

POLITECNICO DI TORINO
Repository ISTITUZIONALE

Connecting objects, times and places:

Digital VR re-contextualization of the standing Sekhmet statues in the Museo Egizio, Turin,

Original

Connecting objects, times and places:

Digital VR re-contextualization of the standing Sekhmet statues in the Museo Egizio, Turin, from the Temple of Ptah at Karnak / Spallone, Roberta; Lamberti, Fabrizio; Calandra, Davide; Mezzino, Davide; Auenmüller, Johannes; Rinascimento, Martina. - ELETTRONICO. - (2023), pp. 248-257. (Intervento presentato al convegno IMG23 University of L'Aquila (Italy) IMAGIN(G) HERITAGE INTERNATIONAL AND INTERDISCIPLINARY CONFERENCE ON IMAGE AND IMAGINATION tenutosi a L'Aquila nel 2023, July 6-7).

Availability:

This version is available at: 11583/2980057 since: 2023-07-07T15:40:40Z

Publisher:

Publca

Published

DOI:

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

IV CONVEGNO INTERNAZIONALE E INTERDISCIPLINARE
SU IMMAGINI E IMMAGINAZIONE
4th INTERNATIONAL AND INTERDISCIPLINARY CONFERENCE
ON IMAGES AND IMAGINATION

IMG23



IMG23

4th INTERNATIONAL AND INTERDISCIPLINARY CONFERENCE
ON IMAGES AND IMAGINATION

P V B L I C A



IMG23

Atti del IV Convegno Internazionale e Interdisciplinare
su Immagini e Immaginazione

Proceedings of 4th International and Interdisciplinary
Conference on Images and Imagination



A cura di / Edited by

Stefano Brusaporci, Pamela Maiezza, Adriana Marra
Ilaria Trizio, Francesca Savini, Alessandra Tata

PUBLICA

SHARING KNOWLEDGE

IMG23

Atti del IV Convegno Internazionale e Interdisciplinare

su Immagini e Immaginazione

Proceedings of 4th International and Interdisciplinary Conference

on Images and Imagination

a cura di / edited by:

Stefano Brusaporci (c)

Pamela Maiezza

Adriana Marra

Ilaria Trizio

Francesca Savini

Alessandra Tata

Tutti i contributi sono stati sottoposti a *Double Blind Peer Review* e sono pubblicati con licenza Creative Commons Attribution 4.0 International License.
All papers were subjected to Double Blind Peer Review and are published under a Creative Commons Attribution 4.0 International Licence.

© PUBLICA, Alghero, 2023

ISBN 978 88 99586 32 4

ebook ISBN 978 88 99586 32 4

Pubblicazione Luglio 2023

www.publicapress.it

con il patrocinio di/under the patronage of:



UNIVERSITÀ
DEGLI STUDI
DELL'AQUILA



Dipartimento di
Ingegneria Civile,
Edile-Architettura
e Ambientale
DIPARTIMENTO DI ECCELLENZA
MUR
2023-2027



REpresentation
Advances And
CHallenges



DSU
Dipartimento
di Scienze
Umane



**IV CONVEGNO INTERNAZIONALE E INTERDISCIPLINARE
SU IMMAGINI E IMMAGINAZIONE**
4th INTERNATIONAL AND INTERDISCIPLINARY CONFERENCE
ON IMAGES AND IMAGINATION

IMG23

IMG2023@img-network.it
www.img-network.it

IV CONVEGNO INTERNAZIONALE E INTERDISCIPLINARE
SU IMMAGINI E IMMAGINAZIONE
4th INTERNATIONAL AND INTERDISCIPLINARY CONFERENCE
ON IMAGES AND IMAGINATION

IMG23



**IMAGIN(G)
HERITAGE**

Atti del Convegno | Proceedings



REVIEWERS

REVISORI

Alessandra De Nicola	Ramona Quattrini
Alessandra Tata	Roberta Spallone
Alessandro Basso	Rossella Salerno
Alessandro Luigini	Sofia Menconero
Carlo Battini	Valeria Cera
Caterina Palestini	Vincenza Garofalo
Daniele Rossi	Vincenzo Cirillo
Daniele Villa	
Donato Di Ludovico	
Enrico Cicalò	
Fabio Colonnese	
Francesca Picchio	
Francesco Maggio	
Giovanni Caffio	
Giuseppe Amoruso	
Ilaria Trizio	
Luigi Corniello	
Manuela Piscitelli	
Maria Laura Rossi	
Marinella Arena	
Massimiliano Lo Turco	
Maurizio Bocconcino	
Menchetelli Valeria	
Paola Raffa	
Pierpaolo D'Agostino	

|||||
SCIENTIFIC COMMITTEE
COMITATO SCIENTIFICO

Dario Ambrosini
Fabrizio Apollonio
Demis Basso
Paolo Belardi
Andrés Benedek
Emma Beseghi
Giorgio Camuffo
Mario Centofanti
Eugene Ch'ng
Pilar Chías Navarro
Enrico Cicalò
Alessandra Cirafici
Simonetta Ciranna
Cristina Collettini
Roberto Dainese
Marco Antonio D'Arcangeli
Manuel de Miguel
Agostino de Rosa
Antonella Di Lugo
Paolo Di Stefano
Edoardo Dotto
Francesca Fatta
Maria Linda Falcidieno
Roberto Farnè
Franz Fischnaller
Marco Gaiani
Fabrizio Gay
Teresa Gil-Piqueras
Andrea Giordano
Nicole Goetschi Danesi
William Grandi
Fabio Graziosi
Nicolás Gutierrez
Robert Harland

Ricard Huerta
Elena Ippoliti
Maria Vittoria Isidori
Pedro António Janeiro
Massimiliano Lo Turco
Alessandro Luigini
Francesco Maggio
Stuart Medley
Valeria Menchetelli
Matteo Moretti
Raffaele Milani
Henry Muccini
Elena Pacetti
Chiara Panciroli
Cristiana Pasqualetti
Luca Pezzuto
Andrea Pinotti
Antonella Poce
Paola Puma
Fabio Quici
Ana Margarida Ramos
Michael Renner
Pier Cesare Rivoltella
Pablo Rodríguez-Navarro
Daniele Rossi
Pier Giuseppe Rossi
Rossella Salerno
Maurizio Unali
Tomaso Vecchi
Daniele Villa
Carlo Vinti
Federica Zalabria
Ornella Zerlenga
Franca Zuccoli

|||||
PROGRAM AND ORGANIZING COMMITTEE
COMITATO DI PROGRAMMA E ORGANIZZATIVO

Stefano Brusaporci [c]
Alfonso Forgione
Pamela Maiezza
Adriana Marra
Silvia Mantini

