

Information Technologies for Epigraphy and Cultural Heritage

Proceedings of the First EAGLE International
Conference



europeana
eagle project

Collana Convegni 26

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Information Technologies for Epigraphy and Cultural Heritage

Proceedings
of the
First EAGLE International Conference

a cura di

*Silvia Orlandi, Raffaella Santucci,
Vittore Casarosa, Pietro Maria Liuzzo*



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*In den Flüssen nördlich
der Zukunft / werf ich das
Netz aus, das du / zögernd
beschwerst / mit von Steinen
geschriebenen / Schatten.
(Paul Celan)*

Foreward

Information Technologies have made possible many important changes in the field of cultural heritage and continue to provide dynamic and exciting media platforms through which new possibilities perpetually emerge. This wave of change has had particularly significant consequences in the field of epigraphy, where a vast array of possibilities for digital content fruition continues to reveal itself, constantly opening doors to new and as-yet-unexplored synergies. Many technological developments concerning digital libraries, media entertainment and education are now fully developed and ready to be exported, applied, utilised and cultivated by the public.

EAGLE is a best practice network co-funded through the ICT Policy Support Programme of the European Commission. EAGLE's goal is to enable digital access to epigraphic resources, while providing guidelines and using metadata standards for searching and browsing.

By creating a seamless and centralised online database, EAGLE is providing access to the epigraphic collections and archives of its project partners, amongst which are many of the leading institutions in the field. An ever-growing part of these resources is becoming accessible through a common, multilingual, easy-to-use portal.

The EAGLE metadata will become part of Europeana, the European portal of millions of digitized items from museums, libraries, archives and multimedia collections.

The EAGLE 2014 conference aims to function as a forum in which progress-oriented individuals and institutions find a place to collaborate and present results. It also aims to provide an overview of the state of the art for epigraphic digital collections within the framework

of the following best-practice themes: digital library tools, education and research facilities, IPR issues, cultural heritage and technologies.

The event featured a variety of workshops, sessions and panels that conform to our standard of quality. We hosted a keynote speaker lineup consisting of two of the most salient voices in the field, both invited to join us from overseas. Susan Hazan is Curator of New Media and Head of the Internet Office at the Israel Museum (Jerusalem). She is a champion of Open Access and had blazed new paths for many national and local museums, while simultaneously leading the User Engagement Group for Europeana Foundation.¹ Tom Elliott is Associate Director for Digital Programs and Senior Research Scholar at the Institute for the Study of the Ancient World at New York University. He is a founding member of the EpiDoc consortium, a pivotal group for the revolution in digital epigraphy that has taken place in recent decades.²

An international committee [p.506] evaluated with a double peer review the proposals gathered from the event's Call for Papers. EAGLE 2014 features more than 30 presentations delivered by specialists from several European and overseas countries.³

Our work on EAGLE has shown us that an interdisciplinary approach to the application of IT to epigraphy is a challenge that must be addressed. It is difficult to meaningfully study all the ramifications of the sometimes troublesome marriage of IT with classical studies. On the one hand, the risk is that humanities scholars may ignore, overlook or oversimplify technical issues; on the other hand, IT people are not necessarily aware of the problems and the needs that are unique to epigraphy and classical studies.

As "a digital bridge to the ancient world", the present volume (based on proceedings from the First International conference of the EAGLE BPN in Paris, October 2014) gathers a very wide range of projects in the field of digital epigraphy. Many *epigraphies* of different periods and contexts are represented and not only in Greek and Latin. Many

¹ The keynote address presentation can be seen here: <http://www.imj.org.il/eagle2014/index.html>

² The transcript of his keynote address can be found in *horothesia* (<http://nblo.gs/10sghm>).

³ See C for details on each contributor's affiliation, and the network page on the EAGLE website <http://www.eagle-network.eu/about/partners/>.

tools are presented to improve research possibilities in several areas of interest; interaction and exploration of new possibilities is in many ways the rule of these proceedings.

This conference and this volume bear witness to a sort of revolution in its young age; it immortalizes a moment in which aims become clear, enthusiasm is still high, and the full range of possibilities has not yet revealed itself. Although our presentation of these proceedings is organized according to thematic blocks, it is not the only path the reader might take through the various contributions.

In part I, *Epigraphic Data: Model, Vocabularies and Interactions*, the reader will find contributions related to technical data management for epigraphs; their harmonization, modeling, search and research. Chapter 1 describes the efforts needed to map different epigraphic databases into a single model undertaken for the EAGLE project itself. Chapter 2 looks instead at ways to interrogate the data to make the search results interesting for a researcher, starting from the experience of Epigraphic Database Bari. These two chapters deal thus with the two fundamentals of data, encoding and querying to make it usable for research.

Chapter 3 deals with the third most issue facing epigraphic data harmonization: the establishment of controlled vocabularies of terms. The perspective given in this chapter come from a non-strictly- Epigraphic project, LIMC-France's Thea. This initiative shares the challenges and objectives with projects like EAGLE. Chapter 4 uses the DASI project to demonstrate the interactive use of properly articulated vocabularies in a modern digital edition of an epigraphic corpus. This chapter also evinces that the powerful research opportunities offered by digital approaches are not only for Greek and Latin epigraphy. When the variables at play are understood and the community of participants is open, the possibilities are vast.

The achievements presented in chapter 5 are of no less importance to understand promise of interactions between traditional epigraphy and modern technologies. The Domitilla Project, already well known in the field, has in fact brought back to life in a spectacular 3D mapping an entire catacomb, allowing (in cooperation with EDB), us to put texts back in their context. Achievements realized thanks to interdisciplinary cooperation are epitomized in chapter 6, which examines the study of Visual Recognition processes carried out by CNR-ISTI. This exciting

work allows machines to help us in research tasks such as the recognition and identification of inscriptions, while providing an extremely useful service to any end user in the field.

The last two contributions of this section focus specifically on the text of inscriptions. Chapter 7 shows how readings can be radically improved through the application of the Morphological Residual Model. Chapter 8 looks at a similar possibility; it looks not to the help of sophisticated algorithms, but a simple image editing tool applied to an inscription from Luna.

This section of the conference proceeding gives an overarching view on developments in epigraphic study that digital tools can bring to the researcher at the levels of data, functions, content enrichment, project structure, contextualization, ease of use and recognition, and rediscovery of texts.

The need for translations of epigraphic documents both for didactic and research purposes as well as for user engagement has become patent in the latest years. A series of extremely interesting projects has taken broached this issue and many questions (and answers) have emerged. The II part of these conference proceedings, *Translating Epigraphy: Challenges and Research Outcome*, looks at these emerging problems and at the pilot projects dealing with translations of inscriptions. Traditionally translations have been underestimated in their scientific and euristic value, but today the importance of this task for research is becoming clear, and not just because of the lower level of knowledge of the languages; on the contrary, it is because of the high level of interpretation involved and for the relevance this reality has to our understanding of the ancient world.

The four contributions in the following section provide a first theorization for this sector of research and scholarly activity. Chapter 9 presents the results of the ongoing online project to publish English translations of Attic Inscriptions. It is the only project currently dedicated specifically to the online publication of a major regional corpus of translated inscriptions for both research and teaching purposes. Chapter 10 introduces a first practical and pragmatic theorization of the translation work, presenting problems and some guidelines for this task on the basis of the inscriptions of Lepcis Magna and Roman Tripolitania. Chapter 11 explores cases and considers the development of translation activity for epigraphists, complementing the propositions

of the previous chapter with attention to specific cases as specific lexicon and elliptical forms of expression.

The section is then closed with the presentation in 12 partnership with Wikimedia Italia and the Perseids project. This collaboration seeks to bring together existing translations with Wikibase so that translation studies may be carried out more effectively. This contribution segues nicely into the following section, as it deals with the users of this content.

Part III *Users, Epigraphy and the social web* deals substantially with user engagement. Against the common intuition that epigraphy is not a topic that can engage anyone besides researchers and specialised amateurs, the reader will find projects focusing on specific classes, museums and people; on many types of epigraphy, designed for all levels of education. In chapter 13 we look at epigraphy in a primary school in Slovenia. Chapter 14 looks at secondary schools in the British system within the Ashmolean Latin Inscriptions' project, while chapter 15 presents the results of a study conducted with university students in Romania. The picture is then completed in chapter 16 by a large survey directed to those who are considered the main users of digital epigraphy. If this set of contributions looks at the world of education and research, the following moves the focus to cultural institutions, especially museums. Chapter 17 explores the objectives and results of #svegliamuseo in bringing the use of social networks to cultural institutions. Chapter 18 reports the accomplishments of #digitalinvasions, a project that began with users' promotion of free knowledge⁴ via social media. Chapter 19 presents the ArcheoWiki project and the many activities that it comprises. This initiative reaches out users, institutions and policymakers to advocate for free knowledge and its dissemination to the public. In the last paper in this section, chapter 20, attention is given to the procedure adopted by the British School at Rome for the resolution of intellectual property right issues.

Having thus covered some of the various aspects of a digital epigraphy project, part IV, *Digital Approaches to Cross-disciplinary Studies of Inscriptions*, looks more directly at some digital epigraphy projects wherein interactions, methodologies and tools are exploited to bring research into this new era, despite skepticism and traditionalism. Among

⁴ Broadly intended as usable and freely accessible data about cultural heritage for machine and human readers.

these projects, special attention is given to the field of 3D modeling for archaeology (already seen in some of the previous contributions). This is the latest horizon of research interactions and thus deserves more careful scrutiny in the arch of our project. Chapter 21 introduces a project set on digitizing the Marmor Parium, thus bridging to the field of ancient Greek historiography. Chapter 22 problematizes a key point of the digital description of inscriptions: the need to harmonize the description of the text with the description of the text-bearing object (or monument). It presents a theoretical paradigm that throws light on many problems found also in other contributions to this volume. Chapter 23, presents activities and ideas behind the Inscriptions of Greek Cyrenaica project. It gives an example of how new methods bring new questions and approaches to the discipline of epigraphy, while keeping attention on long-term continuity in the needs of codification. Chapter 24 announces to the reader an initiative focusing on a very specific corpus of Latin epigraphic poetry from *Hispania* and *Gallia*. It exploits existing tools to bring forward ideas in full continuity with previous scholarship on the poems. Chapter 25 looks at the outcomes of an extremely accurate imaging project, presenting the results obtained for the datation of the inscriptions of Aquincum with deep paleographic analysis.

The final contributions are related to 3D projects and methodologies. Chapter 26 looks at basic low cost possibilities like the Structure From Motion technology, while chapter 27 gives an overview of the potential of models and data used with a specific open access toolkit in the context of the Open-Access Epigraphy project. The direct impact on modeling and imaging research is presented in chapter 28, which complements the results presented in chapter 7 by applying the findings of the Morphological Residual Model to epigraphically relevant questions about objects and texts.

Finally, the two last contributions look at projects from a multi-disciplinary perspective. The EPNet project, in chapter 29, presents one possible way in which rich structured data can be deployed to understand wider controversial issues for the study of the economy of the Roman Empire with an otherwise impossible scientific base. The section is then concluded on a pleasant note in chapter 30 wherein an inscription is translated into real music by the Terpandros ensemble and accompanied by a 3-D modeling of the instrument which would have accompanied the text.

A list of the challenging and vibrant panels [A] held during the conference in Paris can then be found after the papers, followed also by a list of the posters [B].⁵

Our hope is that gatherings such as the EAGLE2014 Conference will further promote dialogue between specialists in different fields. We are confident that these efforts will lead to many fruitful future collaborations.

The EAGLE2014 conference aims to become a place where institutions, industries, the European Commission and Europeana family projects in the areas of cultural heritage can find ample opportunity for networking, debating, sharing ideas as well as best practices.

As editors of the volume and organizers of the conference, it is our pleasure to express our gratitude to the dedicated program co-chairs, committee members and conference support staff who have contributed to making the EAGLE 2014 international conference a sold-out event.

Silvia Orlandi

Vittore Casarosa

Raffaella Santucci

Pietro Maria Liuzzo

⁵ These contributions can also be seen in the digital online exhibition of the posters and in the videos: www.eagle-network.eu/about/events/eagle2014/digital-poster-exhibition/

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Abbreviations

AE	L'Année épigraphique
AIJ	V. Hoffiller, B. Saria, Antike Inschriften aus Jugoslavien, Heft I: Noricum und Pannonia Superior. – Zagreb 1938.
AIO	Attic Inscriptions Online
BE	Bulletin Épigraphique, in REG, Paris 1888-.
CIDOC-CRM	International Committee for Documentation - Conceptual Reference Model
CIG	Corpus Inscriptionum Graecarum, I-IV, Berlin 1828-1877.
CIL	Corpus Inscriptionum Latinarum
EDB	Epigraphic Database Bari
EDH	Epigraphic Database Heidelberg
EDR	Epigraphic Database Roma
EDM	Europeana Data Model
ICVR	Inscriptiones Christianae Urbis Romae septimo saeculo antiquiores; ICVR nova series, voll. I-X, Roma – in civitate Vaticana 1922-1992.
IG	Inscriptiones Graecae
ILJug	A. and J. Šašel, Inscriptiones Latinae, quae in Jugoslavia inter annos MCMLX et MCMLXX repertae et editae sunt (Situla 19). Ljubljana 1978; <i>idem</i> , Inscriptiones Latinae, quae in Jugoslavia inter annos MCMII et MCMXL repertae et editae sunt (Situla 25). Ljubljana 1986.

ILSI 1	M. Lovenjak, <i>Inscriptiones Latinae Sloveniae 1. Neviodonum (Situla 37)</i> . – Ljubljana, 1998.
LIMC	<i>Lexicon Iconographicum Mythologiae Classicae</i>
LOD	Linked Open Data
lupa	UBI ERAT LUPA – Roman Stone Monuments (Service provider: CHC – Archäometrie und Cultural Heritage Computing, Universität Salzburg.
OA	Open Annotation
PHI	Searchable Greek Inscriptions, Packard Humanities Institute, Los Altos 1996.
PIR2 II	<i>Prosopographia Imperii Romani saec. I. II. III. Pars II</i> , ed. E. Groag, A. Stein, Berolini-Lipsiae 1936.
PIR2 V 2	<i>Prosopographia Imperii Romani saec. I. II. III. Pars V, fasciculus 2</i> , ed. L. Petersen, Berolini 1983.
RDF	Resource Description Framework
RINMS	M. Šašel Kos, <i>The Roman Inscriptions in the National Museum of Slovenia / Lapidarij Narodnega muzeja Slovenije (Situla 35)</i> . Ljubljana 1997.
SB	Preisigke, F. et al. (eds.), <i>Sammelbuch griechischer Urkunden aus Ägypten</i> , Strassburg-Wiesbaden 1915-.
SECir	Oliverio, G., Pugliese-Carratelli, G., Morelli, D., <i>Supplemento Epigrafico Cirenaico, Annuario della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente (ASAA)</i> , 39-40 (= n.s. 23-24), 1963, 219-375.
SEG	<i>Supplementum Epigraphicum Graecum</i> , Leiden 1923-1971, then Amsterdam 1979-.
SGDI	Bechtel, F., Baunack, J., et al., Collitz, H. (ed.), <i>Sammlung der griechischen Dialekt-Inschriften</i> , Göttingen 1884-1915.
SKOS	Simple Knowledge Organization System
URI	Unique Resource Identifier

PART I

EPIGRAPHIC DATA:
MODELS, VOCABULARIES AND INTERACTIONS

1. A Conceptual Model for Inscriptions

Harmonizing Digital Epigraphy Data Sources

Vittore Casarosa, Paolo Manghi, Andrea Mannocci, Eydel Rivero Ruiz, Franco Zoppi

Abstract

The TEI/EpiDoc encoding is considered the de facto standard in digital epigraphy as it enables a holistic digital description of an inscription and the semantic mark-up of its text, all of this in a flexible, machine-readable and exchangeable format. At the same time, an EpiDoc document consists of a monolithic, self-descriptive and self-standing information unit which hardly exposes an easy way for cross-linking different documents.

This drawback becomes particularly relevant when dealing with material of heterogeneous nature, collected from heterogeneous sources, as it happens in recent content aggregation projects aiming at the construction of a shared Information Space serving a federated community. This is exactly the case for the project EAGLE (Europeana network of Ancient Greek and Latin Epigraphy), whose main aim is to provide a single user-friendly portal to the inscriptions of the Ancient World, a massive resource for both the curious and the scholarly.

Modern search engines enable users to express a great variety of queries against heterogeneous material and provide a rich functionality for users to browse, explore and interlink the items found. To overcome the heterogeneity of the material collected by EAGLE from over 15 different Content Providers, a unifying conceptual model has been defined, and is presented in this paper.

