectures are no longer existing there, flooded by the river or replaced out of the local environment.

Collection of data from a museum collection

The actual conditions and displacements of the models in different areas with different destinations of the museum reflect more an issue related to the complex itself: the series has not always been managed as a collection.

Considered as part of the 'Drovetti Museum' from the beginning (in Egypt), the model arrived with the rest of the collection of Drovetti to Livorno in 1818, as recorded into a report made by Vivoli[9]. The models remained there, in a bad state of conservation, until the end of 1823[10]. In Livorno, they were already treated as something standing-

by themselves, to the point that, in a first moment, they were not included in the transportation to the Museo Egizio with the rest of the Egyptian antiquities. The integration of 1823, that was made to the inventory of goods purchased from Drovetti's collection, included fifteen boxes containing architectural models of Egyptian monuments[11]: that was the first reference to the maquettes made within an official document. During the first part of the 19th century, the models were recognised as a distinctive set within the museum collection, as could be seen from the inventories, the guide and the set-up of the museum exhibition: indeed, all the models were exhibited in a room of the museum with a specific layout. Within the Orcurti catalogue of 1852, the architectural models had a specific section and a specific order: the models, numbered from 39 to 53, were included in paragraph 5 of the section 'Different monuments'. Although from the cataloguing of Rossi, Fabretti, Lanzone of 1888[12] they had no more a dedicated section and they were joined with the rest of the collection, losing their special catalogue numeration. Nevertheless, the models of monuments still remained all exhibited in the 'room 2' at the ground floor, and the collection remained unaltered in its position on display along all the century.

With the turn of the century, some additions were made to the museum collection with a huge number of objects deriving from new explorations. For this reason, a new inventory was necessary and also the exhibition had to change. The models were divided basing on the monuments they represented, separating the temples from the obelisk. The collection of models, still quantitatively composed of fifteen items, lost its place on display, and after 1967 one of the model, the item numbered 7114 in the catalogue, is no quoted anymore.

The consequence is that the entire collection is currently hardly recognisable as a whole and the value as an original series is lost. The historical research revealed these gaps and, within its objectives, the project has the double aim to make visible and usable what nowadays is hidden and to digitally recomposing the complete collection. With these goals, different kinds of data have been collected: guides, catalogues, inventories, correspondence of museum directors, exhibitions' plans and exhibits' catalogues.

source/content	***text***	***image***	***3d***	***nr.***
lithography	V	V		20
drawing	V	V		63
manuscript	V			4
object				14
3d model			V	26

Tab. 1 - Type of information that can be extrapolated by different kind of historical or archival source

A multidisciplinary approach

Today, the increasingly widespread use of the Internet and the new technologies applied to cultural heritage allow a very immediate type of dissemination in which the narrative plays a fundamental role in the creation of content, which should have both entertainment value, but also informative character.

The project aims to make the EMEA collection accessible online through the creation of a web portal in which the digital replicas of the models and the graphic and documentary apparatus collected, are presented simultaneously. Then, together with the historical researcher, a re-thinking and organizing of the data collected was done.

The research was carried on by different teams simultaneously: a first phase was covered by the elaboration of the digital models, carried out using photogrammetry technology. At the same time, the collection and the analysis of documentation available were made by the historian and the database manager that started to digitised a different kind of sources. Curating digital asset for EMEA collection was a work that saw the succession of many phases in which new metadata were created according to the development of the historical and archival