Antonella Nuzzaci
Ilaria Trizio
Alessandra Tata
Francesca Savini
Luca Vespaiano

INDICE

STEFANO BRUSAPORCI IMAGIN(G) HERITAGE	21
TOPICS	22
FRANCESCA FATTA Scene da un Patrimonio	25
ALESSANDRO LUIGINI Sguardi plurali sulle immagini di un patrimonio immaginario	27
ADRIANA MARRA Esperienze di imagin(g) heritage. I contributi del volume	29
IMG23: PAPERS	
	
HERITAGE EDUCATION EDUCAZIONE AL PATRIMONIO	
CHIARA AGAGIÙ The subconscious heritage as a psycho-pedagogical category Il patrimonio inconscio come categoria psicopedagogica	42
ALESSANDRA DE NICOLA, FRANCA ZUCCOLI Heritage fruition and interpretation A path of kit construction: the importance of images Fruizione e interpretazione del patrimonio Un percorso di costruzioni di kit: l'importanza delle immagini	50
ANITA MACAUDA, VERONICA RUSSO, MARIA CHIARA SGHINOLFI Writing images: a verbal-visual approach in teachers training practice Scrivere le immagini: un approccio verbo-visivo nella formazione degli insegnanti	58
SALVATORE MESSINA, ANITA MACAUDA, CHIARA PANCIROLI Heritage education and media literacy. Analysis of digitization practices Educazione al patrimonio e media literacy: analisi di pratiche di digitalizzazione	66
STEFANO OLIVIERO, MARIANNA DI ROSA Heritage education and heritage learning: toward a participatory perspective Heritage education e heritage learning: verso una prospettiva partecipativa	76
CHIARA PANCIROLI, PIER CESARE RIVOLTELLA The Cooperation Human-Machine. Educating for Creativity in the AI Age	82



GRAPHICAL STUDIES STUDI GRAFICI

LEONARDO BAGLIONI, SOFIA MENCONERO

Objective model and ideal model: physical models compared for the study of painted architectural space

Modello oggettivo e modello ideale: modelli fisici di confronto per lo studio dello spazio architettonico dipinto

92

PAOLO BELARDI, VALERIA MENCHETTELLI, GIOVANNA RAMACCINI,
MARCO WILLIAMS FAGIOLI

HERITAGE UNIPG. The image of the University of Perugia from the Super Specula of 1308 to the Official merchandising of 2022

HERITAGE UNIPG. L'immagine dell'Università degli Studi di Perugia dalla Super Specula del 1308 all'Official merchandising del 2022

100

STEFANO BRUSAPORCI

Models Theory and Visual Sciences in Digital Representation of Architecture
Teoria dei Modelli e Scienze Visuali nella Rappresentazione Digitale
dell'Architettura

108

ALESSIO CARDACI, ANTONELLA VERSACI

A story in pictures: Bergamo and its surroundings in Luigi Angelini's drawings

Un racconto per immagini: Bergamo e la Bergamasca nei disegni di Luigi Angelini

114

IRENE CAZZARO

Hypothetical Cultural Heritage and its users: challenges in the interpretation and communication through verbal and visual methods

122

ENRICO CICALÒ, MICHELE VALENTINO

Visualizing Archaeology. The Graphic Sciences' Contribution to Research in Archaeology

Visualizzare l'archeologia. Il contributo delle scienze grafiche alle ricerche in ambito archeologico

134

ANDREA DONELLI

The digital graphic/geometric construction in CAD-BIM. Models for building drawing

La costruzione grafico/geometrica digitale in CAD-BIM. Modelli per il disegno edile

144

TOMMASO EMPLER, ALEXANDRA FUSINETTI

The forms of representation and narration of the coastal defense systems of Elba

Le forme di rappresentazione e narrazione dei sistemi di difesa costieri elbani

154

MARGHERITA FONTANA

A proposal for a bunker aesthetics from Paul Virilio's archaeology to virtual architecture

162

ELENA IPPOLITI, MICHELE RUSSO, MIRUNA ANDREEA GĂMAN,
NOEMI TOMASELLA, GIULIA FLENGHI

Rediscovering Stratified Urban Context by Visual Pathways: the Esquiline of Rome

170

PAMELA MAIEZZA, STEFANO BRUSAPORCI Rebuilding the Past. For a Taxonomy of Virtual Reconstructions of Non-Existing Architectural Heritage Ricostruire il passato. Per una tassonomia delle ricostruzioni virtuali di beni architettonici non esistenti	178
LEONARDO PARIS, MARIA LAURA ROSSI, ANGELA MOSCHETTI The spatial syntax for diachronic analysis in the transformations of historical centres. Experimentation on Porta Cintia in Rieti La sintassi spaziale per l'analisi diacronica nelle trasformazioni dei centri storici. Sperimentazione su Porta Cintia a Rieti	186
FRANCESCA SAVINI, ALESSIO CORDISCO, ILARIA TRIZIO Digital Story Modelling: from digitising architectural Heritage to reconstructing the past Digital Story Modelling: dalla digitalizzazione del patrimonio architettonico alla ricostruzione del passato	196
STARLIGHT VATTANO Digital visions of an imagined Venice: the Biennale of 1985 Visioni digitali di una Venezia immaginata: la Biennale del 1985	204
ORNELLA ZERLENGA, CARLO DI RIENZO, VINCENZO CIRILLO Image/in intangible heritage. The ephemeral celebration in Paris in 1739	212
HERITAGE & MUSEUM PATRIMONIO & MUSEI	
RITA CAPURRO, FRANCA ZUCCOLI Bringing a museum to life from the imagination. The distributed museum at Milano-Bicocca University Nascita di un museo immaginato. Il Museo diffuso dell'Università di Milano-Bicocca	224
MARCELLA COLACINO Heritage, documentation and creation of meaning. Museum generativity in the case of the Brera Art Gallery Patrimonio, documentazione e creazione di senso. La generatività museale nel caso della Pinacoteca di Brera	232
MYRTO KOUKOULI, KATERINA SERVI, DIMITRA PETOUSI, MELPOMENI KARTA, NATASA MICHAILIDOU, LABRINI PAPASTRATO, GEORGIOS I. GOGOLOS, KONSTANTINOS KALAMPOKIS, KONSTANTINOS PETRIDIS Channel to the Past: Combining different digital experiences in a single visit to the museum	240
ROBERTA SPALLONE, FABRIZIO LAMBERTI, DAVIDE CALANDRA, DAVIDE MEZZINO, JOHANNES AUENMULLER, MARTINA RINASCIMENTO Connecting objects, times and places: Digital VR re-contextualization of the standing Sekhmet statues in the Museo Egizio, Turin, from the Temple of Ptah at Karnak	248
FEDERICA ZALABRA Recomposing Heritage. Technology to support art-historical storytelling at the Museo Nazionale d'Abruzzo Ricomporre il patrimonio. La tecnologia a supporto della narrazione storico-artistica al Museo Nazionale d'Abruzzo	258