The proposed conceptual model, which is based on a preliminary identification analysis based on the CIDOC-CRM ontology, consists of a few core entities which can: i) thoroughly express all the different facets of epigraphy-related content such as physical supports, texts, translations, images and other context-related information; ii) serve as the basis for the definition of a common metadata schema; iii) enable users to express sophisticated queries to accurately retrieve the material of interest.

Keywords

Epigraphy, EpiDoc, data model, metadata, portal service, search engine.

1.1. Introduction

The EpiDoc project [BODARD 2009] represents the most incisive innovation in the field of Epigraphy after the Leiden conventions were defined in 1932 [VAN GRONINGEN 1932], and it is considered the de facto standard in digital epigraphy. EpiDoc enables a holistic digital description of an inscription and the semantic mark-up of its text, all of this in a flexible, machine-readable and exchangeable format, satisfying many aspects of the requirements currently set by the Epigraphic community. At the same time, an EpiDoc file consists in a monolithic, self-descriptive and self-standing information unit. To make an analogy, an EpiDoc file is similar to a folder taken out from an archive. It is easy to make use of it as a whole, or to make searches within it, but it is not so easy to connect elements contained in the folder with elements contained in other folders of the archive or, even more difficult, with elements in other archives. Therefore, any “outer jump” leading to external information or evidence is left to the investigator’s intuition. Similarly, an epigraphy practitioner navigating in an EpiDoc file faces the same situation. In 2009 Bodard et al. claimed: “We see EpiDoc as a small first step on the road to truly digitally-enabled epigraphy scholarship, in which not only will it be possible more efficiently to answer questions, but in addition it will be possible to ask and answer new types of question, and even to discover new questions to ask.” [BODARD 2009].

However, the monolithic nature of EpiDoc becomes particularly evident when dealing with material of heterogeneous nature, collected from many different sources, as it happens in content aggregation projects such as EAGLE,¹ which is a Best Practice Network co-funded by the European Commission, under its Information and Communication Technologies Policy Support Programme. Its main aim is to bring together the most prominent European institutions and archives in the field of Classical Latin and Greek epigraphy, collecting inscriptions coming from 25 EU countries, with more than 1.5 M of images and related metadata, including translations of selected texts for the benefit of the general public. The collected material will serve two purposes: on one side it will be ingested to Europeana, providing a comprehensive collection of unique historical sources which constitute a veritable pillar of European culture (the collected material represent approximately

¹ <http://www.eagle-network.eu/>

80% of the total amount of inscriptions in the Mediterranean area). On the other side the collected material will be made available on the EAGLE portal to the epigraphers' community and to the general public, for queries and research. Two applications will be integrated into the portal, especially addressing the general public: a mobile application will enable tourists to get information about inscriptions they find in archaeological sites or in museums by sending their images to the EAGLE portal; a storytelling application will allow teachers and experts to assemble epigraphy-based narratives for the benefit of less experienced user.

Present search engines have accustomed users to express queries against heterogeneous material looking for a specific sets of entities, such as web pages, images, files, videos, etc., and enable the user to browse, drill-down and interlink the results found (e.g. search for an image and get all the web pages containing the same image or visually close images). Being able to transpose such functionality to the epigraphic world and being able to relate originally separate concepts and items will provide benefits both to the scholarly research and to the general public, which today are not so easy to achieve with the existing EpiDoc archives.

In this paper we present a conceptual model that starts with a preliminary identification of the main entities of interest in epigraphy, based on the CIDOC-CRM ontology [DOERR 2003]. In a second step a more concise conceptual model is defined, consisting in a few core entities which can adequately support: i) thoroughly expressing all the different facets of epigraphy-related content such as physical supports, texts, translations, images and other context information; ii) serve as the basis for the definition of a common metadata schema; and iii) enabling the user to express sophisticated queries to accurately retrieve the material of interest. This conceptual model is the basis for defining the EAGLE Common Metadata Model, unifying all the different data sets received from the EAGLE Content Providers, and underlying the query and search facilities provided by the EAGLE portal.

The remainder of this paper is organized as follows: in Section 2 we provide some additional considerations about mark-up languages and EpiDoc, in Section 3 we present the preliminary analysis based on the CIDOC-CRM ontology, in Section 4 we present the EAGLE conceptual model, in Section 5 we present its implementation based on the D-NET

open source software,² and finally, in Section 6 we provide some final considerations.

1.2. EpiDoc and modern epigraphy

At the beginning of last century, the creation of large corpora of (printed) inscriptions made clear to the epigraphist community the importance of having a consistent, agreed upon standard for representing, as faithfully as possible, not only the text (the characters) appearing on an inscription, but also how the text appeared on the original carrier (e.g. abbreviations, erasures, unreadable or missing characters) and possibly also the editor's interpretation. In 1931-32 the so called Leiden Convention was proposed [VAN GRONINGEN 1932], basically specifying how features of an inscription, besides the text itself, should be represented in print, and it quickly became the de-facto standard for representing the transcription of inscriptions.

The arrival of computers and the increased use of digital (digitized) material in the last 20 years have almost completely transformed the large body of inscription printed material (articles, books, corpora), into "textual databases", that should support present-day tools for searching and retrieving information. From this point of view the digitized Leiden notation has severe limitations, as it was conceived to represent graphically (in print) all the features of an inscription (e.g. underlined text to indicate text previously known but presently disappeared, or a dot underneath a letter to indicate a dubious interpretation) and those "graphical features" disappear when the information is stored in a data base, and need to be represented with "special characters" to indicate the beginning and the end of the graphical feature. Other special characters, like the round and square brackets, are already present in the Leiden notation, to convey information of a more conceptual nature, like the (guessed) expansion of abbreviations, or the (guessed) insertion of missing characters. Modern search engines are essentially based on character string matching, and all those "extraneous" characters interspersed in the text of the inscription make it difficult and clumsy the retrieval of the desired information.

The arrival of Internet and the Web has led to the re-discovery and common usage of the so called Mark-up Languages, i.e. the possibility

² <http://www.d-net.research-infrastructures.eu>

of defining opening and closing “tags” to be included in the data, providing additional information for the enclosed data. XML (eXtensible Mark-up Language) has become the de-facto standard for the exchange of information between computers, as it has the advantage of having a formal structure that can be understood (processed) by a computer program, and at the same time it can be easily defined (and understood) by a human.

At the end of the nineties, following a round table held in Rome, a manifesto from Prof. Panciera, recommending “the establishment of an online, free and unrestricted database of all surviving Greek and Latin epigraphical texts produced down to the end of Antiquity”, prompted the publication of a proposal (EpiDoc, already under study at the University of North Carolina at Chapel Hill) for the encoding of epigraphic material based on TEI. The Text Encoding Initiative (TEI) was a standard already widely used in the Digital Humanities community for XML annotation of manuscripts and old documents [BODARD 2008]. EpiDoc consists of a group of recommendations and tools that provide a way of encoding scholarly and educational editions of inscriptions based on a subset of TEI. A full EpiDoc document may contain, in addition to the text itself, information about the history of the inscription, a description of the text and its support, commentary, findspot and current locations, links to photographs, translations, etc.

Although EpiDoc is a powerful tool for the scholarly annotation of inscriptions, as we have already pointed out before, it does not lend itself to an easy search and navigation through big epigraphic data bases, with hundreds of thousands of inscriptions. For example, given an EpiDoc document that includes pointers to two images of the described inscription, it is not easy to find another EpiDoc document describing the same inscription, but providing pointers to different images, or to retrieve detailed information about those images, that usually are not included in the EpiDoc documents. Unfortunately, modern search engines (a la Google) have accustomed both the general public and the scholars to believe that with few simple queries it is possible to get not only the items of direct interest, but also (most of) the information that in one way or the other is related to them.

1.3. Analysis in CIDOC-CRM

Usually, epigraphic databases use different information models to best fulfil their needs and purposes. In the frame of the EAGLE project, in

order to try and provide a unified view, aimed at improving interoperability and exchange, a conceptual model of epigraphic entities was developed, based on CIDOC-CRM, to help describe in full detail common concepts and their relationships. CIDOC Conceptual Reference Model (CRM) provides a formal ontological model for describing the structure of Cultural Heritage objects and the relation between them, including event models for representing the life cycle of the objects.

1.3.1. High-Level view of the model

Epigraphic objects are represented as instances of the CIDOC concept *E84 Information Carrier* (in the following, CIDOC concepts and properties are in italics), which is a particular case of *man-made object* and provides the way for describing all the physical characteristics of monuments such as dimensions, materials, state of preservation and also for distinguishing the objects by names or any other identifiers.

If the monument bears an inscription of some kind, this can be represented through the use of an *E34_Inscription* object, which is related to its information carrier using property *P128_carries*.

Any other information related to the inscription (but not to the material object), such as transcription text, translation text, bibliography, critical apparatus, commentary and the different type of surrogates is represented by instances of *E31_Document*, related to the inscription by the property *P70_Documents*.

Fig. 1.1 summarizes this high level view of the conceptual model.

1.3.2. Low-Level expansion of the model

The many different concepts underlying the high-level model are divided in two different subgroups:

- Sub-model for physical characteristics of monuments and inscription, location, dating.
- Sub-model for documental information.

The second sub-model corresponds to the description of the characteristics of the textual information carried by the Physical Object.

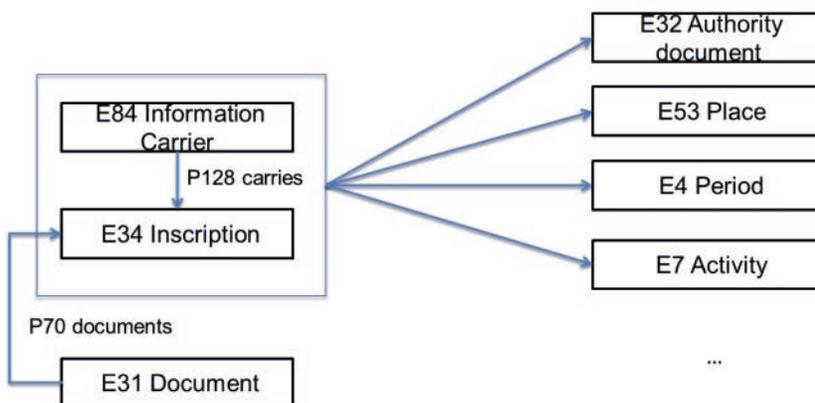


Fig. 1.1. Core Model

1.3.2.1. Sub-model for physical characteristics

Monuments are identified using **E42_Identifier** related via property **P1_is_identified_by**. In EAGLE, identifiers are usually the local identifiers assigned by the institution “owning” the object, qualified by the name of the institution, to avoid naming conflicts. Materials, dimensions, types and status of conservation are expressed by the concepts **E57_Material**, **E54_Dimension**, **E55_Type** and **E3_Condition State** respectively.

The life cycle of objects, including creation, finding and curation activities is represented using **E4_Period**, **E7_Activity** and its sub-concepts. Location of these events can be specified, when possible, using instances of **E53_Place**. Fig. 1.2 summarizes this sub-model.

1.3.2.2. Sub-model for Documental Information

CRM entity **E31_Document** is the way by which the CIDOC model allows the representation of non-physical elements that describe reality. It may be related with any CRM entity via property **P70 documents** and comprises several forms of expressing those descriptions about reality, such as texts, images, graphics, videos, including the special case of documentation databases. **E31_Document** is used in EAGLE for representing all the information not related to the physical characteristics of the information carrier object, which may include transcription text, translation text, images and graphics, bibliography, critical apparatus and commentary. Fig. 1.3 summarizes this sub-model.

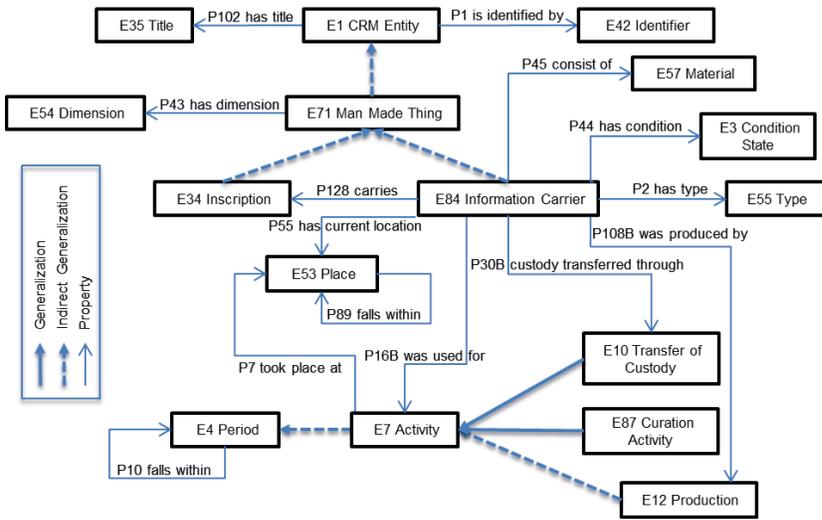


Fig. 1.2. Sub-model for physical characteristics, location, dating

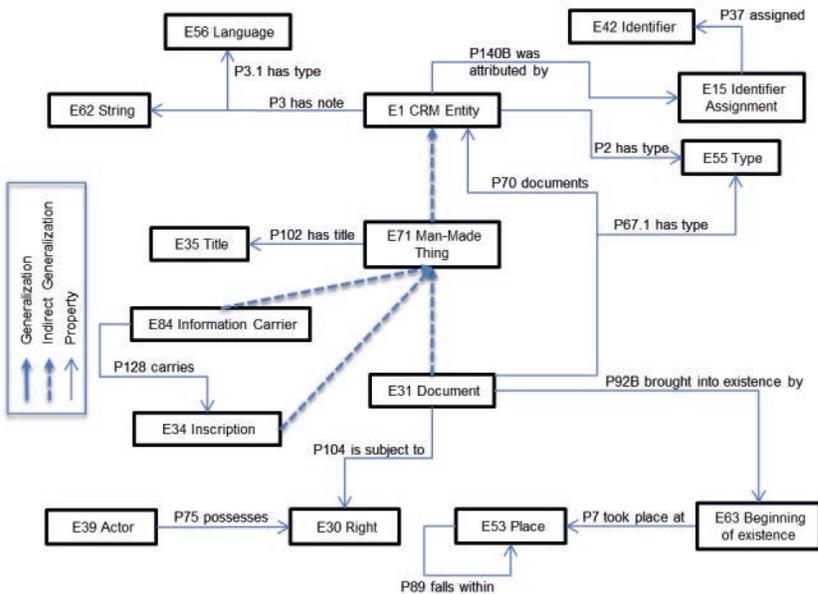


Fig. 1.3. Sub-model for documental information

1.4. The Aggregator Conceptual Model

1.4.1. Harmonizing Digital Epigraphy Data Sources

Since an EpiDoc file packs together several related (but distinct from an ontological perspective) entities, we have provided a preliminary analysis of the concepts and descriptive units conveyed through EpiDoc making use of the ontology defined by CIDOC-CRM [DOERR 2003].

Then, based on this analysis, we have derived a simple conceptual model able to map several inter-related entities which enables fine grained queries and exploration portal-wise.

1.4.2. Conceptual Model for the aggregation of heterogeneous epigraphic content

Very simply, the Epigraphy Aggregation Conceptual Model (EACM) consists of a root entity (the Main Object) from which four sub-entities can be derived, each one capturing some of the properties that have been identified thanks to the EpiDoc and CIDOC modelling efforts. The defined sub-entities are the following: *i) Artefact, ii) Inscription, iii) Visual manifestation, iv) Documental manifestation.*

All the information to be aggregated in EAGLE will find its place into one or multiple instances of the sub-entities mentioned above. In the following we briefly describe each entity, and provide a list of its main properties. It has to be noted that all of the concepts and properties here described have already been defined both in EpiDoc and in the CIDOC based conceptual model.

Fig. 1.4 shows a high-level view of the model, where solid lines represents a hierarchical relation between two entities, e.g. an Artefact (or any blue box) is a Main object, or a Translation/Transcription is a Documental manifestation. A dashed line instead represents a relationship between two entities where applied cardinalities can be expressed at the two ends of the line.

1.4.2.1. Main Object

The top entity in the conceptual model (the Main Object) is an abstract entity that in practice will be materialized into one or more instances of some or all of the sub-entities underlying it. These sub-entities share several common properties, namely a unique object identifier, source information, metadata editing/authoring information and intellectual property rights (IPR) of metadata, title and description.