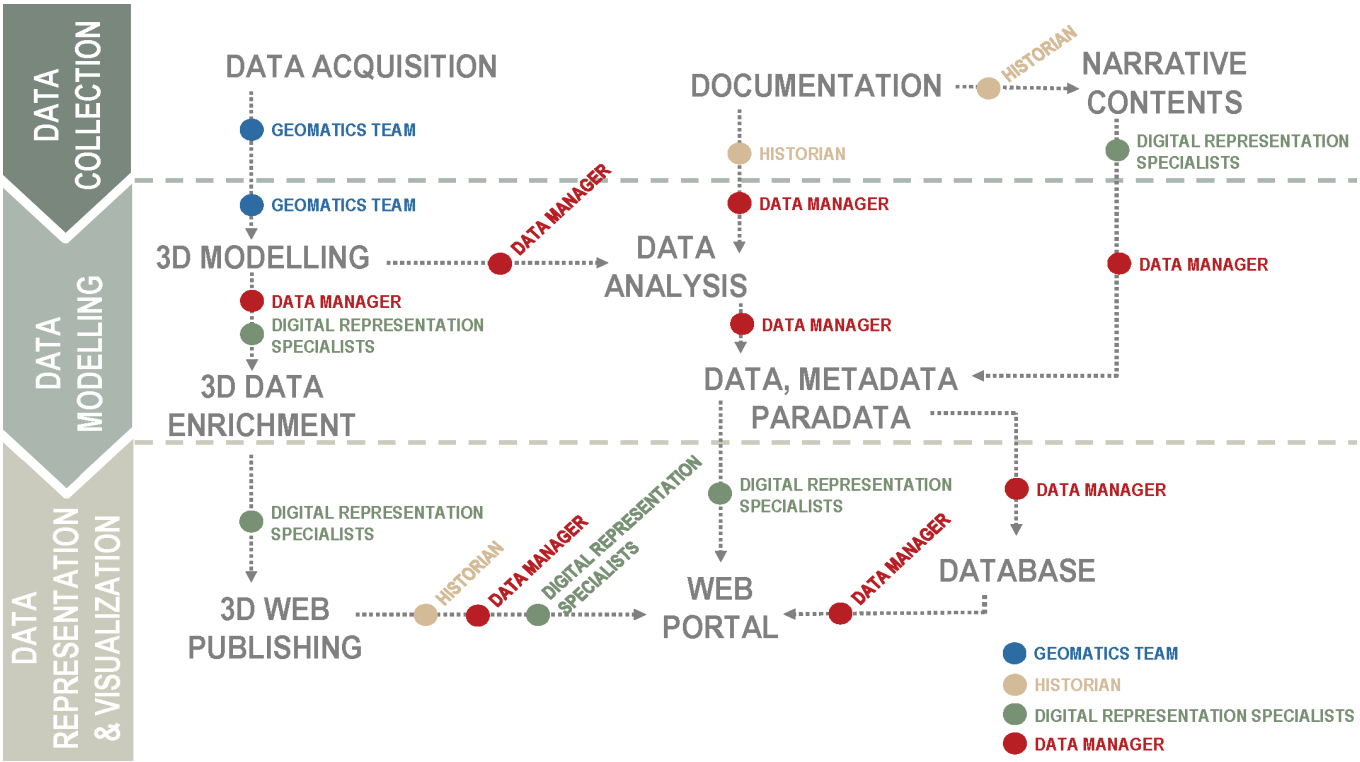


Fig. 1 - Phases of the research project and actors involved

investigation.

Designing and building digital project nowadays concern different activities, such as digitisation, classification, description and metadata organization and navigation.[13] All these activities involved different people with a different background: the curation of the content of the digital asset was made by the historian and the digitization phase and metadata curation of all sources was made by the database manager, taking into account the narratives purposes of the project and their on-line digital publication.

As previously mentioned, Jean Jacques Rifaud was a sculptor specialised in modelling wooden items and he was also one of the first explorers that publish a volume describing Egypt and Nubia. From the narrative point of view it was immediately clear that the maquettes should be associated with the contemporary representations of the temples that they depict. For this reason, the volume 'Voyage en Egypte, en Nubie, et lieux circonvoisins, depuis 1805 jusqu'en 1827' was chosen as the reference documentation. The Voyage should be composed of 8 volumes, 3 volumes composed by 300 planches, 100 per volume and other 5 volumes: 1) natural history, 2) Physics, 3) Archaeology, 4) and 5) planches' descriptions.[14] According to the maquettes available, considering the

selection of planches that describe the temple depicted, the digitisation of graphical and textual content was made (lithographs). This phase faces the challenge of digitising not only the standard metadata for archival management but also the intrinsic content of planches that must be converted in new metadata fields.
The creation of a product suitable both for documenting the research project both to enrich the ME database with new information should, in the end, also follow a standard available and recognizable in museum environment. Then to manage the different data collected within the project the CIDOC-CRM and its extensions were used to manage and organize data: according to the necessity to explicit data provenance[15] and paradata[16] information. The methodology applied to the project was divided into different steps that cover all phases involved in the digitization process for communication purposes of 3d contents:

- Data Collection (geomatics, historician and db manager)
  - Data Acquisition
  - Documentation
- Data Modeling (geomatics and db manager)
  - 3D modeling
  - data, metadata and paradata modeling
- Data Representation and Visualisation (db manager, historician and visual programmer)
  - Data base
  - web portal

DB Collection status and integration

The 'Expedition models of Egyptian Architecture' is a collection characterized by a homogeneous set of data stored in a central information management system: the database of Museo Egizio (ME database). Data and metadata in the ME database could be considered homogeneous because the collection has been little studied over the years, justifying the presence of only few records

ME Field	*New Field*	*CRM CLass*
ID Ogg	id_ME	E42 Identifier
User	user	E21 Person
User_last	user_last_modifier date_modifier	E21 Person E52 Time-Span
Collezione	current_location	E53 Place
Oggetto	object_appellation_1	E41 Appellation
Titolo/Descrizione	description	E62 String
N. d'inventario	n_inv inv_start_date inv_end_date	E42 Identifier E52 Time-Span E52 Time-Span
Categoria	category	E55 Type
Epoca	period	E4 Period
Materiale/tecnica	material type_material	E57 Material E55 Type
Dimensioni	x_part y_part z_part unit	E60 Number E60 Number E60 Number E58 Measurement Unit
Provenienza	provenance_location	E53 Place
Datazione	date_min date_max	E61 Time Primitive E61 Time Primitive
Collocazione	sub_location_00	E53 Place

Tab. 2 - Mapping records of the database of Museo Egizio (ME) of Turin using standard ISO 21127:2006 also known as CIDOC-CRM

to document the objects. The main challenge was to define a procedure to complete and integrate all missing and new information about objects and the archival ongoing research assuring the accuracy of historical contents and scientific knowledge production.
Starting from data available, the challenge was to create a system that could be as articulate and complete as possible, following the CIDOC-CRM standard to model information. The CIDOC Conceptual Reference Model (CRM) provides definitions and a formal structure for describing the implicit and explicit concepts and relationships used in cultural heritage documentation.[17] Use a standard for conceptual modelling of data and metadata allows to describe different sources of cultural heritage environment

object	n. inv	name temple	name object	name file	web-page
	7101	Dakka	Model of the Temple of Dakka (Propylaea)	01_f	/propylaea.html
	7102	Abu Oda	Model of the Temple of Abu Oda	02_l 02_r	/abu-oda.html
	7103	Beit el-Wali	Model of the Temple of Beit el-Wali	03_l 03_r	/beit-el-wali.html
	7104	Small Abu Simbel	Model of the Small Temple of Abu Simbel	04_l 04_r	/abu-simbel.html
	7105	Debod	Model of the Temple of Debod	05_l 05_r	/debod.html
	7106	Gherf Hussein	Model of the Temple of Gherf Hussein	06_l 06_r	/gherf-hussein.html
	7107	Tafa South	Model of the Temple of Tafa South	07_l 07_r	/tafa-south.html
	7108	Dendur	Model of the Temple of Dendur	08_l 08_r	/dendur.html
			Model of the Temple of Dendur (Portal)	08_f	/portal.html