HERITAGE & ARCHIVE PATRIMONIO & ARCHIVIO

CECILIA BOLOGNESI, DEIDA BASSORIZZI

Images of old projects, models of new spaces. Architecture translation: from archives to AR

Immagini di antichi progetti, modelli di nuovi spazi. Traduzione di architetture dagli archivi alla AR

266

SALVATORE DAMIANO

Implementing the archival heritage: virtual reconstruction of an unbuilt villa by Giuseppe Samonà in Sicily

Implementare il patrimonio archivistico: ricostruzione virtuale di una villa non realizzata di Giuseppe Samonà in Sicilia

274

PATRIZIA MONTUORI

L'Aquila and the new urban 'doors' for welcoming tourists and travellers. The Hotel Castello and the Motel Amiternum

L'Aquila e le nuove "porte" urbane per l'accoglienza turistica e dei viaggiatori. L'Hotel Castello e il Motel Amiternum

282

CATERINA PALESTINI, GIOVANNI RASETTI

Unknown urban heritage: graphical-visual memories of architectures from the second half of the twentieth century in Abruzzo

Ignoti patrimoni urbani: memorie grafico-visive delle architetture del secondo Novecento in Abruzzo

292

MARCO PAOLUCCI, SIMONETTA CIRANNA

The other side of Gran Sasso: Campotosto area in the 20th century. From the peat and hydroelectric industry to tourist-accommodation districts that have never been built

L'altro Gran Sasso: l'area di Campotosto nel XX secolo. Dall'industria torbifera e idroelettrica ai complessi turistico-ricettivi mai realizzati

302



VISUAL HERITAGE PATRIMONIO VISUALE

DARIO AMBROSINI, ANNAMARIA CICCOZZI, TULLIO DE RUBEIS,

DOMENICA PAOLETTI

Optical methods: imagin(g) the hidden world of cultural heritage

312

CARLO BATTINI

No contact detection technologies: artistic expression as well?

Tecnologie di rilevamento no contact: anche espressione artistica?

320

ALAN CHANDLER, MICHELA PACE

Heritage in a van. The paradox of intangibility

328

ALESSANDRO LUIGINI

AI imaging, imagery and imagination. Considerations on a future that is already present, for a digital humanism in poetic and educational processes

336

DONATO MANIELLO

Being in time. The fragment as a vision device

Essere nel tempo. Il frammento come dispositivo della visione

344

SEBASTIANO NUCIFORA

The controversial heritage. The colonial architectural heritage in western sub-Saharan between its material presence and the persistence of memory

L'eredità controversa. Il patrimonio architettonico coloniale in Africa sub-sahariana occidentale tra presenza materiale e persistenza della memoria	350
ANNAMARIA POLI	
The Visual Heritage of Spoon River: intangible and tangible cultural heritage, from monuments and history to poetry and cinema	360
FEDERICO REBECCHINI	
Uzo Nishiyama and the drawing of domestic mutation Uzo Nishiyama e il disegno del mutamento domestico	368
FEDERICO RITA	
A heritage to be enhanced. The design and cultural perspectives of digital technologies Un patrimonio da valorizzare. Il design e le prospettive culturali delle tecnologie digitali	376
MARCELLO SCALZO	
Italy on the walls. Localities and Italian cities in tourist posters between the first and second post-war periods L'Italia sui muri. Località e città italiane nei manifesti turistici tra primo e secondo dopoguerra	386
PASQUALE TUNZI	
Between history and memory. The role of illustrations in early 19th century Italian periodicals Tra storia e memoria. Il ruolo delle illustrazioni nei periodici italiani del primo Ottocento	396
HERITAGE INTERPRETATION AND MAKING	
INTERPRETAZIONE DEL PATRIMONIO E HERITAGE MAKING	
FABRIZIA BANDI	
Alive ruins: imagining cultural heritage through virtual reality Rovine viventi: immaginare il patrimonio culturale attraverso la realtà virtuale	406
MIRCO CANNELLA, VINCENZA GAROFALO, MARCO ROSARIO GERAZI, LUDOVICA PRESTIGIOVANNI	
The Recovered Image: the Majolica Floor of the Oratory of San Mercurio in Palermo L'immagine recuperata: il pavimento maiolicato dell'Oratorio di San Mercurio a Palermo	412
ALESSANDRA CIRAFICI, CATERINA CRISTINA FIORENTINO, PASQUALE ARGENZIANO	
The Cimarosian identity in Aversa. Visual paradigms and communicative codes L'identità cimarosiana ad Aversa. Paradigmi visuali e codici comunicativi	422
ORNELLA CIRILLO, CATERINA CRISTINA FIORENTINO, ROBERTO LIBERTI	
Procida's manufactures in the threads of history. An interdisciplinary approach to heritage making Le manifatture di Procida nelle trame della storia. Un approccio interdisciplinare all'heritage making	432
FRANCESCO DE LORENZO, AGOSTINO URSO	
Formal configurations of urban space. The design of blocks in the drawings of the Ente Edilizio of Reggio Calabria Configurazioni formali dello spazio urbano. La progettazione degli isolati nei disegni dell'Ente Edilizio di Reggio Calabria	440