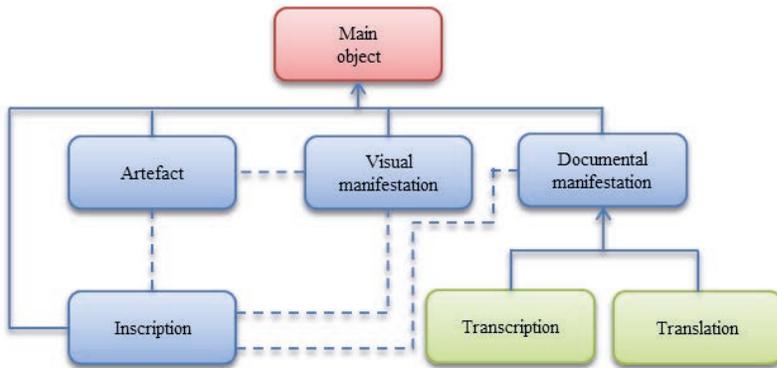


Fig. 1.4. Epigraphy Aggregation Conceptual Model

1.4.2.2. Artefact

The Artefact entity captures the physical nature of an object of study in the Epigraphic domain. From the analysis of properties identified in EpiDoc, we isolated a set of relevant properties such as the artefact type (i.e. the kind of monument), its material and dimensions, its decoration, the status of preservation and place of conservation, and relevant findspot and dating information.

In accordance with the CIDOC model, an Artefact can be related to one or more Visual manifestation (instances of images related to the artefact) and can be related to zero or more Inscription (instances of text regions possibly present on its surface).

1.4.2.3. Inscription

The Inscription entity is a collection of structured properties describing the textual and semantic nature of a text region possibly present on an artefact.

Common properties describing this concept consist in the inscription type, its engraving technique, the metric of the text, the sizes of the field and letters, its palaeographic characteristics, the author of the inscription, the honorand, the dedicator and other person names possibly cited, or referral to events.

Since an Inscription has both visual and textual characteristics, an Inscription instance can be put in relation with zero or one Artefact instance, zero or more Visual Manifestation instances, and zero or more

Documental manifestation instances (either Transcriptions or Translations or both).

1.4.2.4. Documental manifestation

The Documental manifestation entity contains all information related to the “textual nature” of an inscription. It has two sub-entities: the Transcription, which gathers the information related to the text of the inscription itself, and the Translation, which gathers the relevant properties of possible translations in modern languages of the (interpreted) text of the inscription.

Transcription

The Transcription entity describes the inscription text in its original (ancient) language. A Transcription is related to one and only one Inscription instance. Some of the main properties of a Transcription entity are (obviously) the transcription text, its critical apparatus, side commentaries and referenced bibliography.

Translation

The Translation entity captures all the aspects relevant to the translation of an ancient text. Some of the properties regarding a translation are the (modern) language used, the author(s) contributing to the translation, the text of the translation and possible annotations, its intellectual property right statement (IPR) and publishing information if available.

A Translation instance can be put in relation with one or more Inscription instances, of which it is a translation.

1.4.2.5. Visual manifestation

The Visual manifestation entity collects all the information related to the “visual nature” of a generic artefact, be it a stone, a monument, or an epigraphy-related object providing context to others epigraphic objects of interest. Visual manifestation instances can contain either born-digital material such as pictures from a digital camera, computer graphics, or digitized printed material, such as drawings, pictures, literature (e.g. CIL pages), or also digitized videos. .

The main properties of a Visual manifestation are the digital file, its location (URL, thumbnail), its general properties (e.g. dimensions, format, resolution, quality, etc.), and authoring information (e.g. author, date and copyright statement).

A Visual manifestation can be put in relation with zero or one Artefact instances (of which it is a picture) and zero or more Inscription instances.

1.5. The EAGLE implementation

1.5.1. Implementing Data Infrastructures

The increased usage of digital archives, which has taken place over the last twenty years in several communities, has stimulated the need for integrating and aggregating content from several different archives to make it available through a single access point. This tendency can be seen in several national initiatives (e.g., BASE,³ DAREnet,⁴ OAIster,⁵) and European projects (e.g., Europeana,⁶ Bricks,⁷ ScholNet,⁸ DILIGENT,⁹ D4Science,¹⁰ DRIVER,¹¹ OpenAIRE,¹² CLARIN,¹³ EFG,¹⁴ HOPE).¹⁵ In the last three Framework Programme calls, the European Union initiated the so called knowledge infrastructure vision, inspired by the same goal of unifying data resources of all kinds available in Europe. The idea was that of devising data infrastructures, which are environments through which several organizations can share, process, aggregate their data resources by adopting an economy of scale approach. Several technological solutions [MANGHI, MIKULICIC, CANDELA, ARTINI, et al. 2010] were devised in such projects, to offer functionality for collecting data from heterogeneous data sources (e.g. repository systems, archives, databases), curating such data to form a homogeneous Information Space, and offering customized portal services to operate over such space; e.g. search, inference of references between publications, citation calculation, etc.

³ <http://www.base-search.net>

⁴ <http://www.darenet.nl/>

⁵ <http://www.oaister.org>

⁶ <http://www.europeana.eu>

⁷ <http://www.brickscommunity.org/>

⁸ <ftp://ftp.cordis.europa.eu/pub/ist/docs/rn/scholnet.pdf>

⁹ <http://diligent.e3rcim.eu/>

¹⁰ <http://www.d4science.eu/>

¹¹ <http://www.driver-community.eu/>

¹² <http://www.openaire.eu/>

¹³ <http://www.clarin.eu/>

¹⁴ <http://www.europeanfilmgateway.eu/>

¹⁵ <http://www.peoplesheritage.eu>

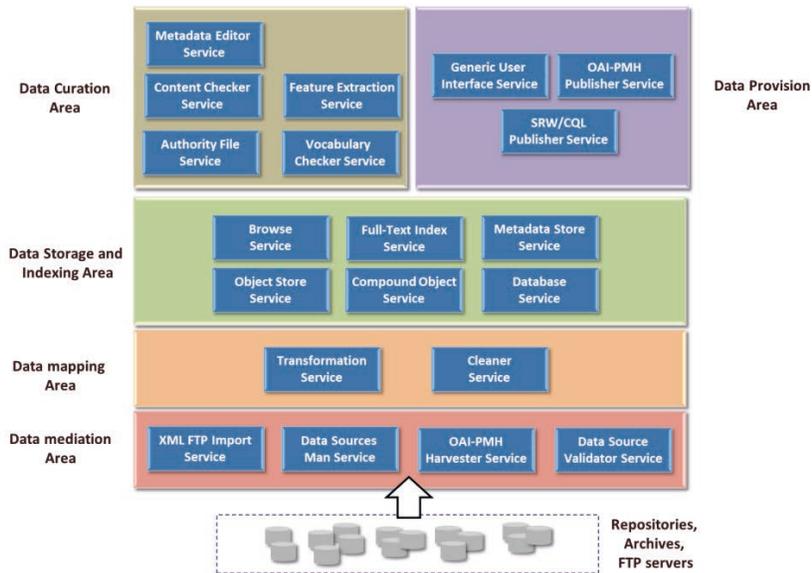


Fig. 1.5. D-NET service architecture

The D-NET software toolkit, resulting from the experience of ISTI-CNR through its participation in the OpenAIRE,¹⁶ DRIVER, DRIVER-II,¹⁷ and European projects, is an open source solution specifically devised for the construction and operation of customized data infrastructures. D-NET provides a service-oriented framework where data infrastructures can be constructed in a LEGO-like approach, by selecting and properly combining the required D-NET services [MANGHI, MIKULICIC, CANDELA, CASTELLI, et al. 2010]. The resulting infrastructures are customizable (e.g., transformation into common metadata formats can be configured to match community preferences), extensible (e.g. new services can be integrated, to offer functionality not yet supported by D-NET), and scalable (e.g., storage and index replicas can be maintained and deployed on remote nodes to tackle multiple concurrent accesses or very-large data size). D-NET¹⁸ offers a rich set of services [Fig. 1.5] targeting aspects such as data collection (mediation area), data mappings from formats to formats (mapping area), and

¹⁶ <http://www.openaire.eu/>

¹⁷ <http://www.driver-community.eu/>

¹⁸ <http://www.d-net.research-infrastructures.eu>

data access (provision area). Services can be customized and combined to meet the data workflow requirements of a target user community. As proven by the several installations and adoption in a number of European projects (DRIVER,¹⁹ OpenAIRE,²⁰ HOPE,²¹ EFG²²), D-NET represents an optimal and sustainable solution [MANGHI, BARDI, et al. 2014; MANGHI, ARTINI, et al. 2014] for the realization of the EAGLE infrastructure.

1.5.2. The EAGLE Infrastructure

The EAGLE infrastructure consists of the D-NET services shown in Fig. 1.5, appropriately combined to support the data ingestion workflow defined for the epigraphists' community. In particular, the services in the Data Mapping, Curation and Provision areas result from the project design activities. They were devised in order to meet the requirements of the EAGLE Content Providers, but engineered to support their functionalities when operating over arbitrary XML schemas.

1.5.2.1. Metadata Mapping Definition, Transformation, and Cleaning

Archives and their experts joining the EAGLE infrastructure are supported with a methodology that facilitates the definition of structural mappings from their archive schema onto the EAGLE common metadata schema and semantic mappings from their vocabularies onto the common vocabularies. A mapping consists in a set of rules, which serve as input to the infrastructure administrators to configure the services in the Data Mapping Area. Here, the Transformator Service and the Cleaner Service run programs which parse, validate and transform the source records into EAGLE records according to the defined rules.

The Transformator Service is responsible for the application of structural rules. Such rules define the correspondence among elements and attributes of the archive schema and elements and attributes of the EAGLE schema. Structural mapping is not as trivial as it may seem, due to the fact that input XML records are typically mapped onto several

¹⁹ <http://www.driver-community.eu/>

²⁰ <http://www.openaire.eu/>

²¹ <http://www.peoplesheritage.eu>

²² <http://www.europeanfilmgateway.eu/>

interrelated EAGLE records, representing different EAGLE data model entities.

The Cleaner Service is responsible for the application of semantic rules. Such rules identify an element of the archive schema and the corresponding element of the EAGLE schema (i.e., source element and target element of structural rules), and define the correspondence between the terms of the respective vocabularies.

1.5.2.2. Metadata quality control and enrichment

The D-NET software toolkit customisation for the EAGLE infrastructure includes the following services, constituting the D-NET Data Curation Area.

Content Checker. The Content Checker is a validation tool that allows low-level searching and browsing the pre-production Information Space in order to check if metadata records have been correctly harvested and mapped.

Vocabulary Checker. The Vocabulary Checker gives access to the metadata records that do not satisfy the constraints imposed by the common metadata schema and vocabularies after the transformation and cleaning phases. The Vocabulary Checker displays the number, the types and the positions of errors in the records of the Information Space. Thanks to the browse by error typology functionality, curators can decide if an error can be solved directly in the Information Space via the Metadata Editor Tool or in the original source archive.

Metadata Editor Tool. The Metadata Editor Tool (MET) is a cataloguing tool for the enrichment of the Information Space. It allows data curators to add, edit and delete metadata records in the Information Space, as well as to establish relationships between existing (authority) records, even if coming from different sources. The MET is aware of controlled vocabularies, hence supports data curators while editing controlled elements by proposing a drop down list with all and only the terms defined by the associated controlled vocabulary.

1.5.2.3. Metadata Publishing

The EAGLE implementation will be shortly accessible via a dedicated portal. Facilities like advanced metadata search and browse (by collection, provider, etc.) and search results filtering enhance the user experience in the phases of search and access. Moreover, D-NET offers

services to export metadata records through OAI-PMH, OAI-ORE, and SRW/CQL protocols. EAGLE will operate such services to automatically serve its information space to third-party consumers, above all the Europeana project²³, of which EAGLE is a direct feeder.

1.6. Conclusions

We have described the solution adopted in the EAGLE Best Practice Network to achieve a complete integration of different Ancient Greek and Latin Epigraphy archives, representing nearly the 80% of the existing assets in the area.

The solution is based on the creation of a conceptual model that has, at the same time, the power to preserve the metadata quality of the different archives' schema and the simplicity to enable simple mappings from all different archives. Metadata aggregation is based on the use of the D-NET open source software toolkit, a data infrastructure enabling software.

The need and rationale for moving from the TEI/EpiDoc encoding - the de facto standard in digital epigraphy - to the proposed conceptual model has been introduced and discussed.

²³ <http://www.europeana.eu>

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2. Improving Text-Based Search of Inscriptions

Michelangelo Ceci, Gianvito Pio, Anita Rocco

Abstract

In this paper we present the text-based search in EDB, a web-based system which allows users to query a database of inscriptions by Christians from Rome, between 3rd and 8th cent. In particular, we analyze the different available features, focusing on the method we adopt to improve results and on the basis of the identification of lemmas of terms, that also allow us to handle the presence of aberrant forms. Since this is a typical issue in the considered application domain, we aim at exploiting the proposed approach also in the context of other similar epigraphic databases.

Keywords

Epigraphic database, EDB, Late Antique Epigraphy, text-based search, Lemmatization, computational linguistic.

2.1. Introduction

The Epigraphic Database Bari (EDB) stores inscriptions by Christians from Rome, between 3rd and 8th cent. It also provides a web-based system to search for almost all the Greek and Latin inscriptions published in the corpus of the *Inscriptiones Christianae Urbis Romae, nova series* [ICVR]. However, the main goal is to include all the epigraphic documents commissioned by Christians, including those brought to light after the publication of ICVR volumes, in the context of the collaboration with the EU-Project “Europeana best practice network of Ancient Greek and Latin Epigraphy (EAGLE)”.

For each epigraphic document of this huge heritage, a rich set of data and metadata is (or is going to be) stored, about both the artifact/support (context, conservation, support, technique, reuse) and the

inscribed text (language, graphical and onomastic notes, figurative apparatus, function), whose transcription follows the Krummrey Panciera conventions for epigraphic editions [KRUMMREY et al. 1980, PANCIERA 1991].

In this paper we describe some basic and advanced features of the text-based search in EDB.¹ In particular, in Section 2.2 we briefly describe the syntax that can be used to obtain different results through the text-based search implemented in EDB. In Section 2.2 we briefly present the lemmatization-based method we adopt for the text-based search and to handle the presence of aberrant forms. Finally, some conclusions are drawn in Section 2.4.

2.2. Epigraphic text-based search in EDB

Similarly to currently available web search engines, EDB provides an advanced text-based system which allows users to obtain different results according to a predefined syntax. In the following, we report some simple use cases.

Exact word matching: user searches for a single “exact” word.

Input: “*quiescit*”. Output: all the records containing exactly the term *quiescit* (i.e. inscriptions containing *requiescit*, *conquiescit*, etc. are not returned)

Partial word matching: user searches for a single word, also partially composing other terms.

Input: *quiescit*. Output: all the records containing the term *quiescit* or other terms partially composed by the text *quiescit*, such as *requiescit*, *conquiescit*.

Input: *vix*. Output: all the records containing the term *vix* or other terms partially composed by the text *vix*, such as *vixit*, *vixerunt*, *convixi*, *convixit*, *convixerunt*, etc.

Exact phrase matching: user searches for an exact sequence of words.

Input: “*quiescit in pace*”. Output: all the records containing exactly the sequence of words *quiescit in pace*.

¹ edb.uniba.it/search/quick

Partial phrase matching: research several word not in sequence

Input: *benemerenti pace quiescit*. Output: all the records containing, in sequence or not, the terms *benemerenti* (or *benemerentibus*, etc), *pace* and *quiescit* (or *requiescit* etc.).

Input: "*benemerenti*" "*quiescit*". Output: all the records containing, in sequence or not, exactly the terms *benemerenti* and *quiescit*.

Input: "*benemerenti*" *quiescit*. Output: all the records containing, in sequence or not, exactly the term *benemerenti* and the term *quiescit* (or *requiescit* etc.)

Input: "*in somno pacis*" *quiescit*. Output: all the records containing, in sequence or not, exactly the sequence in *somno pacis* and the term *quiescit* (or *requiescit*, etc.).

Moreover, it is possible to select whether to consider epigraphic diacritical marks, Greek accents and spirits as well as capital letters. The text-based search can also be combined with other metadata, such as bibliographic data, context, conservation, support, technique, function, reuse, language, dating, etc. This wide range of possibilities helps users to easily retrieve and access the desired inscriptions and has been designed to accomplish different users' needs. For example, an occasional user looking for data about a specific inscription that is in front of him, can just type one or more words he is able to read in order to search for possible matching inscriptions in the database. On the other hand, scholars can use the system to retrieve details about inscriptions they are studying and, by exploiting the phrase matching, can identify all the epitaphs containing the so-called "formulas", i.e. recurrent expressions that are useful, for example, for dating purposes.