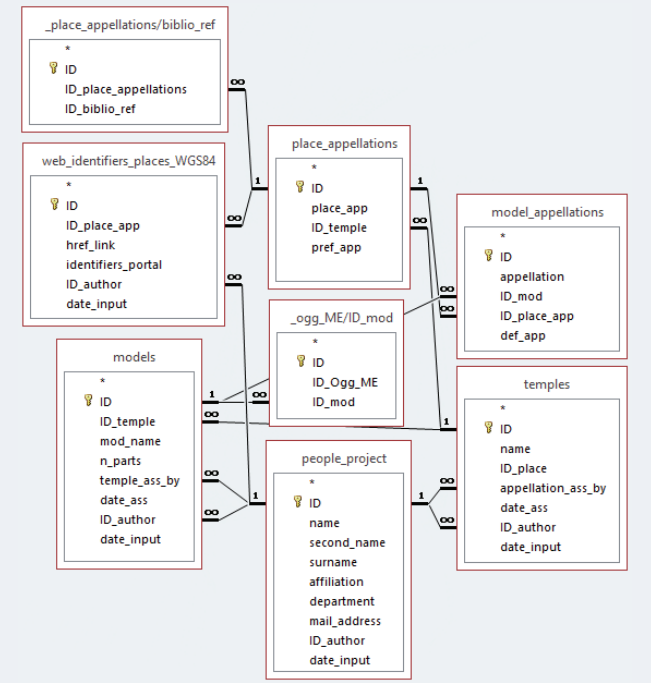
	7109	Dakka	Model of the Temple of Dakka	01_l 01_f	/dakka.html
	7110	Tafa North	Model of the Temple of Tafa North	09_l 09_r	/tafa-north.html
	7111	Debod	Model of the Temple of Debod (Portals)	05_f	/portals.html
	7112	Derr	Model of the Temple of Derr	10_l 10_r	/derr.html
	7113	El-Hilla	Model of the Temple of El-Hilla	11_l 11_r	/el-hilla.html
< MISSING >	7114	Maharraqa	Model of the Temple of Maharraqa		
	7115	Heliopolis	Model of the Obelisk of Heliopolis	13_o	/obelisk.html

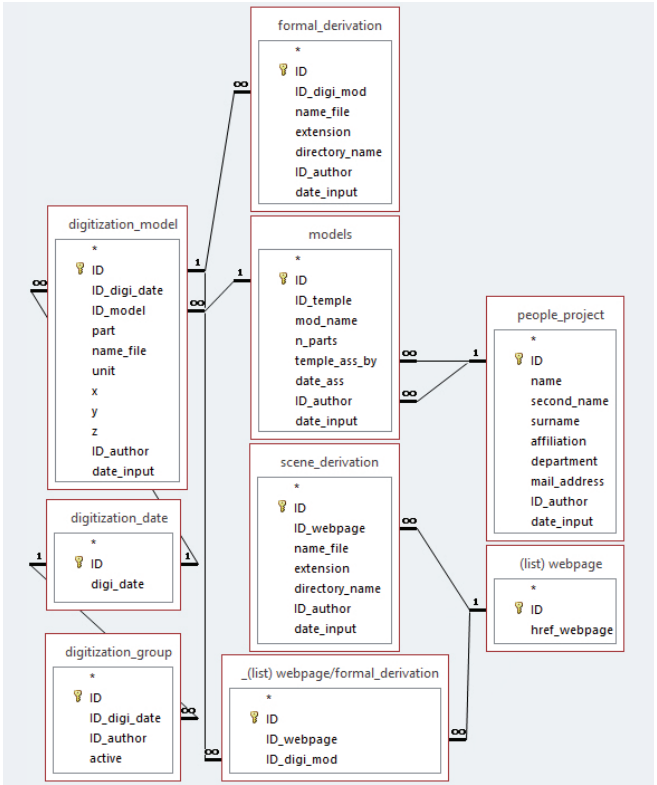
Tab. 3 - The 'Expedition models of Egyptian Architecture' Collection with encoding of the file name for the digitized models used in 3d scenes available on web-pages