LAURA FARRONI, MATTEO FLAVIO MANCINI Real, virtual and digital images from the Room of Pompeo quadratura at Palazzo Spada in Rome	448
ALESSIA GAROZZO, FRANCESCO MAGGIO Memory of the past between old and new images La memoria del passato tra antiche e nuove immagini	456
ROSINA IADEROSA The tradition of ancient crafts by means of images. Their tales between analogue and digital La tradizione degli antichi mestieri attraverso le immagini. I loro racconti tra analogico e digitale	464
ELENA IPPOLITI, FLAVIA CAMAGNI, ANDREA CASALE Seeing Urbino through the eyes of the Renaissance. A multimedia travel notebook Urbino con gli occhi del Rinascimento. Un taccuino di viaggio multimediale	472
SILVANA KÜHTZ, ALESSANDRO RAFFA Image and imagination. Re-inventing heritage in Matera. For a definition of heritage in marginal areas	482
ALESSANDRO LUIGINI, BARBARA TRAMELLI, FRANCESCA CONDORELLI, GIUSEPPE NICASTRO, ALESSANDRO BASSO Three experiences of imagin(g) heritage Tre esperienze di imagin(g) per il patrimonio	490
ADRIANA MARRA Reconstructing images through 3D printing: Application to archaeological finds at Amiternum (AQ) Ricostruire le immagini attraverso la stampa 3D: applicazione ai reperti archeologici di Amiternum (AQ)	498
VALERIA MENCHETELLI, FRANCESCO COTANA, CHIARA SPIPPOLI Images to interpret Cultural Heritage. Fortified Architecture in Umbria Between Survey, Cataloguing and Communication Immagini per interpretare il patrimonio culturale. Le architetture fortificate in Umbria tra rilievo, catalogazione e comunicazione	508
SONIA MOLLICA Physical and perceptual images. The visual representation of the paintings of the Basilica of S. Giorgio in Venice Immagini fisiche e percettive. La rappresentazione visuale dei dipinti della Basilica di S. Giorgio a Venezia	518
JONATHAN PIERINI, GIANLUCA CAMILLINI The editorial practice as a device for enacting archives Una pratica editoriale come dispositivo di riattivazione dell'archivio	526
ADRIANA ROSSI, SARA GONIZZI BARSANTI "Augmenting" Reality: a recent goal? "Aumentare" la realtà: un obiettivo recente?	534
DANIELE ROSSI, ALESSANDRO BASSO Exploring Cultural Heritage Through Virtual Tours: The Loggia of Galatea in Villa Farnesina	544
MICHELA ROSSI, SARA CONTE Visual Heritage and Memory Design	554

SABATINO MICHELE		
Remembering and documenting heritage through images. The farmhouses O.N.C. Of the land of the "Mazzoni"		
Ricordare e documentare il patrimonio attraverso le immagini. Le case coloniche O.N.C. della terra dei "Mazzoni"		564
ROSSELLA SALERNO		
"Reading" a place: between identity and globalization		
"La lettura" del luogo: tra identità e globalizzazione		572
KHAOULA STITI		
Revisiting participation in research. A literature review to rearrange the definitions of "research with" in heritage		
		580
ALESSANDRA TATA		
Memory and photography in the digital age: the case of L'Aquila		
Memoria e fotografia nell'era digitale: il caso dell'Aquila		588
TRAMELLI BARBARA		
Finding, seeing and comparing. Visualization Methods in the Lyon16ci Database		
		598
CHRISTIAN UPMEIER, ISABELLA KÜCHLER		
The Sounds of Heritage: a prototype for the Haus Am Horn of Weimar		
I suoni del patrimonio: un prototipo per la Haus Am Horn di Weimar		608
AGOSTINO URSO, FRANCESCO DE LORENZO		
Puzzles and representation. The puzzle image as a useful tool for graphic, multimedia and interactive storytelling		
Puzzle e rappresentazione. L'immagine del puzzle come utile strumento di narrazione grafica, multimediale e interattiva		616
ORNELLA ZERLENGA, MARGHERITA CICALA, RICCARDO MIELE		
Images for the fruition of Cultural Heritage. Virtual itineraries for the knowledge and enhancement of the Roccarainola castle		
Immagini per la fruizione del Patrimonio Culturale. Itinerari virtuali per la conoscenza e la valorizzazione del castello di Roccarainola		624
		
LANDSCAPE		
PAESAGGIO		
GIUSEPPE AMORUSO		
Rebuilding Amatrice. The authentic representation of the historical urban landscape		
Ricostruire Amatrice. La rappresentazione autentica del paesaggio urbano storico		634
MARINELLA ARENA		
Imago Memoriae		
		642
GIOVANNI CAFFIO		
Beyond villages. The challenge of drawing as a method of investigating depopulated villages		
Oltre i borghi. La sfida del disegno come metodo d'indagine dei paesi in spopolamento		650
ANTONIO CONTE, MARIANNA CALIA, ROBERTO PEDONE, ROSSELLA LAERA		
Creative heritage and fragility in Lucania small towns. Reconstruction through images of human events as a palimpsest of housing memory		
Patrimoni creativi e fragilità nei piccoli centri della Lucania. Ricostruzione per immagini di vicende umane come palinsesto della memoria abitativa		658