Search results are reported in a table showing EDB ID, ICVR number, bibliography, pertinence location, conservation location, the text of the inscription and a link to the details of each inscription. Results can be sorted according to each column.

2.3. Exploiting lemmatization to improve text-based search

The peculiarities of the Latin and Greek languages of the transcriptions have made necessary to develop an advanced method to perform text-based search. The stored epigraphic documents are mainly part of

the epigraphic documentation of Late Antiquity and provide a source of noteworthy importance for the study of the history of Greek and Latin language in this period. In Late Antiquity, language underwent a gradual transformation and was enriched with forms and expressions of common use. The early Christian community was characterized by its heterogeneous composition as "creative minority", in which groups of different social and cultural backgrounds lived together with a large number of "peregrini" from Greece and the Orient. For this reason, the inscriptions by Christians are precious sources of knowledge about languages, even more than written texts, which, by their nature, were subject to a purification process of the language, adapting to the literary register [MOHRMANN 1961].

However, the epigraphic production by Christians, although in many cases made outside of lapidary workshops, was conditioned by the strict rules of the genre code and by the funerary practice of the community. Epitaphs, responding to an individual need related to the death, could be considered an ideal mirror of all the linguistic phenomena, created and established within the various social groups. On the other hand, they had to adapt to the "normalization" and to the "codification" as funerary inscriptions [DI STEFANO MANZELLA et al. 1997, ZILLIACUS et al. 1963].

Moreover, the possibility that something initially appearing as an important linguistic phenomenon could actually be just spelling mistakes or oversights of the executor must not be ignored. Indeed, such mistakes are often present in transcriptions, due to precarious conditions in which some inscriptions were made, under unsuitable conditions and using makeshift equipments.

In order to face with such issue, which is specific and peculiar of Late Antique inscriptions, since the beginning of EDB project, the so-called "aberrant" forms have not been "normalized" to the "classical" model, if they are grapho-phonetic outcomes of linguistic modifications of both Latin and Greek. If the compiler recognizes that they are outcomes of misstatements and material mistakes of the stonecutters, he transcribes them with the appropriate corrections, following the Krummrey - Panciera conventions.

This choice, which highlights the evolution of Greek and Latin language in Rome in Late Antiquity and the historicity of the original document, does not guarantee an immediate comprehension of the

text, for those that are not familiar with late Latin and Greek, and complicates the search on the basis of the terms. On the contrary, texts with many corrections, as it happens in other epigraphic databases, are difficult to read even for specialists (Fig. 2.1).

A. R.

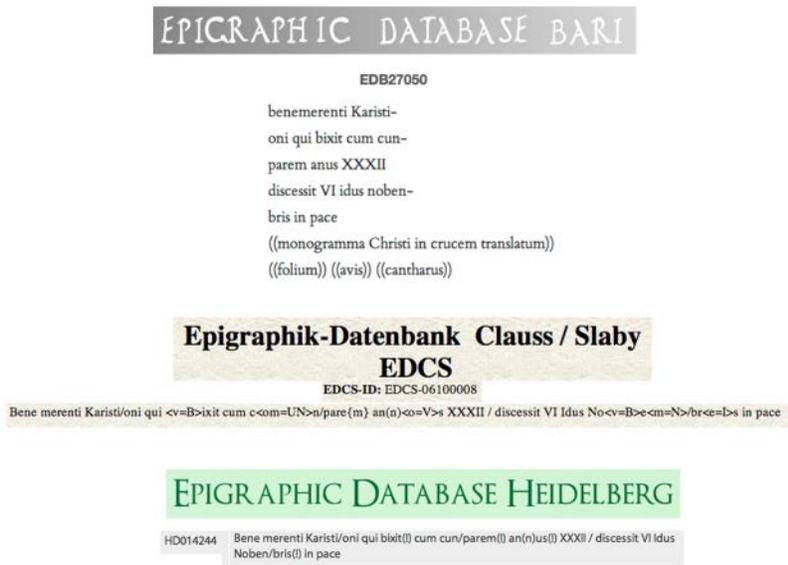


Fig. 2.1. Examples of different transcriptions of the same inscription [AE 1992, 0150], stored in three epigraphic databases [EDB, EDCS, EDH].

It is noteworthy that a standard query system is not able to match a query with all the inscriptions containing different spellings of a word. For example, if a transcription contains the word *cesquet* and the user's query contains the word *quiescit*, the system will not retrieve such inscription, since, in this case, there is no match. To face with this issue we store each inscription in its original form and in a "lemmatized" form, where each term is actually replaced with its corresponding lemma, possibly by taking into account its inflexed forms (Fig. 2.2).

The transformation process consists of the following steps:

- extraction of the list of all the terms from the collection of stored inscriptions;

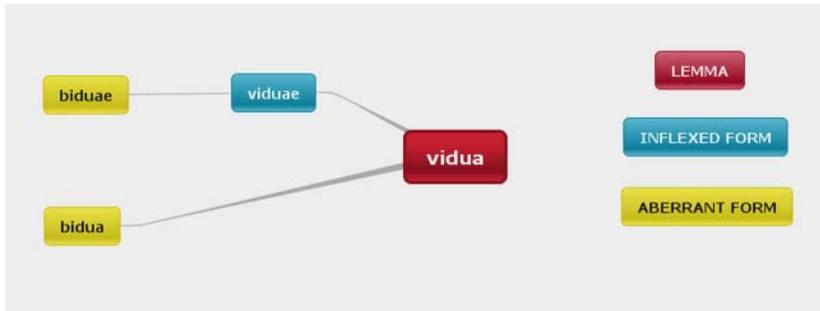


Fig. 2.2. An example of a transformation of aberrant forms (yellow boxes) to the inflexed form (blue box) and, finally, to the lemma (red box).

- identification of the lemma of each term, by adopting an existing tool (<http://www.ilc.cnr.it/lemlat/>). When the tool fails to identify the correct lemma, it is manually specified by experts;
- automatic replacing of each term with the corresponding lemma in all the stored transcriptions.

When a new inscription is stored, such steps are executed only for its transcription. If there are some new terms that are still not indexed, their lemmas are (automatically or, if necessary, manually) extracted and a lemmatized version of the transcription is stored. In this way, matching between terms and lemmas is built incrementally when not-indexed terms appear in a new inscription.

The user's query follows the same procedure. In particular, all the query terms are replaced with their corresponding lemmas and the transformed query is compared to the lemmatized version of the transcriptions. In this way, matching is actually performed between lemmas, instead of between terms. The only limitation is that, at query time, only already indexed terms can be lemmatized. Currently, this feature is still under development and counts more than 30.000 indexed terms (noun, pronoun, verb, adverb, adjective, verbs, adjectives, proper nouns of people or places, etc.) comprehensive of all the related variants attested in epigraphic documentation.

This feature, which is actually under development in EDB, extends the spectrum of the possible use of the database and opens its adoption to philologists and linguists.

G. P. and M. C.

2.4. Conclusions and Future Work

In this paper we briefly described the text-based search implemented in EDB and reported some details about a lemmatization method which allows us to improve EDB query system. For future work, we intend to exploit the list of indexed terms to automatically identify possible misspellings and/or currently unknown aberrant forms, when a new inscription is stored in the database.

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3. From the LIMC Vocabulary to LOD

Current and Expected Uses of the Multilingual Thesaurus *TheA*

Anne-Violaine Szabados

Abstract

The multilingual thesaurus *TheA* (*Thésaurus-Antiquité*), by the French team of the LIMC, is dedicated to classical mythology and monuments. Vocabularies now regarded as a key component in semantic web provide new opportunities to increase data interoperability. Although considered and used as a tool closely related to the online LIMC-France resources, *TheA* is in a process of transfer into a SKOS- and ISO25964-compliant online application allowing access to its content and alignments with reference thesauri. *TheA* or some of its components could be used in the Linked Data and in processes to improve data quality.

Keywords

Thesaurus, iconography, mythology, multilingualism, interoperability, semantic web, Linked Open Data.

3.1. Introduction

Over the years the controlled vocabulary of the French team of the LIMC has evolved into a multilingual and SKOS-compliant thesaurus, *TheA*, dedicated to classical mythology, iconography and monuments. Although considered and used as a tool closely related to the online LIMC-France¹ databases and resources, *TheA* is in a process of transfer into an online application based on the principles of both SKOS and the more recent standard ISO 25964. The project aims at allowing access to its content and aligning the terms with well-established and reference thesauri. This implies a survey of practices and a study of online and open reference thesauri in order to select the most relevant

¹ <http://www.limc-france.fr/>

ones and suitable approaches. The rapid developments of practices and data processing in the fields of knowledge management and semantic web techniques provide new opportunities to increase efficiency in processing research and technical information. Thesauri and vocabularies are now regarded as key components of the semantic web and the Linked Open Data. Some of the topics covered by *TheA*, such as ancient periods, geospatial data, mythological themes and characters might evolve when transferred and be used in processes to improve data quality in the near future.

3.2. Why the need for a controlled vocabulary?

The controlled vocabulary of the LIMC, *TheA* (*Thésaurus-Antiquité*), has been developing since 1981 along with the database of the French team of the *International Foundation for the LIMC*.² The French component of the LIMC was established in 1972 within the CNRS (UMR7041 ArScAn, équipe ESPRI-LIMC).³ The iconography of classical mythology is its main field of research.

In order to publish the *Lexicon Iconographicum Mythologiae Classicae* [LIMC 1981–2009], the French team has studied over the years many ancient objects and monuments bearing a mythological or religious representation. Most of these monuments are located in museums or on archaeological sites in France or in other countries⁴. Destroyed or lost monuments mentioned in Greek and Latin ancient texts or provided by old sources, such as a 19th century drawing, are also taken into account.

An easy access to this huge documentation was needed. The arrival of micro-computing in the beginning of the Eighties allowed the French team to create its database in 1981. The paper-based study cards were converted into database records. In this very first version of the database each record already dealt with an ancient monument and its figured decoration. At that time, both small storage capacity of hard disks and software constraints entailed writing texts as short as possible and using abbreviations. This led to the development of several authority lists for the relevant and searchable data fields : object type (Fig. 3.1), material, artistic domain / technique, cultural area,

² <http://www.limcnet.org/>

³ <http://www.mae.u-paris10.fr/arscan/-ArScAn-Lexicon-Iconographicum-.html>

⁴ Mainly in Roman Africa, Central and Eastern Europe, Near- and Middle-East.

mythological character (Tab. 3.1). Another key benefit was and is the expected use of this pre-coordinated controlled vocabulary of preferred terms for better indexing and retrieval.

This remains true, since the fields in *LIMC-France* are still controlled to encourage the proper use of terms. *TheA* also makes the advanced search (with autocomplete) more user-friendly for the Internet users and multilingual.

terms	abbreviations	related art fields
EMPREINTE (seul ou en complément)	EMPREINTE	NU, GL
ENCLOS	ENCLOS	RE
ENDUIT A RELIEF	ER	RE
ENDUIT A RELIEF, FRISE	ER, FRISE	RE
ENDUIT A RELIEF, LUNETTE	ER, LUNETTE	RE
ENDUIT A RELIEF, VOUTE	ER, VOUTE	RE
EPEE	EPEE	AR
EPICHESIS	EPICHESIS	CP
EPINETRON	EPINETRON	CP, VR
EPINGLE	EPINGLE	BX/RB, BX/GR
ESTAMPILLE (seul ou en complément)	ESTAMPILLE	NU
EXALEIPTRON (voir aussi KOTHON)	EXALEIPTRON	CP
FEUILLE (voir aussi LAMELLE)	FEUILLE	GR

Fig. 3.1. Extract from the list Object type of the first vocabulary (violet : "hierarchy" ; yellow and green : kinds of scope notes)

3.3. From a controlled vocabulary to a standards-compliant thesaurus

3.3.1. SKOS-compliant

This first vocabulary has formed the basis on which *TheA* has been developed. *TheA* became a multilingual thesaurus in 1998 and has evolved over time in connection with advances in computing and the development of standards for data processing. New components – subdivisions – have been added (Tab. 3.2) : artists, places, periods of time, iconographic keywords and themes, mythological characters' names published in the *Lexicon* [LIMC 1981–2009].⁵ The thesaurus has been translated in partnership with other teams of the *International Foundation for the LIMC* and foreign colleagues. It is now available in

⁵ Tab.3.1 and Tab.3.2 don't reflect the current structure of the application (backend). The actual numbers of entries (terms) are approximately : 26 artistic fields, 200 cultural areas, 700 iconographic keywords, 90 materials, 2500 names, 3000 article-LIMC, 250 object types, 450 periods, 7500 places.

nine languages (Arabic, English, French, German, Greek, Hungarian, Italian, Russian, Spanish).

Components of the controlled vocabulary	Use in the Database/Website
object types	ancient object
materials	ancient object
artistic domains / technique	ancient object
cultural areas	production of the object
mythological characters' names (general list <i>Name</i>)	iconography beared by the object

Tab. 3.1. Components of the first controlled vocabulary of the French LIMC team and their use in the LIMC-France databases

Components added in 1998 in <i>TheA</i>	Use in the Database/website
artists/ workshops	ancient object
places	previous and current locations of the object
periods of time	creation, production of the object
iconographic keywords & themes	iconography beared by the object
mythological characters' names from the <i>Lexicon (Article-LIMC)</i>	iconography and references to the <i>LIMC</i>

Tab. 3.2. Components of *TheA* added in 1998 and their use in the LIMC-France databases

At the beginning of the process of translation it was obvious that the values must express concepts instead of terms.⁶ During this preparatory phase leading up to the first online release of the LIMC-France resources, semantic relations were added to make the search even more precise and get better matching results [LINANT DE BELLEFONDS et al. 2006, pp. 33-36]. The French team has ensured that *TheA* complies with the general principles of thesaurus (broader/narrower terms, synonyms...) and the SKOS⁷ recommendations (concept ; preferred, alternative and hidden labels ; unique identifier for each concept...)⁸ [MILES et al. 2009; DALBIN 2008, pp. 138-141; VATANT 2008, pp. 183-185; ISAAC 2012, pp. 96-98; VAN HOOLAND et al. 2014, 112f. and 129f.].

⁶ Cf. Svenonius 2000 quoted in VAN HOOLAND et al. 2014, p. 129.

⁷ <http://www.w3.org/2004/02/skos/>

⁸ The development of *TheA* has been carried out by A.-V. Szabados.

3.3.2. Some principles of *TheA*

Given that the LIMC covers a broad spectrum of concepts related to ancient documents – that is to say of all kinds of artefacts, materials, techniques and art fields in wide spatial and temporal coverages – a strict and reducing approach has been adopted : not too many selected concepts and authorised labels. The search for a balance has always influenced the level of granularity. The queries are improved with the addition of hierarchical and associative semantic relations : in *TheA* many concepts are semantically related to each other in hierarchies and association networks.

The following example shows a part of the hierarchy of the preferred iconographic keywords.

vase (bt)⁹
 alabastron (nt)
 aryballos (nt)
 amphora (nt)
 bowl (nt) ...

The different types of amphoras (amphora A ; neck-amphora...), for instance, are to precise to be selected for this specific use. It is the same with “amphora” as an *object type* because unlike the *Pottery database* of the Beazley Archive¹⁰ ancient vases are just one of many sorts of monuments studied in *LIMC-France*.

The associative semantic relations include hidden synonyms and different variations or spellings (Tab. 3.3).

The hierarchical semantic relations (broader / narrower terms) are deliberately kept as close as possible to standard and usual meanings, in a sense, close to a general dictionary definitions.

animal (bt) > *bird* (nt) *bird* (bt) > *eagle* (nt)

No attempt is made to express a peculiar ancient cultural meaning within the semantic relations (“an *eagle* is one of *Zeus’ attribute*”). This approach aims at preventing semantic distortions in query results (“an *eagle* is always a *Zeus’ attribute*”). For example, a non-mythological eagle

⁹ bt : broader term. nt : narrower term. rt : related term.

¹⁰ <http://www.beazley.ox.ac.uk/pottery/>

preferred label (English)	variation (rt)	type of variation	subdivision
thunderbolt	lightning	synonym	iconography
Ulysses	Odysseus <i>Odysseus / Ulixes / Uthuze</i>	variant term <i>LIMC version</i>	mythological name
Annaba	Hippo Regius <i>Hippone Bône</i>	ancient place name <i>old place names</i>	place

Tab. 3.3. Some examples of associative semantic relations in *TheA*

on a Corinthian aryballos;¹¹ an eagle as Jupiter's attribute on a roman cameo;¹² Jupiter in the shape of an eagle on a jewel.¹³ Similarly, the use of an object is only expressed by its name (*oenochoe* is not included in a "vase for wine" group) because ancient objects can have several uses, such as funeral uses. A few labels are more precise¹⁴.

stele (bt)

decree stele (nt)

grave stele (nt)

votive stele (nt)

Thus the concepts listed in *TheA* can be used in contexts other than the digital resources of the LIMC or classical mythology and iconography.