using the same language.
In practical term, the procedure has the aim to move forward some targets of digital documentation:
integrating existing data without modifying the database of Museo Egizio
establish a conceptual data model to carry out the creation of new records suitable for documenting the historical research, taking into account the link between different kind of sources[18]
documenting the digitization process related to artefacts[19].
Digitised documentation of 'Expedition models of Egyptian Architecture' collection (EMEA) was stored in a specific information management system: a relational database system (RDBS). The choice of the software platform was driven by the necessity to have a direct link with the ME database that was developed using the same platform.
The front-end solution used by the Museo Egizio is a commercial web-based solution for museum management and it works as a mask directly linked to the original and very old ME database. The platform is designed to manage the entire collection, with thematic sections that permit the creation of a customized set of new metadata stored in a separate system. The solution, from one hand solve the migration problem of the entire original database, but from the other hand, it allows to generate metadata in an uncontrolled way. Fortunately, the studied collection EMEA was poor of metadata and was re-designed using standard ISO 21127:2006.
In the user interface available, records stored in the database concern only general information. The main mask can be divided in different areas: on the top, on the right side, there is information related to the object ID (in the database) and the active user. Near the user identifier there are fields related to last change, with a specification about user and date. The top area has a frame to show images of the object.
Other general records are shown in the main top area.
Record 'collezione' identifies the reference collection, which addresses only the Egyptian Museum as a possible selection option. Objects are often titled and described using the same nomenclature, sometimes with a redundant value. The preferred inventory number follows the cataloguing of 1888.
In the lower part of the mask, there is a tabbed menu for multiple data-pages dedicated to various topics. In this case, for most of the objects in the collection the data available are able to fill only the 'Generic Data' tab.
Other records are 'Dimension' where the measurements of the object are indicated without single reference lengths. Moreover, following the analyses carried on the three-dimensional acquisitions of the objects, the measurements already present in the ME database were different.
In general terms, the 'location' is divided into 'Location' and 'Current Coll.' while it would be more appropriate to consider a single field for the indication of the location and in addition another field to indicate the time extension of permanence in single places.
With reference to the individual objects, each of them has associated records of belonging to the exposures in which they took part: 'exhibitions' and 'exhibitions_title'.
The most innovative part of the project lies in the use of a database to collect historical information and documentation relating to different types of sources. The possibility of creating direct links between the model and the existing documentation oriented to the web-publishing is part of the ongoing research.
The documentation collected concern both the historical research and the photogrammetric survey campaign carried out by the geomatics team. According to CIDOC-CRM classes, the available records for each object were re-assigned.
After the first phase of analysis and re-modelling of available data, the second phase was related to the metadata creation for the documentation of the digitization process. The main challenge was to create a new classification for information about the objects taking into account the

Fig. 2 - database relationship structure for the models appellation

Fig. 3 - database relationship structure for digitization data structure





morphological consistency of each one: most of them are composed by two parts, that must be referred to a unique ID Ogg in the ME database.

Since the historical and archival research has started, it was clear that each maquette represents a Temple or a part of it. Then a classification based on the Temple represented by maquettes was done. Finally a list of twelve temples and one obelisk was created for the assignment of fifteen objects. The 'temple' table contains an ID as primary key that is generated automatically by the system, then other records related to the person that made the assignment of a specific name to the Temple was defined, assuring the paradata traceability. In this case the 'persons' table collects a list of people that are working within the same project and their specific attributes. After the definition of the right correspondence between a Temple and the Object, another issue was related to the correct Appellation of the Temple. The historical research, in fact, shows how, depending on the source to which reference is made, the historical period and the geographical area of belonging of the various authors, the temple could take a different name: the choice, according to main documentation collected, was to follow a nomenclature based on the place to which the temple pertains.

The 'place_appellation' table store a list of available names and it links them to more specific tables for available data