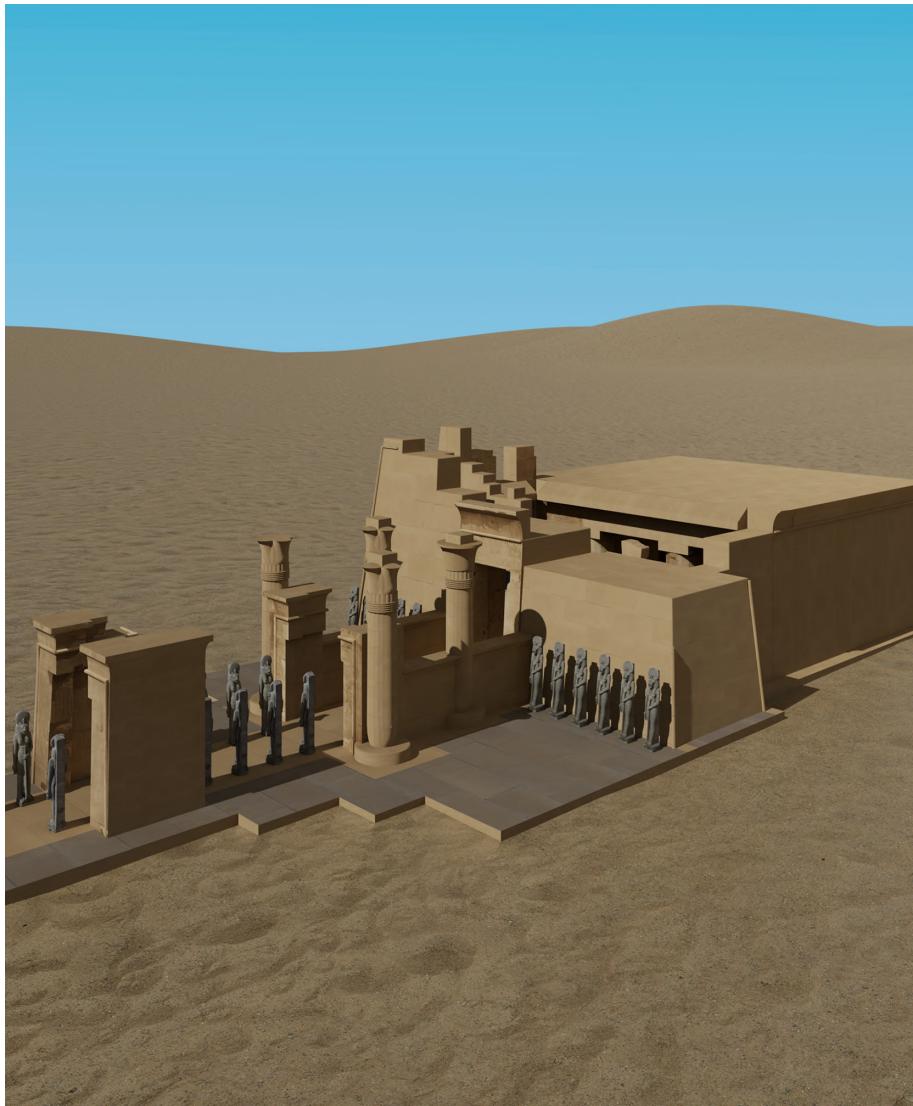
CARMELO GARCÍA-RODRÍGUEZ, JOSÉ LUIS GARCÍA-RODRÍGUEZ, MARÍA DEL CARMEN VÍLCHEZ-LARA, JUAN FRANCISCO REINOSO-GORDO, ANTONIO GÓMEZ-BLANCO, JORGE MOLINERO-SÁNCHEZ Images of a disappearing cultural landscape: The factory-flour complex of Los Tajos of Alhama de Granada (Spain) Imágenes de un paisaje cultural que desaparece: El complejo fabril-harinero de los Tajos de Alhama de Granada (España)	666
CAMILLA SETTE, BERNARDINO ROMANO Public landscape heritage. The Unsustainable Planning of Soil Consumption	674
 ARCHITECTURAL HERITAGE PATRIMONIO ARCHITETTONICO 	
FABRIZIO AGNELLO Image and Imagination: Light as a material of architecture Immagine e immaginazione: la luce come materia dell'architettura	684
ALESSANDRA BELLICOSO Constructing images and preserving memory. The New Provincial Insane Asylum of L'Aquila Costruire immagini e conservare memoria. Il Nuovo Manicomio Provinciale dell'Aquila	692
STEFANO BRUSAPORCI, PAMELA MAIEZZA, ADRIANA MARRA, ALESSANDRA TATA, LUCA VESPASIANO Reliability of HBIM models for built heritage management Affidabilità dei modelli HBIM per la gestione del patrimonio costruito	702
LUIGI CORNIELLO, GIANLUCA GIOIOSO, FABIANA GUERRIERO, GENNARO PIO LENTO, PEDRO A. JANEIRO A heritage of images. The survey model Un patrimonio di immagini. Il modello di rilievo	708
ANGELO DE CICCO, ANDREA MALIQARI, ANDRONIRA BURDA, GENNARO PIO LENTO, FABIANA GUERRIERO, ROSA DE CARO, ADRIANA TREMATERRA, GIANLUCA GIOIOSO, LUIGI CORNIELLO Images of the UNESCO heritage site of Berat in Albania. Photographic and photogrammetric surveys of the cistern in the castle Immagini del patrimonio Unesco di Berat in Albania. Rilievi fotografici e fotogrammetrici della cisterna nel castello	716
DANIELE ARTURO DE LUCA, RAMONA QUATTRINI, CHIARA MARIOTTI HBIM strategies for the phygital interaction with the architectural heritage. Palazzo Olivieri-Machirelli and the Auditorium Pedrotti in Pesaro	724
GIANCARLO DI MARCO, JUAN CARLOS DALL'ASTA Architectural materiality as an image of the future past. 3D printed concrete at the intersection of aesthetic language evolution and technological development	734
ERIKA ELEFANTE, GIUSEPPE ANTUONO, PIERPAOLO D'AGOSTINO Gamification for participatory communication of information models. Imagining the heritage of inaccessible architecture Gamification per la comunicazione partecipativa dei modelli informativi. Immaginare il patrimonio dell'architettura inaccessibile	742
MASSIMILIANO LO TURCO, ANDREA TOMALINI, JACOPO BONO A Heritage of images witnessing the passage of time. The renovation of the Torino Esposizioni complex	750

MÓNICA LÓPEZ-PIQUER, CINTA LLUIS-TERUEL, JOSEP LLUIS I GINOVART Comparison of the methodology used for the analysis of the main section in Romanesque buildings in Val d'Aran	762
FANWEI MENG, YU HUAIYUAN The oldest catholic church in Beijing: Nan Tang	770
LUCA ROSSATO, FABIO PLANU, GRETA MONTANARI, DARIO RIZZI, FRANCESCO VIROLI The Rocca Malatestiana of Verucchio. Integrated survey and SCAN to HBIM process for cultural heritage management La Rocca Malatestiana di Verucchio. Rilievo integrato e processo di SCAN to HBIM per la gestione del patrimonio culturale	778
ADRIANA TREMATERRA, GIANLUCA PINTUS, ANGELO DE CICCO, FABIANA GUERRIERO, ROSA DE CARO, LUIGI CORNIELLO Images of Sacred Heritage. Enhancement of Montenegro's Orthodox Monasteries for Sustainable Religious Tourism	788
GRAZIANO MARIO VALENTI Non-canonical representations: the aid of reflection Rappresentazioni non canoniche: l'ausilio della riflessione	796
LUCA VESPASIANO Fragments from Renaissance. The loggias in the historial center of L'Aquila Frammenti dal rinascimento. Le logge nel centro storico dell'Aquila	804
Index of authors/Index degli autori	816





**IMAGIN(G)
HERITAGE**



Connecting objects, times and places:

Digital VR re-contextualization of the standing Sekhmet statues in the Museo Egizio, Turin, from the Temple of Ptah at Karnak

Abstract

The experience described in this paper concerns the reconstruction of the temple of Ptah at Karnak with the aim to check and present two hypotheses for the original placement of statues of the goddess Sekhmet now kept at the Museo Egizio, Turin. The reconstruction including the statues, enjoyable through virtual reality, highlights its potential as a tool for scientific debate and as a means of interactive presentation of knowledge content for the public.

Keywords

Digital reconstruction, Virtual reality, Immersive environments, Museo Egizio Turin, Temple of Ptah at Karnak.