3.3.3. Envisaged improvements

TheA is not seen as perfect. The vocabulary is still in progress and its translations too. Continuing adjustments are made, particularly as regards the Greek and Latin labels. The LIMC-France website addresses not only researchers but also a wider audience (general public). Some

¹¹ BnF, Monnaies, médailles et antiques De Ridder.113 : <http://medaillesetantiques.bnf.fr/ark:/12148/c33gbzztq>

¹² Bnf Camée.5 : <http://medaillesetantiques.bnf.fr/ark:/12148/c33gb1cq62>

¹³ BnF inv. 56.200 : <http://medaillesetantiques.bnf.fr/ark:/12148/c33gbhb6q>

¹⁴ The narrower labels gathering several meanings (type of object [other than Greek vases] + function) are often underused by the contributors. The general term is often overused.

of the Internet users might not know which one of the ancient terms – Greek or Latin – to choose ... and sometimes the contributors too.

The “Venus de Milo” [title of the English wikipedia article (2014.07.20 : http://en.wikipedia.org/wiki/Venus_de_Milo)] is an *Aphrodite* from Milos.

In the searchable list of mythological names *Aphrodite*, *Venus* and the Etruscan *Turan* are aggregated.

As regards the iconographic keywords, it has been our experience that it is often better to prefer the use of the modern word (*lionskin* vs. *leonte*). Many of the ancient terms of the keywords components are hidden but searchable in the keyword field of the LIMC-France resources dedicated to ancient figured monuments, *LIMC-icon*.¹⁵ Of course a few specific ancient words such as *lagobolon*, *pedum* or *thyrsos* are selected as preferred labels.

Several other issues should be explored. One of them is the granularity of the list of mythological characters’ names. That’s the field of expertise of the LIMC and the very long general list of names (*Name*) includes homonyms. For instance, there is only one name “Thaleia” in *Name* but six “Thaleia” are known and listed among the mythological names drawn from the *Lexicon* (Article-LIMC):¹⁶ “Thaleia I” ; “Thaleia II”, ..., “Thaleia VI”.

Article-LIMC is potentially a link between the mythological characters’ names and the articles – and consequently the catalogues of figured objects – published in the *Lexicon* [LIMC 1981–2009]. Linking *Name* with *Article-LIMC* could provide a first step towards a solution for disambiguation and a better granularity, a step to further build a network of resources associated with the LIMC data (Fig. 3.2).¹⁷ The associations between these two components of *TheA* can be made

¹⁵ In *LIMC-icon*, the ancient terms are preferred to the modern ones in the description of the figured representation beared by the monument. This field is also searchable (full-text).

¹⁶ In *TheA* there are two subdivisions dedicated to mythological characters’ names: the one used in the keyword field, and the list of articles published in the LIMC (Article-LIMC = name of a mythological character).

¹⁷ The pelike of the MAC-Empúries collection (inv.1494) has been studied again in June 2014 by the French team and Spanish researchers : ΘΑΛΕΙΑ is probably not a maenad and should not be published in LIMC s.v. Thaleia IV. This is an example of an updated study posted on LIMC-France. The way this information can be reused in the LOD might be interesting.

within the thesaurus. Nevertheless they don't deal with the same concepts (character's name / part of a publication) and their linkage must be carefully considered. The connections between the mythological characters, their names, their figured representations and their documentations (*Lexicon...*) could be based on the principles of the Linked Data [BERNERS-LEE 2006; BERNERS-LEE 2014; ALLEMANG et al. 2011; HEATH et al. 2011; BERMÈS et al. 2012; ISAAC 2012; CALDERAN et al. 2012; VAN HOOLAND et al. 2014, p. 134] and linked through the LOD.

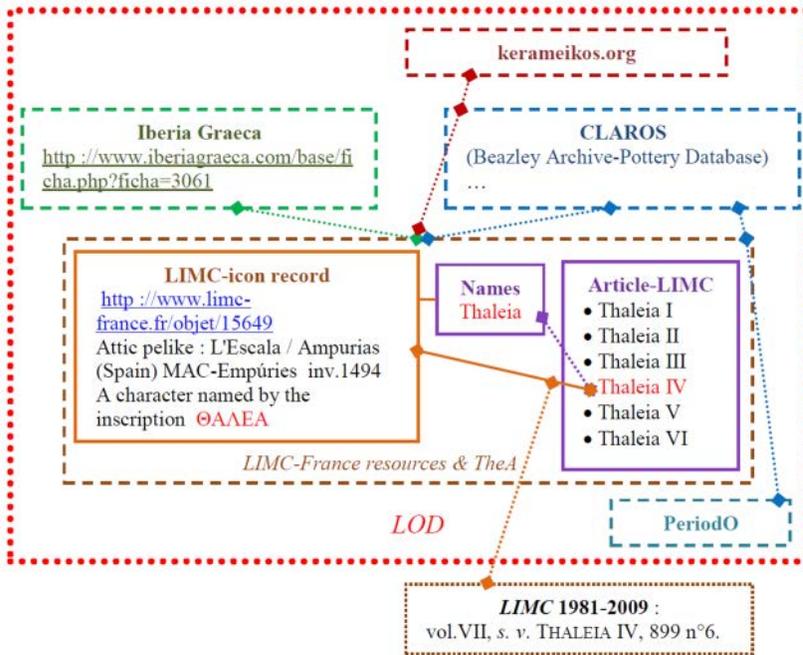


Fig. 3.2. Some possible links within LIMC-France and the LOD

3.4. ISO 25964 -compliant

The current application is not suitable or ergonomic enough for the achievement of some of these improvements.¹⁸ In addition, although it is online and collaborative it doesn't allow an open access to the

¹⁸ For ex. The extractions of metadata from the current application into RDF is not «native» but need a specific routine (a routine exists for the CLAROS project). Others improvements should be made at the same time : each record has a unique and stable URL but PIDs like ark or doi are wished for the LIMC-France resources.

content of *TheA*. In order to give an open access the thesaurus should be transferred into another online collaborative application.

Two free opensource corporate softwares for the management of vocabularies have caught our attention¹⁹ and are potentially suitable. Both are compliant with SKOS and the recent ISO25964-1 and -2 (*Information and documentation – Thesauri and interoperability with other vocabularies*)²⁰ [MILES et al. 2009; ISAAC et al. n.d.; ISAAC et al. 2013] :

- GINCO (Ministère de la Culture et de la Communication/MCC)²¹ [FRANCART 2013]
- OpenTheso²² (CNRS. Test version of the ISO25964-compliant version available in Summer 2014)²³

The French team has always maintained some form of experimentation in the management of its data and is more and more involved in projects dealing with or based on the Semantic Web and the Linked Data. The LIMC-France digital resources – or some parts of them – are now used as study cases in working groups and projects such as “Modélisation, référentiels et culture numérique” of the Cluster of Excellence (LabEx) “*Pasts in the Present*”.²⁴ *TheA* plays a pivotal role in a project aiming at putting on the LOD a part of the LIMC-France digital resources (ancient collections of the Cabinet des Médailles et Antiques, BnF).²⁵ These involvements actively support the evolution and improvements of the thesaurus.

Alignments and thesaurus to thesaurus alignment should be considered. Open Data too. Most of the components of *TheA* should be available online as Linked Open Data. Tools such as *GINCO* and *OpenTheso* – compatible with SKOS and ISO 25964 – allow it. Furthermore, they

¹⁹ <http://archeonum.hypotheses.org/255>

²⁰ ISO 25964-1:2011 and ISO 25964-2:2013. www.niso.org/schemas/iso25964/

²¹ <http://www.culturecommunication.gouv.fr/Ressources/HADOC/Referentiels2/Les-vocabulaires-scientifiques-et-techniques/L-application-GINCO>

²² <http://www.frantiq.fr/thesaurus-pactols/logiciels-opentheso>

²³ The phase of test for *TheA* should occur as soon as the updated version is released (Summer or Fall 2014).

²⁴ <http://passes-present.eu/fr/les-projets-de-recherche/rerelations-au-passe/modelisation-referentiels-et-culture-numerique#.U9LIKaL1veo>

²⁵ http://passes-present.eu/en/themes-research/active-knowledge-past/digitized-collections-bnfs-department-medals#.U_Ng_WMuc3U

facilitate alignments with reference thesauri for the benefit of both the LIMC-France and the Cultural Heritage digital resources [ISAAC 2012, 99f. BERMÈS et al. 2012, pp. 82-83; ZYSMAN et al. 2012].

ISO 25964-2:2013 “gives recommendations for the establishment and maintenance of mappings between multiple thesauri, or between thesauri and other types of vocabularies”²⁶

A big issue is the choice of thesauri to be aligned with.

- Should we select a few reference thesauri?
- Should we consider some reference thesauri as “meta-thesauri”?
 - MCC Vocabularies?²⁷
 - PACTOLS?²⁸
 - Getty Vocabularies AAT/ULAN/ TGN?²⁹
 - SENESCHAL?³⁰
 - Iconclass?³¹
 - ...
- Does *TheA* include specific topics worthy of mapping and alignments?
 - mythological characters’ names?
 - iconographic keywords?
 - artists and workshops’ names?
 - ...

²⁶ http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=53658

²⁷ <http://data.culture.fr/thesaurus/>

²⁸ TRD FRANTIQU-MOM-CNRS. <http://frantiq.mom.fr/thesaurus-pactols>

²⁹ <http://www.getty.edu/research/tools/vocabularies/lod/>

³⁰ <http://www.heritagedata.org/blog/about-heritage-data/seneschal/>

³¹ <http://www.iconclass.org/>

3.5. Linked Data : opening new ways

3.5.1. Multilingualism

The website *LIMC-France*, is available in several languages but only a part of the data comprising the data sets is translated. The translated data of the records “object” (ancient monuments) is drawn from *TheA*. The thesaurus is, therefore, used for entering data, indexing, searching and translating.

Multilingualism is an asset, but it can also be a burden because new terms should be translated by specialists to reach a satisfactorily high quality.³² The process of alignments with reference thesauri gives the opportunity to check and assess the concepts, the labels and their translations.

The recent proofs of concept, *HDA Lab* (Histoire des Arts), *Muséosphère* (previously *Muséophile*) and *JocondeLab*, three experiments by the Ministère de la Culture et de la Communication (MCC), open a new path towards a way of addressing multilingualism : translated terms are drawn from *Wikipedia* via *DBpedia*³³ [GROUAS 2013]. The experiments are partly based on the fact that the titles of Wikipedia articles are available in many languages and checked by the international Wikipedia community: they could almost be regarded as standard labels for concepts. The process is perhaps imperfect, but it deserves special attention.

3.5.2. Gazetteer

The component *Lieu* (place) of *TheA* is a specific one, a way of managing the polysemy and the variants of place names. Its first and main purposes are the identification of places and the disambiguation of their names : many places located in North Africa, Near- and Middle-East have an Arabic name or several variants and spellings (Tab. 3.3: *Annaba*); some places have the same name. One of the easier means to identify a place is to associate it with its region or country. Spatial coordinates identify too. *Lieu* has thus evolved over the years into a gazetteer.

³² A reviewing and updating of the translations has begun in June 2014 with Arabic. German in July-August 2014. Russian in Fall 2014.

³³ <http://wiki.dbpedia.org/Publications>

The places in *TheA* are the current and previous locations of ancient artefacts and monuments studied by the LIMC team: museums, collections, archaeological sites, place of discovery and excavations³⁴.

The hierarchical relations are: countries > regions (> and other administrative subdivisions) > towns and ancient sites (or > ancient sites) > buildings.

The associative relations are: different spellings or variations, geospatial coordinates (latitude ; longitude) and some identifiers of reference gazetteer such as the TGN Getty.

When *Lieu* started (2000) many relevant places were not taken into account by the TGN³⁵ and Geonames was not yet really suitable. Furthermore, the information allowing the identification of a place is sometimes – or often – available only while the ancient object is studied (*in situ*, in its current location or in publications). Relating a place name with its country and geospatial coordinates (if available) within the thesaurus and *Lieu* was and still is an easy solution. Nevertheless these data might be associated with other gazetteers or projects if the content of *Lieu* is posted on line and open³⁶. For this reason, *Lieu* is going to be transferred with *TheA* in the new online application.

It would also be interesting to connect the LIMC-France resources with data representing geometries/polygons [CRIPPS et al. 2014] that express ancient places (regions, cities, buildings). Linked Open Data should bring solutions. Aligning some of the *TheA* ancient and historic regions or countries with geometries would also better query and display the ancient monuments with webmapping tools (for ex : a bronze found in “*Latium*”).

³⁴ The documentation studied leads to the fact that modern locations are more populated in LIMC-icon than the find places and consequently modern places more than ancient sites.

³⁵ For ex. many little towns in “Ex-Yougoslavia” : Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Slovenia, and Serbia; find places in North Africa...

³⁶ For ex. linkage with Geonames (<http://www.geonames.org/>) and the TGN through the Linked Data. LIMC-France (and its data) is not directly associated with the Pleiades gazetteer and the Pelagios project (<http://pleiades.stoa.org/docs/using-our-data/pelagios>) – using Linked Open Data approach – but is involved in the CLAROS project (<http://www.clarosnet.org/>), a Pelagios partner. Contributing to Pelagios would be facilitated by the current work on LIMC-France in the Linked Data (extractions of metadata into RDF).

3.5.3. Periods and other experiments

Experiments based on Linked Open Data and cross-referencing between data drawn from SPARQL endpoints open new ways. For example, the *Periods, Organized (PeriodO)*³⁷ project aims at "... the creation of a gazetteer not of agreed-upon, centralized, and abstracted period concepts, but of the individual *assertions* made by authoritative scholarly sources about the temporal and spatial boundaries of periods in particular contexts" [RABINOWITZ et al. 2014], "a way to provide it in a bottom-up Linked Data gazetteer of period assertions – that is, a set of stable references for what authorities say about periods, rather than a thesaurus that seeks to impose consensus about what periods are" [RABINOWITZ 2014].

Associating the LIMC-France data (linkage between monuments, dating and location) and *TheA* with such a project could lead to test and improve the quality of both the LIMC-France online resources and the component of *TheA* dedicated to time (Periods links labels with *terminus ante quem/ terminus post quem*). Dating of ancient images and monuments in the LIMC often derives from scholarly assumptions. Dating and geospatial information obtained from archaeological excavations or linked with epigraphic evidence might provide an even more accurate set of data.

Experimental data processing and cross-referencing between data drawn from Linked Open Data could be applied to other difficult key issues such as cultural areas and art styles.

3.6. Conclusion

This paper gives the opportunity to describe the development of *TheA* from its creation to the present time and to present some of its specificities and future changes. Both the thesaurus *TheA* and the LIMC-France resources would benefit from Linked Data and Linked Open Data. These approaches and the practices they imply, such as alignment processes, should improve the quality of its content. The fact that this thesaurus is a tool very closely related to a long-lasting research program allows the use of the data as study cases. The study of the interactions between *TheA* and the LIMC-France data – or other online resources and thesauri – might reflect the adequations or the inadequations of

³⁷ <http://perio.do/>

the past choices (concepts, group of concepts, modeling...). The most interesting value of lifting the *TheA* or LIMC-France data in the LOD lays in the possible connections of complementary knowledge. Some component of *TheA* might be useful for the academic, research and cultural heritage communities both for experimental data processing and as scholarly resources.

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4. Between Harmonization and Peculiarities of Scientific Domains

Digitizing the epigraphic heritage of pre-Islamic Arabia in the project DASI

Alessandra Avanzini, Annamaria De Santis, Daniele Marotta, Irene Rossi

Abstract

DASI is an ERC-Advanced Grant project aimed at digitizing the pre-Islamic inscriptions from Arabia and fostering best practices for the digitization of the epigraphic heritage related to Semitic languages. This paper describes the content model, the standards chosen, and exemplifies the vocabularies in view of a possible harmonization of data pertaining to the specific domain. The architecture of the system and the tools for encoding and retrieving textual content are also illustrated.

Keywords

Digital epigraphy, pre-Islamic Arabia, vocabularies, text encoding, epigraphic standard.

4.1. Studying the epigraphic heritage of ancient Arabia: overview of the project DASI

From the late 2nd millennium BC until the advent of Islam, the huge territory designated as Arabia was a country of literate civilizations, which are known almost exclusively by their enormous epigraphic heritage in different languages and scripts.¹ However, Arabian studies is yet a very young field. Epigraphic material of pre-Islamic Arabia is only relatively studied and is often difficult to interpret. Furthermore, this cultural wealth today is hardly accessible, due to the complicated socio-political situation of some regions of the Peninsula.