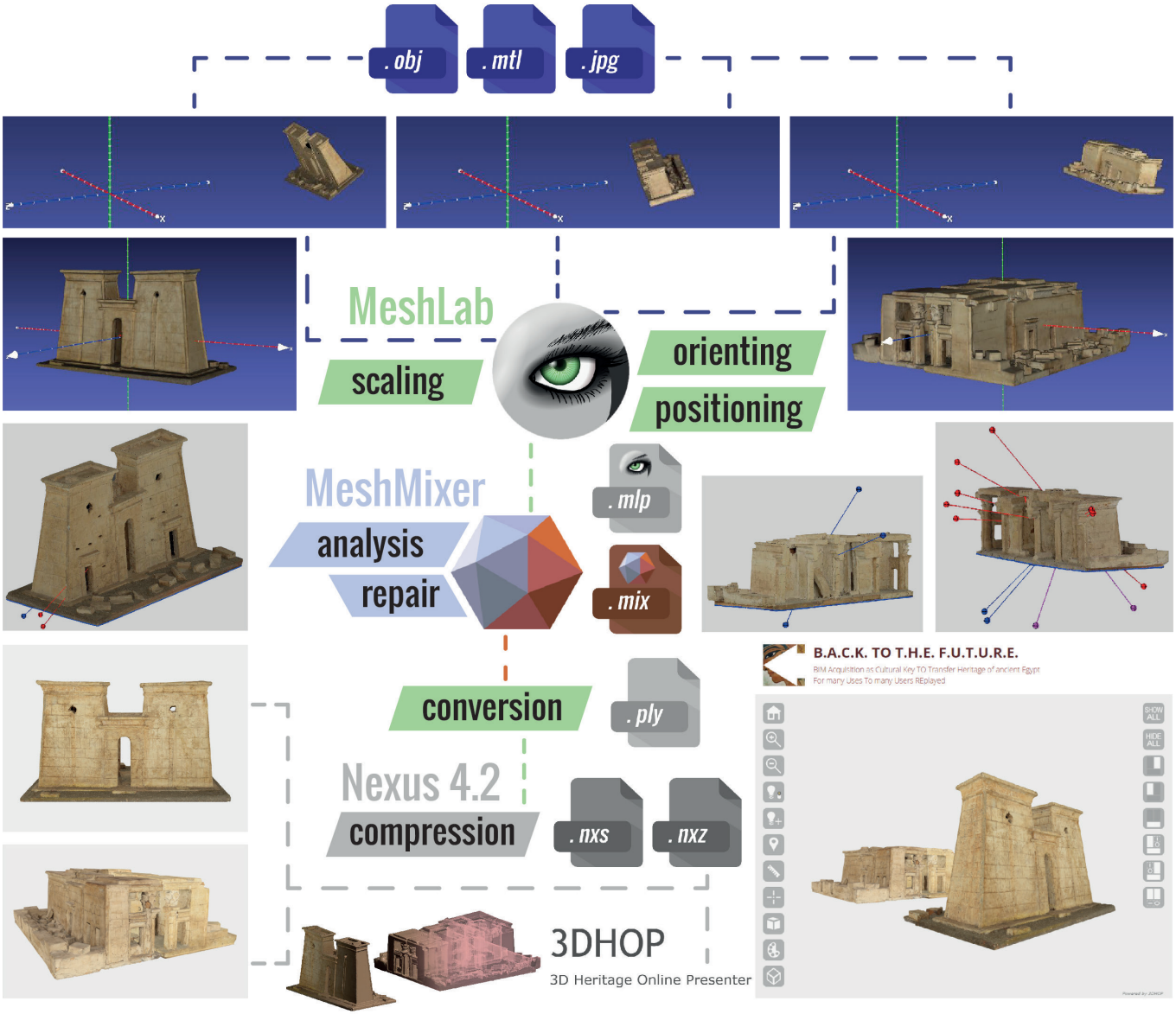


Fig. 4 - The workflow of 3D web-publishing using 3dHOP

Fig. 5 - Screenshot of the web interface for the visualisation of the *3D Model of the Temple of Dakka* and related documentary heritage

provenance: in this case, a list of URI collected within the web and a bibliographic list or references. In the 'models' table a set of records were defined to link the object to the temple that represents documenting the attribution phase both for the temple that for the name of the object.
A new name/title was assigned to the object in accordance with the temple name, even if a set of possible appellation for each object was stored in the 'model_appellation' table. According to the ID of the 'temple' table a new encoding to objects and their part was assigned. The same code was used for the naming of digitization files. From the other hand the use of the name of places was preferred for the naming of folders and web-pages.
According to the new encoding of the parts of the object a set of new tables was created to manage the digitization process. The 'digitization_model' table contains records related to the object acquired with photogrammetric technique. The table is also linked to information about people that attended the acquisition campaign: 'digitization_group' table. Because of the needs of the museum and the availability of maquettes, the acquisition campaign of the entire collection was made in different dates, listed in the 'digitization_date' table, so it is possible to check which models were acquired in different dates and who acquire them.
Thinking about the number of files generated for the 3d web publishing, the 'formal_derivation' table was created to store all single file for each acquired model's part and the derived file produced. To obtain the final 3d model to publish on the web according to the necessity of develop a single web-page for each object, different scenes were developed with both parts of each model, but also

following the historical narratives output of the project, we decided to create other three web-pages to visualise not only objects but also Temples and their complexity, creating scenes with a combination of at least two objects: data about the scenes files were stored in the 'scene_ derivation' table.
Starting from the structure of the back-end, a pilot front-end was tested, using 3DHOP (3D Heritage Online Presenter) a software package for the creation of interactive Web presentations of high-resolution 3D models.[20]