INTRODUCTION

The Museo Egizio, Turin, preserves one of the largest collections of seated and standing statues of the goddess Sekhmet dating back to 1390-1350 BCE. Originally, they all seem to have been set up in the mortuary temple of king Amenhotep III in Western Thebes. Archival records show that the standing Sekhmet statues were, however, found in the temple of Ptah at Karnak in 1818. Since there is no archaeological documentation, their disposition in the Ptah temple is difficult to reconstruct. Thanks to the collaboration between the Museo Egizio, Turin, the Architecture and Design and the Control and Computer Engineering departments of the Politecnico di Torino as well as the VR@POLITO Laboratories, an interdisciplinary research project was initiated with the aim to digitally reconstruct the setting of the standing Sekhmet statues in the Ptah temple. Due to the lack of accurate data on their place of installation or discovery, a digital 3D model of the temple has been created to test different hypotheses of their local set-up. The results of the reconstructions are visualized and presented through an immersive VR experience that allows both scholars and visitors to explore the site. The experience creates new connections between past and present as well as the museum and the archaeological site, fueling scholarly debate and the public's interest.

DIGITAL CONTINUUM, CULTURAL HERITAGE SITES AND MUSEUMS

In the Digital Humanities, studies of heritage sites and museum collections are embracing digital-based ways of representation, communication, and interpretation. A common key element is the adoption of a trans-historical and trans-medial approach on cultural heritage objects and sites for knowledge transfer, visualization, and dissemination (Burdick et al., 2016).

This so-called "digital continuum" – in which form and information merge and a continuity between space and time is created – provides the framework for a new design logic (Continuum.Codes, 2023). The integrated digital design space opens several opportunities also in the field of Cultural Heritage which allow for the synchronous representation of time and space. This new logic also affects museums for whom the digital transition is transforming approaches to study and dissemination.

Additionally, the interoperability of digital 3D reconstructions enables different users to see, interpret and verify reconstruction hypotheses developed by digital humanists with different skills and competencies including, but not limited to, 3D modelling, archaeology, architecture, computer sciences, and visual communication (Rheams et al., 2018). Captured Reality (CR) techniques and computer-generated 3D models are used worldwide in, e.g., the "Turku Åbo 1827" project which offers an immersive virtual reconstruction of Finland's former capital and provides interactive experiences along with an edutainment approach (Turku Åbo 1827, n.d.), the digital 3D reconstruction of the "Wanfanganhe" pavilion of the Yuanmingyuan Palace, Beijing's ancient summer palace (Chen & Del Blanco Garcia, 2022), the Argentinian project "Digitalización de bienes culturales mediante imágenes 3D" (Morita & Bilmes, 2018), or the exhibition "Krause. Vestigios disponibles" that took place in 2017 at the *Museo Provincial de Bellas Artes Emilio Pettoruti* in Buenos Aires (Loaiza et al., 2020).

VR AND MUSEUMS

Museums are open, accessible and inclusive institutions that research, collect, conserve, interpret and exhibit intangible and tangible heritage for education, enjoyment, reflection and knowledge sharing

(ICOM, 2022). This mission considers the concept of the so-called new museology (Vergo, 1997). According to this concept, museums shall evolve from elementary exhibitions to enticing experiences which are able to foster visitor engagement and participation (Vergo, 1997). In this context, several cutting-edge technologies have been explored. Among them, Virtual Reality (VR) has been acknowledged as one of the most fruitful and promising ones (Bekele et al., 2018). So far, museums used VR as a way to interact in alternative form with their visitors (Bekele et al., 2018) to deliver engaging, interactive, and immersive experiences in the frame of museum learning (Carrozzino & Bergamasco, 2010) and allowing visitors to access lost or damaged historical spaces (tom Dieck et al., 2019) or artifacts (Gonizzi Barsanti et al., 2015) by digitally reconstructing them. For museums, the aspect of accessibility is particularly important in exploring lost sites or bringing objects and historical characters back to life (tom Dieck et al., 2019).

As it is possible to recreate any sort of virtual environments from scratch with VR, museum professionals have explored the potential to curate fully virtual exhibitions to be appreciated detached from the museum's premises (Bekele et al., 2018). Albeit this approach represents a way to attract people to visit the real exhibition, it has been considered more as complementary than a replacement (Vergo, 1997). Successful integrations of VR experiences supporting visitors in experiential learning typical of museums exist (Carrozzino & Bergamasco, 2010).

Digital reconstruction and VR have been also exploited from the perspective of heritage protection and conservation and as a tool to assist archaeologists in restoration measures or to reduce the cost associated to on-site campaigns (Bekele et al., 2018). In fact, VR can enable scholars to virtually restore too fragile artifacts, giving them the possibility to study these objects, or even entire sites (Bekele et al., 2018), in a surrogate and immersive way.