¹ For an overview of the topic, see ROBIN 1991 and MACDONALD 2000.

The five-year project DASI – Digital Archive for the study of pre-Islamic Arabian inscriptions² has been funded by the European Research Council with the objective of getting the whole corpus of ancient Arabian inscriptions inventoried and digitized. At the third year of the project, nearly 7000 Ancient South Arabian inscriptions are accessible for fruition on the web, plus a number of inscriptions in the Aramaic and Ancient North Arabian languages,³ which are available thanks to the cooperation with UMR 8167-Orient & Méditerranée of the CNRS-Paris and the project OCIANA – Online *Corpus of Inscriptions of Ancient North Arabia of the University of Oxford*.⁴

The second objective of the project is to enhance Arabian studies by means of the edition of the material on the web, scientific publications and dissemination, in order to achieve a better overall perception and knowledge of the civilizations of pre-Islamic Arabia and stimulate the protection of their cultural heritage.

The third objective of DASI is to foster methodologies and getting a common understanding of best practices and procedures for the digitalization and preservation of the epigraphic heritage, with a special attention to the specificities of the pre-Islamic Arabian cultures and Semitic languages.

4.2. Describing inscriptions

DASI is the development of the project CSAI – *Corpus of South Arabian Inscriptions*, which had been set up in 2001 by the same research group of the University of Pisa. CSAI was a pioneering attempt to publish the entire Ancient South Arabian (hereafter ASA) epigraphic corpus in digital form.⁵ The digital edition of the inscriptions consisted of XML files, each one grouping the inscriptions belonging to one ASA

² The project, under the directorship of Prof. Alessandra Avanzini of the University of Pisa and with the collaboration of the Scuola Normale Superiore di Pisa for the technical part, was funded within the Seventh Framework Programme “Ideas”, Specific Programme “ERC – Advanced Grant”, Grant Agreement n° 269774. <http://www.dasiproject.eu>

³ DASI – *Digital Archive for the Study of pre-Islamic Arabian Inscriptions*. <http://dasi.humnet.unipi.it>

⁴ <http://krc2.orient.ox.ac.uk/aalc/index.php/en/news/286-the-safaitic-database-online-sdo>

⁵ The project is described in AVANZINI et al. 2000; see also AVANZINI 2008 for the editorial criteria.

sub-corpus. The description model focused on the text, whose editorial interventions and onomastic features were marked.

The clearly text-oriented model of CSAI has undergone changes over time. The digitization of inscriptions preserved in museums and the adoption of the holistic interpretation method, led to the enhancement of the description of the physical support in order to wholly appreciate the interdependency between the inscription and the objects carrying the text, which are often artistically valuable.⁶

4.2.1. A hybrid system for uniform data retrieving

The new approach of DASI is a compromise between the two models applied by most of the projects related to digital archiving and publication of epigraphs:⁷ the database approach and the XML approach. Whereas the latter – experimented in CSAI – had some limitations,⁸ DASI is a hybrid system combining both the technologies for archiving and displaying data. It consists of three main components: a relational database, a data entry and a front end.

The database stores not only metadata, but also text encoded in XML format according to the EpiDoc standard⁹, being the data entry provided with an editing module specifically developed to encode pre-Islamic Arabian inscriptions.¹⁰ In this way, the texts of the inscriptions are still “fully queryable and manipulable” [CAYLESS et al. 2009, p. 26].

On the other hand, the entire content of the database is extracted in XML by a web service, called XMLManager, in order to construct the dynamic sections of the front end. In particular, the text of the inscriptions is indexed by using a customization of the library Berkeley

⁶ The adoption of a multidisciplinary method of study – that includes the linguistic, the philological, the archaeological and the art-historical perspectives as well – was enhanced thanks to the funding of related projects such as CASIS and MENCARAWAR, which focused on the direct examination and documentation of the inscriptions preserved in the museums involved.

⁷ See BABEU 2011 for a worldwide overview of single projects relating to digital epigraphy.

⁸ Namely, those relating to the management of multiple users providing data via web and of highly structured data (description of supports, origin of objects, etc.).

⁹ EpiDoc: Epigraphic Documents in TEI XML. <http://sourceforge.net/p/epidoc/wiki/Home/>

¹⁰ The advantages of a database and its web-based data entry system are well known: ease in data insertion via web browsers; use of controlled vocabularies that ensure uniformity of data; data sharing among a large number of users; integrity of data, due to different levels of authorization.

DB XML in order to perform complex full-text queries, such as textual variants, word ranges etc. (see 4.3.2).¹¹ The XMLManager, properly implemented, allows to meet another requirement of the digital publication of inscriptions[CAYLESS et al. 2009, p. 30]: the possibility to export the archived content according to different XML standards (e.g. EpiDoc). Scholars are thus enabled to access raw data and add their own interpretive and editorials interventions.

4.2.2. The data structure

The database has been designed on the basis of a conceptual model which conveys the complexity of epigraphs and takes into account the multiple disciplines involved in their study.

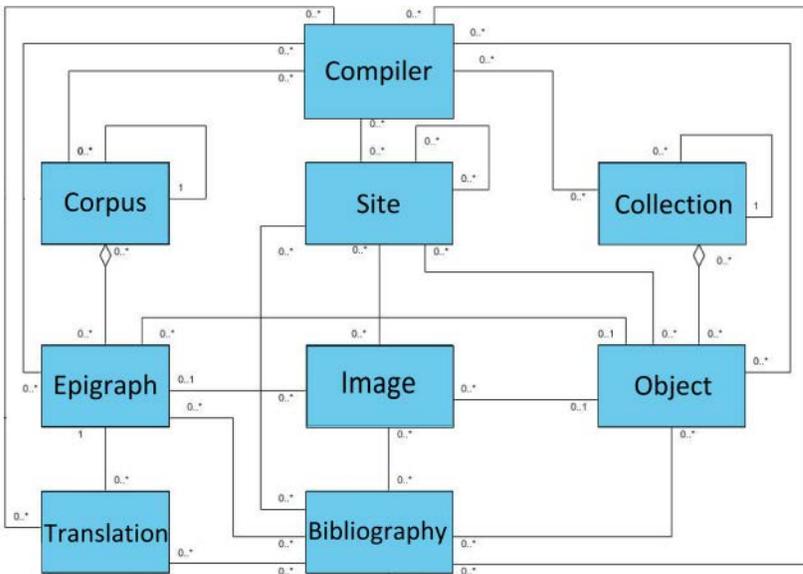


Fig. 4.1. The conceptual model of DASI. The diagram summarizes the entities that represent several aspects of the inscriptions and their relations.

The diagram summarizes the entities that represent several aspects of the inscriptions and their relations.

¹¹ Further web services allow users, registered to the system, to get documents in downloadable and printable formats (presently PDF and RTF) and access a version of the front end with more features for archiving and editing.

The dual nature of inscribed artefacts, as material objects carrying inscriptions and textual information carried by objects, is represented by two separate but strictly related entities: “Epigraph” and “Object” (Fig. 4.1). Each item digitized in DASI is represented by a physical object linked to one or more epigraphs, each one provided with its own images and bibliography.¹² As for the “Epigraph”, the model allows to overcome the limitations of the paper editions, still partly present in some projects of digital publishing based only on databases.¹³ The focus on the text, that already characterized CSAI, has been strengthened by the enhancement of the searches performed on the texts and a forthcoming lexicon of some South Arabian languages (see 4.4). Moreover the attributes of the entity “Epigraph” provide information on linguistic features, writing, chronology and type of text; in addition to the notes of apparatus, there are general and cultural notes.

Information about an object is not embedded in the attributes of the “Epigraph”, but has its own autonomy, while maintaining close ties with that of the inscription. Indeed, the entity “Object” includes attributes regarding: type of support, materials and dimensions, provenance and archaeological context, and the detailed description of its decorative elements.

In order to highlight the complexity of inscriptions, contextual entities are considered. For instance the entity “Site” has been connected with the entity “Object”. DASI supplies not only the information needed to contextualize artefacts, such as provenance or place of production, but also ancient and modern toponyms, geographical coordinates, country, region, ancient kingdom, archaeological information about the sites, such as monuments, history of studies, archaeological missions and so on.

Finally, the entity “Image” is linked both to “Epigraph” and “Object”: this double relation gives the opportunity to provide a suitable

¹² The data model of DASI lends itself to be represented by the CIDOC CRM conceptual model (<http://www.cidoc-crm.org/>) in view of a possible encoding in computational semantic, while preserving the advantages of the EpiDoc description. The benefits of this approach in terms of ontologies and *linked open data* are well exemplified in DOERR et al. 2010 and ÁLVAREZ et al. 2011.

¹³ BODARD 2008, p. 2: “The objects on which the texts are inscribed, the stelae, statues, wall panels, tablets, and grave monuments, are studied by archaeologists and art historians for whom the written texts are little more than a footnote, if not an inconvenience. This fact has tended to keep inscriptions in an academic limbo – not quite literary text and not quite archaeological object”. See also BABEU 2011, pp. 97-98.

visual documentation for both the object as a whole and the portions where the inscription is placed. This allows to perform the functions of “scale” and “media” [BODARD 2008] and provides more precise information (e.g. several inscriptions on a single support).

4.2.3. Transcription and encoding

The benefits of XML encoding of texts have led to the spread of EpiDoc within the scientific community [ROUECHÉ 2009]. This spread will be further increased if easy-to-use tools are offered to epigraphists. This is the reason why DASI has developed a tool that allows to obtain an EpiDoc text without learning XML.

An XML editor has thus been integrated into the data entry (Fig. 4.2). It does not handle a generic XML, but a set of EpiDoc elements to represent specific phenomena, according to the scientific needs of the project DASI. The encoding is transparent to the user, who is not bound to learn XML syntax and work directly on the code, but only uses menus and buttons to enter the Latin transliteration (UTF-8 set) and the phenomena to be highlighted.

The encoded phenomena are:

- structural phenomena (line breaks and in-word line breaks);
- phenomena concerning the relationship between text and support (broken support, turn of side);
- onomastics (names of individuals and social groups, toponyms, etc.);
- textual portions (signature, eponyms, etc.);
- transcription phenomena (ambiguous and lost characters, lacunae, text omitted);
- symbols (word divider, paraph);
- editorial interventions (restored text, superfluous characters, corrections);
- grammatical phenomena (grammatical analysis of the words).

The development of the editor faced some problems related to the creation of valid and well-formed XML documents. The editor prevents users from entering elements in positions not allowed by the EpiDoc schema and not considered within the project.

The editor verifies that tags are rightly nested in order to avoid overlapping. In this regard, *fragmentation* is the solution [MARINELLI et al. 2008] used by DASI: in case two elements overlap, the last element which was inserted, is divided into several fragments; each of these fragments is provided with an identifier and related with the others through linking attributes. This rule has been adopted because it is not predictable which information level will be encoded first. For example:

```
<supplied> inserted after <persName>
  ⑆<supplied reason="lost" xml:id="e8" next="e9">r </supplied>
  <persName type="gender" subtype="m"><supplied reason="lost"
  xml:id="e9" prev="e8"> ⑆r</supplied>⑆m</persName>
```

```
<persName> inserted after <supplied>
  ⑆<supplied reason="lost">r
  <persName type="gender" subtype="m" xml:id="e3" next="e4">
  ⑆r</persName></supplied><persName type="gender"
  subtype="m" xml:id="e4" prev="e3">⑆m</persName>
```

Even though the EpiDoc guidelines suggest to use the Leiden conventions¹⁴, DASI only partly matches them. In fact, being the Leiden conventions focused on Greek and Latin sources, they are not always suitable to represent the same phenomena in pre-Islamic Arabian texts. For example, they represent the unclear text with a dot under the individual characters; in the transliteration of Semitic texts this would create ambiguity, because the dot is used as a diacritical mark to transcribe some phonemes typical of the Semitic languages (e.g. the dental emphatic phoneme, represented by the South Arabian letter ⲁ , is transcribed with the letter d). Presently this is not a limitation, since the encoding is carried out with XML elements in the digital edition.

¹⁴ General Introduction To The EpiDoc Guidelines. <http://www.stoa.org/epidoc/gl/latest/intro-intro.html>

Fig. 4.2. The textual editor of DASI data entry. Transcription and encoding of an inscription, with application of onomastic tags.

4.2.4. Vocabularies

Several metadata elements are provided through vocabulary fields. The elements requiring lists of controlled terms are related both to the textual aspect and content and to the material object.

A survey of current terminologies intended for description of both epigraphic and artistic objects has been carried out while building specific DASI lists. The “Writing technique” vocabulary, aimed at classifying only the method used to produce the texts, and the “Object material” vocabulary, including only the most common materials, could refer already existing terminologies.¹⁵ As regards the other elements, the

¹⁵ Respectively the EAGLE Vocabulary – Writing (<http://www.eagle-network.eu/voc/writing/index.php>) and the EAGLE Vocabulary – Material (<http://www.eagle-network.eu/voc/material/>). The vocabularies of the EAGLE consortium are among the authority lists and controlled vocabularies suggested by EpiDoc. Moreover, the epigraphic domain, the multilingual and alternative terms and the poli-hierarchical design are the reasons of this choice. The overview of the EAGLE vocabularies is taken from the project deliverable EVANGELISTI et al. 2014.

taxonomies and the tradition of Arabian studies do not allow to totally adhere to existing vocabularies and thesauri, as illustrated below, and have led to the creation of independent vocabularies.

4.2.4.1. Language

The classification of the ancient languages of the Arabian peninsula is one of the still debated topics among scholars of the ancient Near East. Even though general linguistic taxonomies including languages treated in DASI are already available,¹⁶ they do not allow to point out the linguistic peculiarities that the epigraphic sample of DASI shows, depending on the chronological and geographical distribution.

About the Ancient South Arabian¹⁷, the third level of the vocabulary (Tab. 4.1) has been added in order to represent further sub-divisions within the corpora corresponding to the linguistic varieties of the chief languages.¹⁸

In addition to the ASA languages, DASI includes epigraphic materials belonging to the Ancient North Arabian, the Aramaic and the Old Arabic linguistic groups. Similarly to ASA, discrepancies in the distinction between languages and varieties led to implement the independent vocabulary according to the classification of the experts in that linguistic domain.

¹⁶ 2009. Multitree: A digital library of language relationships (<http://multitree.org/>). Ypsilanti, MI: Institute for Language Information and Technology (LINGUIST List), Eastern Michigan University: useful thesaurus providing for each language the ISO 693-3 code, alternative labels, definition, hierarchical relations and bibliography.

¹⁷ Being the authors part of the “Corpus of South Arabian Inscriptions” research group, this paper refers mainly to the ancient South Arabian culture, which developed at the southern edge of Arabia (today’s Yemen) in the late 2nd millennium BC. A monumental and a minuscule alphabets were used to inscribe public and private texts in four different languages (Sabaic, Minaic, Qatabanic, Hadramitic), for a total of around 12,000 inscriptions known to date.

¹⁸ The Minaic inscriptions, for instance, are divided into Central Minaic inscriptions – coming from the motherland of the kingdom of Maʿīn – and the Marginal Minaic inscriptions – found outside southern Arabia. The Marginal Minaic differs from Central Minaic in terms of grammar, lexicon and formulas. The Sabaic documentation has been divided mainly on the chronological basis: the texts until the 4th century BC pertain to Early Sabaic; those testifying for the last two centuries of South Arabian history (4th-6th AD) are Late Sabaic; from the 4th-3rd century BC to the 4th AD, the inscriptions from the Sabaean homeland are considered Central Middle Sabaic, those from the high plateau south of Sana have been grouped as Southern Middle Sabaic and those originating from some areas of the northern regions of Yemen are labelled Northern Middle Sabaic. The peculiar traits of the Ancient South Arabian languages are described in STEIN 2011; see also AVANZINI 2004 for Qatabanic, PRIOLETTA 2013 for Hadramitic, and ROSSI 2014 for Minaic.

Group	Language	Variety
	<i>Hadramitic</i>	
	<i>Minaic</i>	<i>Central Minaic</i>
		<i>Marginal Minaic</i>
		<i>Undefined Minaic</i>
	<i>Qatabanic</i>	<i>Central Qatabanic</i>
Ancient South Arabian		<i>Marginal Qatabanic</i>
		<i>Awsanite</i>
		<i>Undefined Qatabanic</i>
	<i>Sabaic</i>	<i>Early Sabaic</i>
		<i>Central Middle Sabaic</i>
		<i>Southern Middle Sabaic</i>
		<i>Northern Middle Sabaic</i>
		<i>Late Sabaic</i>
		<i>Undefined Sabaic</i>
	<i>Undefined South Arabian language</i>	<i>Ancient Arabian</i>

Tab. 4.1. «Language» vocabulary. Selection of items from the vocabulary of DASI showing the addition of the level related to the varieties of the ASA languages.