Conclusions

The structure for EMEA database described, shows how could be possible manage different kind of sources available, starting from a digital acquisition and how to re-structure data from a database already designed. The aim, as mentioned before, was to provide as complete documentation as possible for each object of the collection and at the same time trace information and knowledge about the development of the 3d web-publishing phase. Tracing the relationships between objects and documents, not only using a web-page but also and above all through the use of a central information management system should be a recommendable practice. Systematize data and information for future studies and for the re-use of information is possible only with a declared structure of data, allowing future developments in historical research but also the re-use and re-thinking of narrative outputs.

Notes

[1] The models of the temples of Beit el-Wali, Tafa south and a part of the temple of Dakka are exhibited in the Temple of Ellesiya/Nubian room of the museum. The models of the small temple of Abu Simbel, Balagna, a part of Dakka with its propylaea, Debod with its portals, Dendur with its portal, Derr, El-Hilla, Gherf Hussein, Tafa North and the Obelisk of Heliopolis are stored in different part of the depots of the museum. The model of the temple of Maharraqa is currently undetectable. It has been registered as part of the collection from its arrival in Italy until the 1967, on the occasion of the temporary exhibit in Milan.

[2] See Thomas 2012.

[3] Jean Jacques Rifaud (Marseille 1786 - Genève 1852) was a sculptor by training, specialised in modelling wooden items. He joined the Drovetti expedition in 1814 and took part also in the excavations activity of Thebes, Fayoum, Karnak and Tanis.

[4] See Bruwier, Claes, Quertinmont 2014.

[5] The antiquities collected in Egypt by Bernardino Drovetti, Henry Salt, and Giovanni Belzoni led to the formation of the Egyptian collections of the Louvre, the British Museum and the Museo Egizio of Turin.

[6] See Ridley 1998, pp.250-251.

[7] *Incontro con una civiltà millenaria: mostra dedicata all'Egitto antico e contemporaneo.* Milano: Centro culturale Pirelli, 10-25 marzo 1967.

[8] Fourteen cases were bought in 1842 to cover the models of the temples and a glass domes to cover the obelisk has been inventoried only in 1868; 'quattordici case di vetro per sottrarre alla polvere ed al gr coprire I modelli dei templi della Nubia che fatti con legno e cera già soffrirono alquanto per mancanza di questo riparo 370 lire' ASTo, I vers., mazzo 3, fasc. 1; 'una campana in vetro e piedistallo in legno per un piccolo modello in cera di un obelisco egizio' ASTo, mazzo 1, fasc. 9.

[9] '[…] la raccolta è accuratamente descritta, si parla anche dei modelli in rilievo di legno incerato degli edifici egiziani che non potevano trasportarsi, e si dice che è frutto delle fatiche di sedici anni del console francese in Alessandria Signor Drovet (sic)', in Bresciani, Edda (2000). *La Piramide e la torre: due secoli di archeologia egiziana*. Pisa: Pacini, p.20.

[10] 'In secondo luogo per ciò che riguarda il miglior modo di spedire il rimanente della Collezione, composto ancora di numeri 307, tra statue, casse e colli, oltre le quindici casse di modelli che il Capitano Palazzo porterà forse da Livorno nel prossimo dicembre, ho l'onore di far presente all'Ecc. Vostra che fra quei monumenti ve ne saranno ancora dieci o dodici del peso di Rubbi di Genova 140 ai 160; ed altri dieci o dodici di R 60 ai 100.'San Quintino letter, November 30, 1823.