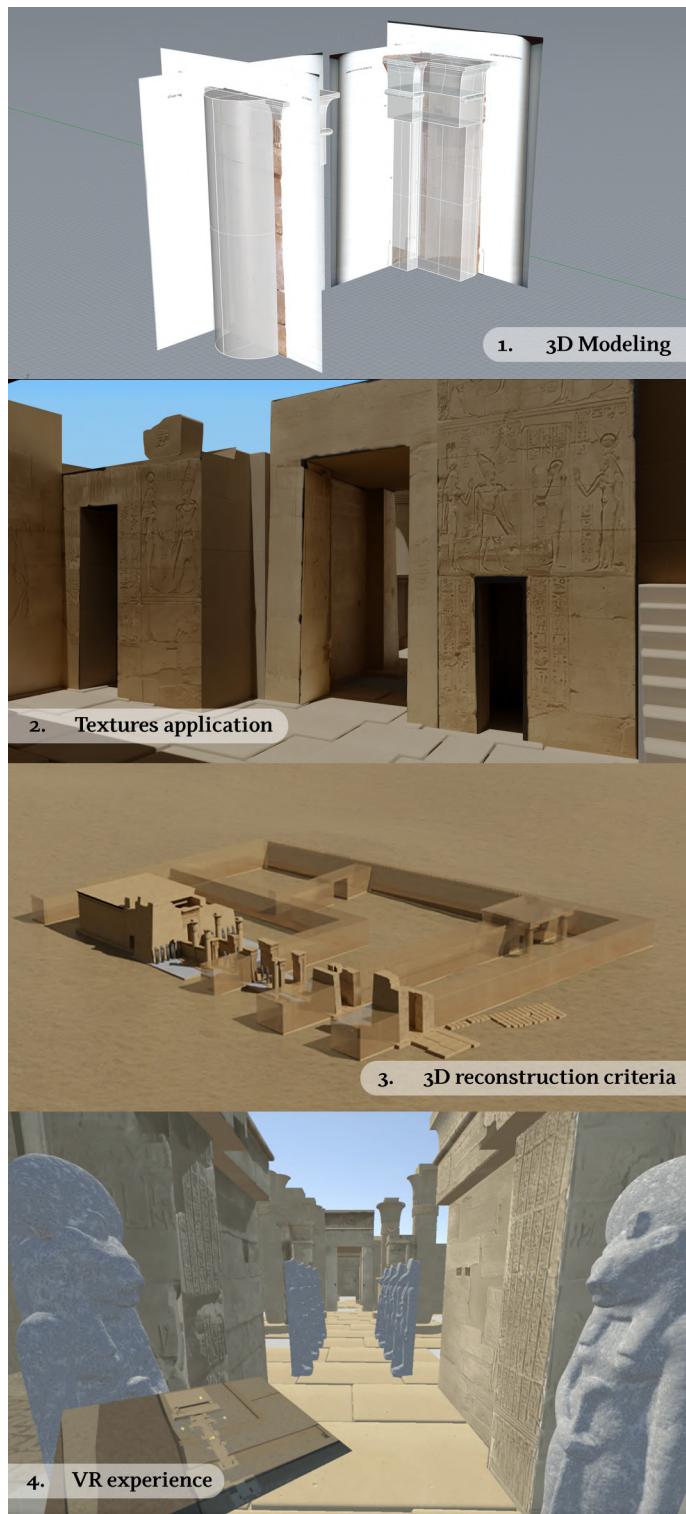
THE PTAH-TEMPLE OF KARNAK, 3D RECONSTRUCTION AND VIRTUAL SPACE FRUITION

The first phase of creating the VR experience comprised of the gathering of all available data for the digital 3D reconstruction of the temple of Ptah and its immediate surroundings. In addition, different hypotheses about the positioning of the 11 Sekhmet statues were discussed. In this regard, the history of the Ptah temple and the history of archaeological research at this site were studied (Thiers & Zignani, 2011; 2013) to have all relevant data ready at hand (fig. 1).

Using the software Rhinoceros, a digital reconstruction of the Ptah temple in its current state was created. Architectural plans, sections and illustrations were taken from a recent publication (Biston-Moulin & Thiers, 2016) in order to obtain the correct dimensions of the structural elements of the temple. The 3D modeling of the surroundings (precinct walls, other buildings and sand dunes) was done in the software Blender, which offers the best control for modeling fluid geometries.

The following steps concerned the hypothesis about the positioning of the 11 Sekhmet statues in the temple complex. According to J.-J. Rifaud's report (Cincotti, 2013), the statues were found in 1818 in front of the façade of the Ptah temple. Their arrangement was not recorded, but evidence from other temples allows to approach this issue methodologically. Two options can be discussed: the Sekhmet statues were either aligned along the façade of the temple pylon or placed side by side in two rows along the main outer temple axis in front of the pylon. These two dispositions are both included in the 3D model together with the representation of one other Sekhmet statue which was found by G. Legrain in the southern chapel of the temple in 1901/2 (Cincotti, 2013).

Fig. 1 - Pipeline of the reconstruction and VR visualization of the temple of Ptah with the placement of the Sekhmets. Editing by Martina Rinascimento.



The creation and application of textures was a crucial and significant step as it offers a photorealistic appearance of the temple and its relief decoration. Published photographs of the decoration (Biston-Moulin & Thiers, 2016) were used as both color and normal maps to be applied to the 3D model in Blender (fig. 2).

For embedding the Sekhmet statues, existing textured 3D models provided by Museo Egizio were used. In accordance with the London Charter (2009) and the Principles of Seville (2012), representational choices were put in place to consistently distinguish between original and reconstructed parts of the temple. To graphically differentiate the original structures from the reconstructed ones, a recent graphic reconstruction of the site (Rondot, 2022, 256-257) was used and two looks with different transparency degrees were set: opaque elements represent the in-situ parts, whilst transparent ones stand for missing elements. The original flooring of the central axis has been distinguished from the restored areas using different tints: the

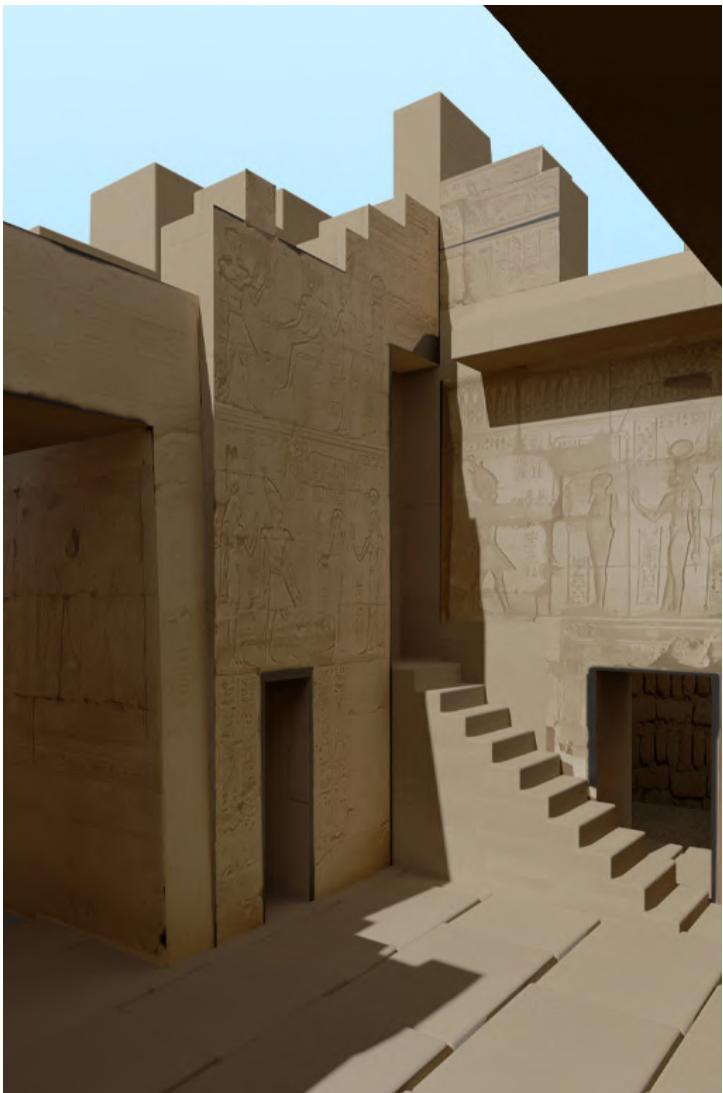


Fig. 2 - Reconstruction of the temple of Ptah and texturing. Perspective view.
Modelling and rendering by Martina Rinascimento.

original parts have a warmer tone while the new parts are rendered in a colder one.