4.2.4.2. Textual typology

This vocabulary is aimed at organizing inscriptions based on the typology of their texts. The categories it is made by, refer to fixed textual models attested in the inscriptions. These models were defined taking into account the formulary pattern, that is composed of [AVANZINI 2008, pp. 152-153; STEIN 2010b, pp. 264-269]:

- constituent parts: lexicon items (in particular the main verb) and morpho-syntactic features;
- their linear lay-out.

As in the previous vocabulary, the comparison with the existing ones¹⁹ has pointed out that some of the entries have exact matches, others are just related to some terms²⁰, and the remaining ones have no match at all (Tab. 4.2), since the textual typologies reflect the particular use that every civilization makes of writing.²¹

DASI entry	Definition	Match
Construction text	<i>text posted on public or private structures, reminding who constructed or restored them (eventually in order to indicate their possession); the text typically includes verbs meaning “build”, “found” (bny, hḥdt)</i>	Bauinschrift
Dedicatory text	<i>dedication of an object or a person to the divinity for different purposes, the text including the verb “dedicate” (hḡny, sʕlʕ)</i>	RT Weihinschrift
Writing exercise	<i>text related to scribal practice (copies of sample texts, lists of grammatical forms, etc.)</i>	
Ritual text	<i>text reminding religious rituals</i>	

Tab. 4.2. «Textual typology» vocabulary. The selected terms exemplify the results of the comparison between the DASI vocabulary and existing vocabularies used in the epigraphic domain synthesized by EAGLE – Type of Inscription.

4.2.4.3. Support type

The list of controlled terms referring to the physical supports of inscriptions includes a sort of classification of the ancient Arabian material

¹⁹ EAGLE Vocabulary – Type of inscription. <http://www.eagle-network.eu/voc/typeins/>

²⁰ This kind of relation occurs, for instance, when the preferred label and the scope note of a term explicitly refer to the Greek and Roman specimen, as expected, due to the domain of the network.

²¹ The minuscule inscriptions on wooden sticks offer a unique insight of the private uses of writing in ancient South Arabia. The rich typology of those texts deduced by STEIN 2010a is a clear example of the complex classification of pre-Islamic Arabian inscriptions based on content.

culture. It has been created on the basis of the repertoires focused on individual classes of artefacts and the early attempts at systematizing the history of pre-Islamic Arabian art.²² Thus, as knowledge of the latter advances, the vocabulary is still in progress.

²² See, as examples, the works by ANTONINI 2001, ʿALĪ ʿAQĪL et al. 2007, ANTONINI DE MAIGRET 2012, respectively about the stone statues, the bronze artefacts and the history of art in general, and the catalogues of the exhibition on the ancient Yemen, traveling in Europe between 1997 and 2002 (see e.g. SIMPSON 2002).

DASI Term	Sub-term	Definition	Match
Incense burner	<i>circular</i>	<i>objects used to burn aromatic substances, with circular shape</i>	AAT: incense burner [ID: 300198817]
	<i>squared</i>	<i>the censer has a squared shape, sometimes placed on four angular legs</i>	
	<i>with truncated pyramidal base</i> <i>with splayed foot</i>	<i>characterized by a censer placed on a base of truncated pyramidal shape</i> <i>short cylindrical censer on a splayed foot</i>	
Stela	<i>aniconic stela</i>	<i>typical of the Qatabanian area, they are constituted by an inscribed base supporting an upper and plain slab. The top can be either convex or concave</i>	AAT: stelae [ID: 300007023] EAGLE: Stele (http://www.eagle-network.eu/voc/objtyp/lod/250)
	<i>with eyes or stylized face</i>	<i>particular and homogeneous group from the Ja'of area and few samples from Qataban, representing eyes or a schematic facial outline</i>	
	<i>with figure in relief</i> <i>with narrative scene</i>	<i>isolated human or animal figures, usually realized in high relief</i> <i>decorated by narrative scenes, usually composed by multiple elements depicted in low relief</i>	

– continued on next page

Table 4.3 – continued from previous page

DASI Term	Sub-term	Definition	Match
	<i>with framework</i>	<i>refined by a decorated framework in low-relief with abstract-figurative elements or with geometric motifs, associated in various and different combinations</i>	

Tab. 4.3. «Support type» vocabulary. Sample from the vocabulary illustrating the degree of correspondence between the list of terms of DASI and the EAGLE – Object Type vocabulary, focused on supports of inscriptions, and the Getty AAT, which is instead a general thesaurus for artistic objects.

Presently, it results to be compatible with the Getty – AAT and the EAGLE – Object Type vocabulary²³ for artefacts whose identification is strictly related to the inscriptions they carry. However DASI includes further terms intended to represent the peculiarities of the ASA art.²⁴

4.2.4.4. Decoration

In spite of its title, the “Decoration” vocabulary does not include the decorative motifs surrounding the inscriptions only. Due to the importance and complexity of the representations, resembling sometimes proper figurative scenes, the vocabulary has been implemented so as to enable the description also of figurative subjects and iconographies.

The standard classification systems already available,²⁵ being focused on the western visual culture, presently does not consider some of the figurative subjects distinguishing the ASA artefacts. Among them, the symbols are commonly found in ancient Near East context as well: used to express a concept in a synthetic and striking way, they could be part of the decoration but are closely linked to the inscription too. Their description is of great importance, since their study and interpretation is still at the beginning.²⁶

²³ The Getty Research Institute – Art & Architecture Thesaurus Online (<http://www.getty.edu/research/tools/vocabularies/aat/>); EAGLE Vocabulary – Object Type <http://www.eagle-network.eu/voc/objtyp>

²⁴ For instance the term “stela” has been split into five entries referring to as many types of stela: the “aniconic stela”, the stela “with eyes or stylized face”, “with figure in relief”, “with narrative scene” and “with framework”, whose different physical characteristics correspond to different dating, zones of provenance/creation and functions.

²⁵ IconClass (<http://www.iconclass.nl/>) is the most suitable among the standard classification systems for subjects in visual works: through hierarchical paths and queues of keys it allows to identify single elements and the context and the significance of scenes.

²⁶ As an example, the so-called “Totschläger”, a sort of curved stick, is attested in contexts related to the main Sabaeen god Almaqah; the simultaneous analysis of its representations, the text and the figurative subjects could light up the nature of this relation. See: GROHMANN 1914 and GAJDA 2012 for issues about ASA symbols; BLACK et al. 1992 for an overview of the ancient Near East figurative subject and the above mentioned ANTONINI DE MAIGRET 2012 dedicated to ASA art.

DASI Entry	Iconclass notation	EAGLE term
Recumbent antelope	25F24(ANTELOPE)(+534) <i>hoofed animals: antelope (+ squatting, crouching animal)</i>	
Head of antelope	25F24(ANTELOPE)(+33) <i>hoofed animals: antelope (+ head of an animal)</i>	
Human gesture – hand raised	31A2511 <i>arm raised upward</i>	
Crescent and disc		moon
Totschläger		
Guilloche	48A98131(+1) <i>ornament ~ circle and derived from circle, e.g.: guilloche (+ surface pattern ~ ornaments)</i>	Guillochis

Tab. 4.4. «Decoration» vocabulary. Examples of: figurative subjects corresponding to Iconclass notations, decoration fitting with terms from the EAGLE – Decoration vocabulary and DASI entries with no concordance.

4.3. Publishing digitized inscriptions

4.3.1. Content browsing

The front end of DASI²⁷ publishes data distinguished into objects, epigraphs and sites, by different levels. The level determines the amount of material that can be accessed via indexes and tools.

The top level, including all the materials archived and published, allows content browsing through a Google map in the homepage. Here are positioned the sites from which users can consult the related records.

The “Project” sub-levels, corresponding to the major linguistic groups (e.g. Ancient South Arabian, Ancient North Arabian), consists in turn of “Corpora” and “Collections”, that include materials homogeneous for language and deposit respectively. Both provide some textual tools, the indexes of inscriptions, objects and sites, in addition to the above mentioned map, and a list of bibliographic references. Each index gives access to data by an alphabetic list of items that can be

²⁷ DASI – Digital Archive for the Study of pre-Islamic Arabian Inscriptions. <http://dasi.humnet.unipi.it/>

screened through a set of filters on metadata. The filters are almost the same as those used to refine the textual search results (see below 4.3).

Data describing each item – be it an inscription, an object or a site – are then displayed in a specific card. Each type of card collects not only the information concerning the pertaining entity, but also pieces of information relating to the related entities which are considered fundamental to complete its description.

CIAS 47.11/o 1/F 72 Q 269; Ja 122; CSAI I, 125



INSRIPTION INFORMATION

Language	Ancient South Arabian » Qatabanic » Central Qatabanic	
Alphabet	Ancient South Arabian	
Script typology	Monumental writing	
Writing technique	Incision	
Measure of letters	2.5	
Chronology	Period	C
Textual typology	Dedicatory text	

TEXT

marker

- 1 Br't dt byt Rtd'I bn S²hz s'q—
- 2 nyt dt Hmym 'itr Ygl slmt d—
- 3 hbn hg-n tkrbt-s' l-wfy-s' w-wf—
- 4 y 'dn-s' w-mqm-s' w-qny-s' qzrt
- 5 'm d-Rbh w rs²wt 'm d-D←ymt
- 6 b→Wrw'I Gyln Yhn'm◄ |

Fig. 4.3. Upper part of an epigraph card in DASI front end site. Sigla, image, metadata and transcription of an inscription. Further details are given below the text: translation, information on the support and its provenance, bibliography.

For example, an epigraph card includes the text of the inscription, its translation(s) and other data concerning the text (Fig. 4.3), and also the basic information on its support and on its origin/provenance context, provided with the links to the related “object” and “site” cards. This representation of the content contributes to highlight the autonomy of the various entities and allows a rapid consultation while providing complete information.

4.3.2. Textual tools

The major effort in the publication of the catalogued material has been made to provide tools for the study of the epigraphic text. Indeed the reconstruction of lexicon and grammar of the languages of the Arabian peninsula is one of the most urgent needs for a full comprehension of the inscriptions and, consequently, of the culture and history of these civilizations.

The *textual search* is one of the most sophisticated functions of the DASI system, which is a powerful mean for the scientific study of the inscriptions. The system allows to search for strings of characters and display results as:

1. text portions
2. distinct words.

For instance, entering the pattern “*t *ml*”²⁸, the system retrieves all the texts consisting of two words, the first one ending with “t” and the second one containing “ml”. The results:

²⁸ The wildcard * allows to search for: complete words or words with a given string of characters in any position (beginning, end, inside). The search finds also words beginning, ending or containing lacunae.

- in the case 1., are displayed as the text portions “bnt yqhmlk”, “bynht ³mlk”, “gdrt mlk”, etc.
- in the case 2., are grouped by the words “³mlk”, “bnt”, “bynht”, “gdrt”, “mlk”, “yqhmlk”, etc.

The examples above show that the system assumes the boolean operator AND between adjacent strings of characters. The filter *Word range* sets the maximum number of words that can intervene between the first and the last words to be searched for. The system retrieves effective results if the value of the range is $r \geq n-1$, where n is the number of strings typed in the research box. For example, if one searches for the three strings “ $b^* *tm *m^*$ ”:

- with $r=2$, the system retrieves the following contexts: “ $S^{2c}rm \underline{b-dtm} n^cmt w-b$ ”, “ $s^{2ft-s^1} \underline{b-dtm} s^{13}mnt 3trt$ ”, etc.
- with $r=3$, the system retrieves the following contexts: “ $w-mqtrnhn \underline{d-b} 3twtm w-ms^1lmn \underline{d-dhbn} \underline{d-b}$ ”; “ $S^{2c}rm \underline{b-dtm} n^cmt w-b$ ”; “ $s^{2ft-s^1} \underline{b-dtm} s^{13}mnt 3trt$ ”, “ $c^s3b-s^1 \underline{b-dtm} s^1wfy Hwkm cmdkr$ ”, etc.

The textual search is performed by the Berkeley DB XML on the texts al-ready tokenized. This process segments the text on the basis of rules that con-sider a space, a divider symbol (<g type=“wordSeparator”/>) or a clitic com-ponent (<milestone unit=“clitic”/>) as the elements distinguishing one word from another: if one searches for the strings “ $f 3tww$ ”, the system will retrieve all three of the forms “ $f 3tww$ ”, “ $f | 3tww$ ”, “ $f-3tww$ ”.

The system is also able to search for textual variants. DASI uses both in-line and external apparatus methods to encode variants. The latter is preferred when the editor chooses one reading or onomastic interpretation only: the variants are recorded in separate notes and cannot be searched. On the contrary, variants are coded in the text of the inscriptions when, from a point of view of the reading or of the interpretation of the text, they have the same probability of being true. Therefore a textual search can be performed on them. For example, in a context $w_1 w_2 ((w_{2.1}))((w_{2.2})) w_3$, the system can retrieve $w_1 w_2 w_3$ but also $w_1 w_{2.1} w_3$ and $w_1 w_{2.2} w_3$. This output is obtained by adding specific attributes to words while indexing, which are:

- the number of the word ($w_2, w_{2.1}, w_{2.2}$ have $n=2$)
- the level (L0: w_2 ; L1: $w_{2.1}$; L2: $w_{2.2}$; all the other words are on the L0)
- the id of the group of variants, as there might be more than one in a text ($w_2, w_{2.1}, w_{2.2}$ have $id=1$).

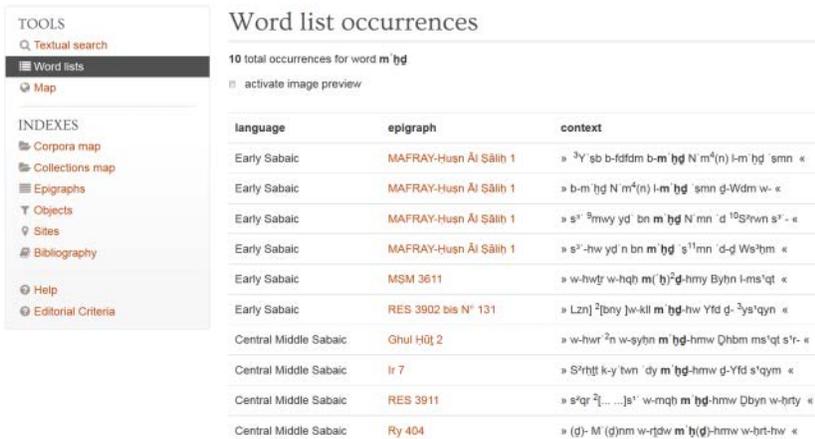
The example shows the principles followed:

- each variant of a specific group adds a level to the text: in the example there are 3 levels,
- the search combines the variants of all the levels with the level 0 of the other words.

The system manages a series of filters to refine the search on the texts of the inscriptions (onomastic categories, textual portions) and on the metadata (language, textual typology, support, decoration, site, etc.).

The search function generates a list of results presented in a concise and legible manner. It shows their distribution among languages and their onomastic category (if any) at a glance, allows to view the contexts in which they appear and then to access the inscriptions, where the text searched for is highlighted in bold.

In addition to the dynamic textual search tool, DASI provides lists of words in alphabetical order, which can be generated according to the level of corpora at which the lists are accessed (e.g. the whole ASA corpus, or the Qatabanic corpus, or one of its sub-varieties, etc.; Fig. 4.4). There are two different *lists of words*: one includes the words beginning with a letter, which can be complete or contain a lacuna inside or at the end of the word; the other one lists the words beginning with a lacuna and therefore lacking the first letter that would assign them to an index letter in alphabetic order. Both lists are created through a textual search following the same principles of tokenization showed above, but with no string searched for. Each of these lists can be refined to give only the lexical or the onomastic results, as a whole or by a specific onomastic category.