[11] 'Rimangono qui quindici casse contenenti modelli di antichi templi ed edifizi egiziani fatti di legno coperti di cera, non avendone trovata menzione nel catalogo io non ne ho domandata la remissione; ieri

il S.r Pedemonte mi disse che avrei potuti mandarli col rimanente, ma essendo le loro case tutte aperte, e mezze rovinate, non avrei più potuto rassettarle senza trattenere il bastimento, con suo danno in questa difficile stagione.' San Quintino letter n.2612, November 1, 1823.

[12] Lanzone, Ariodante, Rossi, Francesco, & Fabretti, Ridolfo Vittorio (1888). Regio Museo di Torino ordinato e descritto da A. Fabretti, F. Rossi e R.V. Lanzone. In Ministero della Pubblica Istruzione (edited by), *Catalogo Generale dei Musei di Antichità e degli Oggetti d'Arte raccolti nelle Gallerie e Biblioteche del Regno*. Roma: Direzione Generale delle Antichità e Belle Arti, pp.307-309.

[13] Cit. Burdick et al. 2012.

[14] Cf. Claes 2014.

[15] W3 (internet) http://www.w3.org/2005/Incubator/prov/wiki/What_Is_Provenance

[16] Cf. Denard 2012.

[17] CIDOC-CRM (internet) http://www.cidoc-crm.org/

[18] Cf. Lo Turco, Calvano, Giovannini 2019

[19] Ibid.

[20] 3DHOP (internet) http://3dhop.net/

Noemi Mafrici is author of paragraphs *Introduction* and *Collection of data from a museum collection*. Noemi Mafrici and Elisabetta C. Giovannini wrote the paragraph *A multidisciplinary approach*. Elisabetta C. Giovannini is author of paragraphs *DB Collection status and integration* and *Conclusions*.

References

Gonizzi Barsanti S., Guidi G. (2013). 3D digitization of museum content within the 3Dicons project. *ISPRS Annals of the Photogrammetry Remote Sensing and Spatial Information Sciences*, no. 5/W1, 2013, vol. II, pp. 151-156.

Bruwier M., Claes W., Quertinmont A. (edited by) (2014). *La Description de l'Egypte de Jean-Jacques Rifaud*. Bruxelles: Editions Safran.

Bruseker G., Carboni N., Guillem A. (2017). In Vincent, Matthew, Bendicho, Víctor Manuel, Ioannides, Marinos, Levy, Thomas. *Cultural Heritage Data Management: The Role of Formal Ontology and CIDOC CRM. Heritage and Archaeology in the Digital Age*. 2017. DOI: 10.1007/978-3-319-65370-9. pp. 93-131.

Carboni N., De Luca L. (2016). *Towards a conceptual foundation for documenting tangible and intagible elements of a cultural object. Digital Applications in Archaeology and Cultural Heritage*, no. 3, 2016, pp. 108-116.

D'Andrea A. (2013). Provenance and Paradata in Open Data: 3D-ICONS model. *MapPapers*, 1-III, 2013, pp. 1-86

Denard H. (2012). A New Introduction to the London Charter. In Bentkowska-Kafel A., Baker D., Denard H. (edited by) *Paradata and Transparency in Virtual Heritage*. Digital Research in the Arts and Humanities Series. Farnham: Ashgate, 2012, pp. 57-71.

Felicetti A., Scarselli T., Mancinelli M. L., Niccolucci F. (2013). Mapping ICCD Archaeological Data to CIDOC-CRM: the RA Schema. CRMEX 2013. In Vladimir A., Vladimir I., Maurice G. (edited by) *Practical Experiences with CIDOC CRM and its Extensions*. Valetta: CEUR Workshop Proceedings, 2013, pp. 11-22.

Lo Turco M., Calvano M., Giovannini E. C. (2019). Data modeling for museum collections. *ISPRS Annals of the Photogrammetry Remote Sensing and Spatial Information Sciences*, vol. XLII, no. 2/W9, pp. 433-440.

Ridley R. T. (1998). *Napoleon's proconsul in Egypt: the life and times of Bernardino Drovetti*. London: Rubicon Press.

Thomas S. (2012). Rediscovering Egypt. *Journal of Literature and Science*, 5, 2012, p.6-22:6.