The VR experience created aims at communicating the architectural development of the temple in tandem with the research and hypotheses underlying the placement of the 11 statues. The software Unity as well as Bolt, a tool of visual scripting, were used to program the interaction between visitors and the contents of the experience. Due to the immersiveness of the VR experience, the visor Oculus Quest Meta 2 must be worn.

The VR experience is composed of two interactive moments. The first includes the appearance of the architectural elements of the temple in relation to their dating, while a voice narrates the temple's evolution through time. The voice also informs the visitors how they can move in the temple through a map of the building and a teleportation tool. Through light beams from the viewer's controller, the visitor can freely explore the digital reconstruction. As regards the possible inclusion of the experience in a museum setting, a large room is not necessary for the experience to be successful.

The second interactive moment takes place throughout the visitors' exploration of the temple when they interact with pulsating icons positioned at significant points. Having approached the icon, a narrating voice shares additional information about the god Ptah and the myth of Sekhmet, the events that led to the statues being moved from their original site to the temple, the archaeological excavations, and the research that forms the basis of the two hypotheses about the placement of the statues (fig. 3).

Each icon activates one of the two possible dispositions of the statues, and while entering the south chapel, the visitor finds the last icon that presents the statue of Sekhmet found during the archaeological excavations and now preserved in situ.

CONCLUSIONS

Reconstructive modelling combined with immersive (re-)presentation offers significant heuristic, interpretive and communicative potential. The reconstruction of the temple complex constituted a true experimental and experience-based laboratory within which the Sekhmet statues could be visualized in their different possible locations, providing new research and dissemination insights. The experience generates multi-layered links between the museum, the objects, and their find spots, resulting in entertaining and informative experiences in all relevant settings.

ACKNOWLEDGEMENTS

Despite methodology and results are shared by the research group, R. Spallone wrote *Introduction and Conclusions*; D. Mezzino wrote *Digital continuum, cultural heritage sites and museums*; F. Lamberti and D. Calandra wrote *VR and museums*; M. Rinascimento wrote *The Ptah-temple of Karnak, 3D reconstruction and virtual space fruition*; J. Auenmüller reviewed and edited the paper.

REFERENCES

- Bekele, M. K., Pierdicca, R., Frontoni, E., Malinvern, E., & Gain, J. (2018). A Survey of Augmented, Virtual, and Mixed Reality for Cultural Heritage. *Journal on Computing and Cultural Heritage*, 11(7), 1-36.
- Biston-Moulin, S., & Thiers, C. (2016). *Le temple de Ptah à Karnak I, II: Relevé épigraphique*. Cairo: Institut Français d'Archéologie Orientale.

Fig. 3 - Visualization of one hypothesis for the placement of the Sekhmet statues side by side in two rows along the main outer temple axis. Perspective view. Modelling and rendering by Martina Rinascimento.



Burdick, A., Drucker, J., Lunenfeld, P., Presner, T., & Schnapp, J. (2016). *Digital_Humanities*. Cambridge (MA): MIT Press.

Carrozzino, M., & Bergamasco, M. (2010). Beyond virtual museums: Experiencing immersive virtual reality in real museums. *Journal of Cultural Heritage*, 11(4), 452-458.

Chen, Y., & Del Blanco Garcia, F. L. (2022). Constructive analysis and digital 3D reconstruction of the Yuanmingyuan Ruins: Wanfanganhe Pavilion (China). *Virtual Archaeology Review*, 13(27), 1-16.

Cincotti, S. (2013). Les fouilles dans le Musée: La collection égyptienne de Turin et le Fonds Rifaud. *Cahiers de Karnak*, 14, 279-284.

Continuum.codes [2023]. *Principles. The Founding Principles of the Digital Continuum*. Retrieved January 23, 2023 from <https://www.continuum.codes/continuum/>

Gonizzi Barsanti, S., Caruso, G., Micoli, L. L., Covarrubias Rodriguez, M., & Guidi, G. [2015]. 3D visualization of cultural heritage artefacts with virtual reality devices. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 40(5/W7), 165-172.

International Council of Museums (ICOM) [2022]. *ICOM approves a new museum definition*. Retrieved February 15, 2023 from <https://icom.museum/en/news/icom-approves-a-new-museum-definition/>

Loaiza Carvajal, D. A., Morita, M. M., & Bilmes, G.M. [2020]. Virtual museums. Captured reality and 3D modeling. *Journal of Cultural Heritage*, 45, 234-239.

Morita, M. M., & Bilmes, G. M. [2018]. Restauro, conservazione e tutela del patrimonio culturale. *Revista Kermes*, 107, 45-49.

Principles of Sevilla, 2012. Retrieved February 15, 2023 from <http://www.sevilleprinciples.com/>

Rheams, D., Neilson, T., & Levenberg I. [2018]. *Research Methods for the Digital Humanities*. London: Palgrave Macmillan.

Rondot, V. [Ed.] [2022]. *Pharaon des Deux Terres: l'épopée africaine des rois de Napata*. Madrid: El Viso.

The London Charter for the Computer-Based Visualisation of Cultural Heritage, Draft 2.1, 7 February 2009, Retrieved February 15, 2023 from <http://www.londoncharter.org/>

Thiers, C., & Zignani, P. [2011]. The temple of Ptah at Karnak. *Egyptian Archaeology*, 38, 20-24

Thiers, C., & Zignani, P. [2013]. Le domaine du temple de Ptah à Karnak: Premières données de terrain. *Cahiers de Karnak*, 14, 493-513.

tom Dieck, M.C., Jung T., & Michopoulou E. [2019]. Experiencing virtual reality in heritage attractions: Perceptions of elderly users. In M.C. tom Dieck & T. Jung [Eds.], *Augmented reality and virtual reality: The power of AR and VR for business* (89-98). Cham: Springer.

Turku Åbo 1827 [n.d.]. In Museum of History and the Future. Retrieved January 12, 2023 from <https://digimuseo.fi/en/exhibitions/turku-abo-1827-en/>

Vergo, P. [Ed.] [1997]. *The new museology*. London: Reaktion books.

© PUBLICA, Alghero, 2023
ISBN 978 88 99586 32 4
ebook ISBN 978 88 99586 32 4
Pubblicazione Luglio 2023

www.publicapress.it