Word list occurrences

10 total occurrences for word **m'ḥg'**

activate image preview

language	epigraph	context
Early Sabaic	MAFRAY-Husn Āi Sālih 1	» ʔY ḡb b-fdldm b-m ḥg' N m ⁴ (n) l-m ḥg' smn «
Early Sabaic	MAFRAY-Husn Āi Sālih 1	» b-m ḥg' N m ⁴ (n) l-m ḥg' smn ḡ-Wdm w- «
Early Sabaic	MAFRAY-Husn Āi Sālih 1	» s ² ʔmwy yd' bn m' ḥg' N' min' d ¹⁰ S ² wn s ² - «
Early Sabaic	MAFRAY-Husn Āi Sālih 1	» s ² -hw yd' n bn m' ḥg' s ¹¹ mn' d-ḡ Ws ² hm «
Early Sabaic	MSM 3611	» w-hwfr w-hqb m(ḥ)ḡ ² ḡ-hmy Bḡhn l-ms'qt «
Early Sabaic	RES 3902 bis N° 131	» Lzn] ʔbny]w-kl m' ḥg'-hw Yfd ḡ-ʔys ² qyn «
Central Middle Sabaic	Ghul HŪ[2	» w-hwr ² n w-syhn m' ḥg'-hmw Ḍhbm ms'qt s ¹ - «
Central Middle Sabaic	lr 7	» S ² hḡ] k-y twm' dy m' ḥg'-hmw ḡ-Yfd s ² qym «
Central Middle Sabaic	RES 3911	» s ² qr ʔ[...]s ¹ w-mqh m' ḥg'-hmw Ḍbyn w-ḡry «
Central Middle Sabaic	Ry 404	» (ḡ)-M(ḡ)nm w-rḡw m' ḥ(ḡ)-hmw w-ḡrt-hw «

Fig. 4.4. Example of occurrences of a word retrieved through the word list in DASI front end site. The occurrences of the word *mr*² in the Qatabanic corpus are listed, with the sub-corpora they belong to, the sigla of the inscriptions and the occurrence's context in the inscription.

4.4. Future developments

Since the enhancement of knowledge of the ancient Arabian civilization is one of the main objectives of DASI, the future efforts of the project are directed toward the interoperability of records and the harmonization of controlled vocabularies.

On the first side, DASI has committed to make available its data in different export formats. Surely records will be entirely distributed according to the EpiDoc standard that is the one presently assuring the valorization of texts and allowing the digital edition of inscriptions.

As regards the vocabularies, DASI will refer to external terminologies, as recommended by the EpiDoc guidelines themselves, as far as possible. To some extent it will try to interact with other projects and contribute concepts not included in already existing vocabularies.

Finally, the creation of digital *lexica* of the ASA languages is already scheduled. In fact, this is one of most urgent needs for the studies on Ancient Arabian epigraphy, as the amount of linguistic material has increased exponentially in the last years, calling for updating of established dictionaries. The lexicon will consist of a list of roots; each root will be entered into the system and provided with its definition. The words deriving from it and attested in the inscriptions will then be

linked to the pertaining root and analyzed in grammar, with the aid of the context of its occurrences provided by the word list.

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5. Epigraphy, Art History, Archaeology

A Case of Interaction between Research Projects: The Epigraphic Database Bari (UniBa, Italy) and the Domitilla Projekt (ÖAW, Austria)

Antonio E. Felle, Norbert Zimmermann

Abstract

Corpora of inscriptions are fundamental collections of the epigraphic material, and they display in the best manner of their times all that was thought to be important about every single written content. From a modern point of view, the perception of inscriptions is, besides the pure text, very much enlarged by its context, in our sense the archaeological, topographical or architectural context being the position in the specific situation, where the inscription was written and subsequently meant to be read (or simply to be). In the last years, with the ongoing digitalisation of scientific approaches, the collections of epigraphic material could benefit from this development as well, adding specific information about the physical position and the topographical context to the inscriptions. As a case study, in this paper we would like to present the inscriptions of the catacomb of Domitilla, at Rome, and the benefits that one can have by considering not only the texts but also using the topographical context for their interpretation. On the one hand, the catacomb itself was recently documented with a 3D-laserscanner, while on the other hand all inscriptions still *in situ* were stored in the EDB. Our approach is now to combine the 3D data with the epigraphic data base and to create interactive catacomb plans, in order to better understand the topographical and chronological developments and also to re-contextualise the epigraphic remains in their original placement. Displayed in this way, the inscriptions offer their entire value as epigraphic monuments more clearly.

Keywords

Rome, catacombs, Christian epigraphy, Spatial data, 3-D models

5.1. EDB and spatial data

In my lecture at the last International Congress of Greek and Latin Epigraphy in Berlin in August 2012, I underlined that "to entirely describe an inscription we have to add a description to its image, as

concise as possible, of its geographical, topographical, and archaeological contexts. In this respect, compared with the other projects in EAGLE, EDB has its own peculiarity, since as its geographical frame EDB is based in only *one* city (although it is *the* City of the ancient world, Rome). Thus, to define spatial data in EDB, a different scale is required than in other similar projects. The limited area of interest of EDB (only the city of Rome) consequently requires a more narrowly defined - and more highly articulated - description of the spatial data. This is due mainly to the fact that a large majority of the Christian inscriptions of Rome can with reasonable certainty still be placed in their original contexts, where they are often still preserved today".¹ In the plans of the catacombs published in the ten volumes of the *Inscriptiones Christianae Urbis Romae, nova series* [SILVAGNI et al. 1922–1992], the sites inside the various funerary complexes are usually defined by a majuscule letter - relating to a single zone (*regio*) of the catacomb - and by another element, relating to a precise internal position: a digit refers to a gallery; a minuscule letter refers to a *cubiculum* or to some other kind of funerary space differing from the simple galleries (Fig. 5.1). In EDB these alphanumeric codes are registered, however without proper geographical coordinates, because presently - apart from a few and partial exceptions - there are no geo-referenced plans of the Roman catacombs.

Plans with geophysical reference data of (almost all) the spaces inside a Roman catacomb are now available for that of Domitilla, situated along the via Ardeatina, being the largest in Roman suburbium. These maps are only one of the important results of the "Domitilla Project", coordinated by Norbert Zimmermann, which mainly focused on the frescoes still preserved there².

¹ Quotation from Felle 2014. In this respect, the workplace of EDB is more similar to that of the famous Inscriptions of Aphrodisias, which is based on EpiDoc. However, we have to consider the widely different number of documents considered: in EDB more than 40,000 inscriptions. Moreover, we cannot establish a direct correspondence between the need for high-definition of spatial data in EDB and the more generic needs of the EpiDoc system (state of 2012): (<rs type="found"><placeName type="ancientFindspot" key="—" ></placeName></rs> e <rs type="origLocation"></rs>). About the complementarity between the EAGLE project and initiatives based on the EpiDoc standard, see FELLE 2012.

² Österreichische Akademie der Wissenschaften - Institut für Kulturgeschichte der Antike.

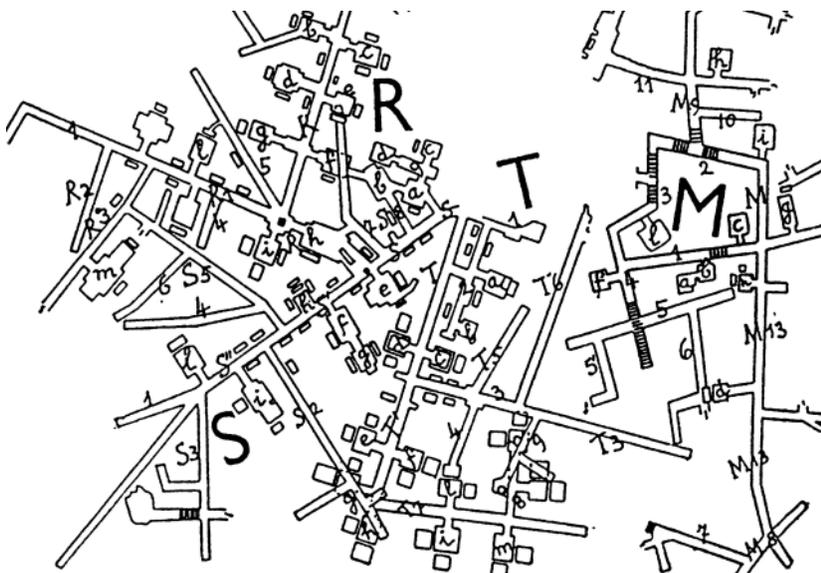


Fig. 5.1. *ICVR*, III. Detail of the plan of the second level of the Domitilla catacomb

A.E.F.

5.2. The Domitilla Project

To better understand the structure and nature of the data set now in use for our cooperation, we will briefly introduce the scientific aims, the practical field work and the workflow of processing and post-processing the data inside the Domitilla project. In 2006, the Domitilla project was installed at the Institute for the Study of Ancient Culture at the Austrian Academy of Sciences and we continued our work until May 2014.³ The field work inside the catacomb was carried out between 2006 and 2010, with a final control campaign in 2012.⁴ For the first time, we had the opportunity to apply the method of 3D-laser scanning for the documentation of a Roman catacomb (Fig. 5.2).

³ FWF START-Project Y282 “The Domitilla-Catacomb in Rome”. The work was carried out in a national cooperation with the Institute of History of Art, Building Archaeology and Restoration at the Vienna University of Technology. The interdisciplinary team consists of archaeologists and architects, supported by geodesists and mathematicians.

⁴ We thank the Pontificia Commissione di Archeologia Sacra in Rome for the possibility to access the catacomb and for all kind help and support.



Fig. 5.2. Domitilla Project. 3D-laser scanning in the catacomb

At the beginning, our main interest was to document the more than 80 painted areas, located in separate *cubicula*, in *arcosolia* and at *loculi*-walls along the galleries. However, because no modern, digital ground plan of the entire monument existed so far, we chose the fastest and most complex way of documenting available at that time, the application of a 3D image laser-scanner.⁵ The scanner is usually mounted on a tripod and by a rotation of 360 degrees produces, from a distance of at least 1m, a so-called point-cloud, a 3D image of the surfaces of the surrounding space. In our case, from 2006 onwards, we used a type of scanner with a photo camera mounted on top, providing true colour photo information from the same position of each point. To capture the entire grid of catacomb galleries, which extend for up to four storeys and for more than 12 km, we had to apply a scan position every 5-8 m in the tight galleries. We distributed reflecting target points throughout the entire catacomb and any new scan position had to include at least five already registered target points to integrate the new point-cloud into the already existing ones.

Working in that way in campaigns of two or three weeks of field work and two or three months of post processing the data at home, in 12 campaigns we were able to cover the entire grid of galleries with the surface sub divo, the stairways and the semi-subterranean basilica, with ca. 2000 scan positions, registered in one single point-cloud of nearly 2.000.000.000 of points. The entire catacomb now exists in one single, geo-referenced 3D model (or better: one single point-cloud), and each point contains its exact digital x-y-z coordinates (Fig. 5.3).⁶

For the areas with paintings, we tried to provide the best lighting conditions in order to produce photo-realistic 3D mesh-models of each painting, which could be re-integrated into the point-cloud,⁷ but for reasons of time we were not able to consider the colour information in the long galleries with only red tuff walls and mostly open graves.

⁵ We used an IL-Scanner Riegl LMS-Z420i in the beginning, and a Riegl VZ 400 at the end of the project, and we would like to thank the TUW-ILScan Center of Competence of TU Vienna, and Riegl Laser Measurement Systems (Horn, Austria) for their support.

⁶ A detailed report on the field-work and the work-flow of the post-processing works will be published in ZIMMERMANN et al. n.d. For summaries and preliminary reports see ZIMMERMANN et al. 2007; ZIMMERMANN et al. 2008.

⁷ Actually, we had better results with 3D models based on photogrammetry, and applied a different solution for the generation of the photo-realistic meshes of all painted areas, which we re-inserted into the point-cloud, see ABDELHAFIZ et al. 2009.

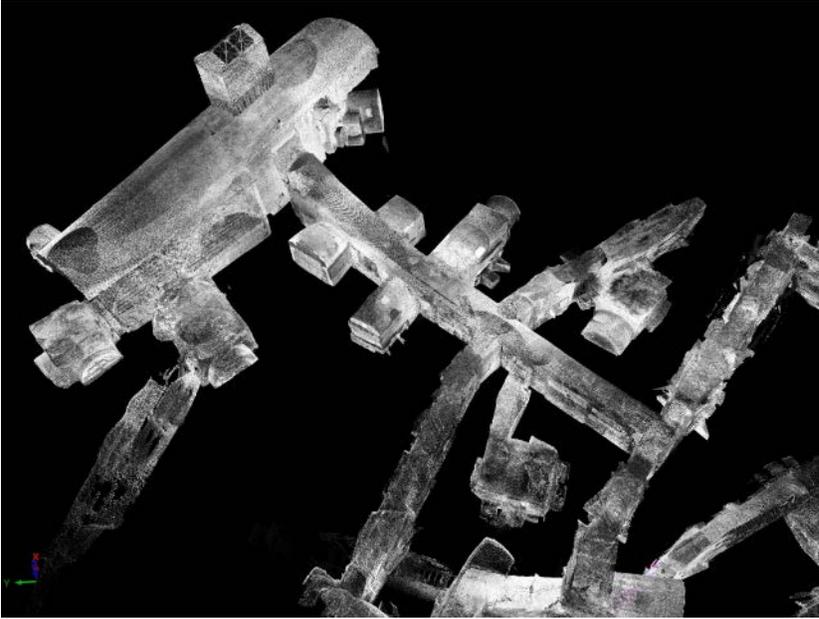


Fig. 5.3. Domitilla Project. Point-cloud of the *hypogaeum* of the Flavi

The photos taken by the camera mounted on the scanner were done with the integrated camera-flash and enlighten only the area close to the scanner, while the main parts of the galleries remained dark with very low or even without any colour information. Here, we needed the architectural information only for drawing the digital plan, generated from ortho-photos in AutoCAD.

In a further step of the Domitilla project, we had the opportunity to collaborate with another work group of the Vienna Technical University and to contribute to the development of the point-cloud viewer “Scanopy”.⁸ For the first time, our entire data-set became visible and accessible virtually in real-time and true colour, and we could incorporate archaeological tools into the software structure, such as measuring, mark and hide point-groups, generate sections etc. (Fig. 5.4) [SCHEIBLAUER et al. 2009].

⁸ The “Scanopy” software was designed inside the FFG-Project “FFG-825842 FIT-IT Visual Computing: TERAPOINTS - High Quality Visualization and Interaction with Gigantic Point Data Sets”, a cooperation between the Technical University of Vienna, the software company “Imagination Computer Service GmbH” and the Institute for the study of Ancient Culture.

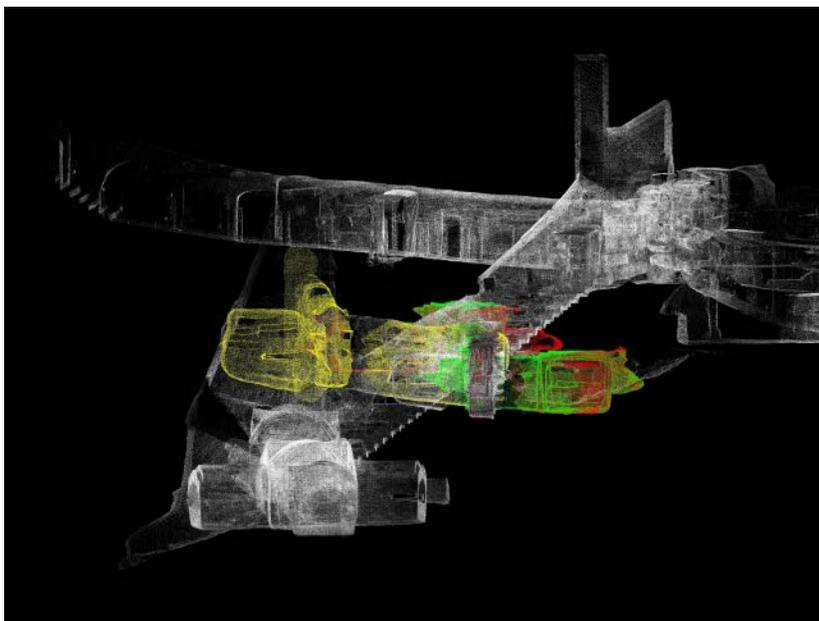


Fig. 5.4. Domitilla Project. Section of the *hypogaeum* of the Flavi and of the 3rd and 4th level of the catacomb

Of course, we probably would have accomplished our data acquisition in an even more dense way, if we would have expected that level of visibility of our Domitilla data-set. Anyway, in our virtual 3D model we can now identify all positions of in-situ inscriptions clearly and indicate their geo-referenced coordinates, but unfortunately we can hardly read or study all of them inside the model: very often, the lack of density of points, or of light, and an inappropriate angle of view of the scanner during the acquisition prevent a direct reading.

It was important to first explain the structure of the data set “behind” our new AutoCAD Domitilla plan, usually exported as a 2D plan in PDF format. We are now able, for the very first time, to virtually recognize every inscription still *in situ* in the 3D model, to measure its exact topographical position, and to link the position on the new plan directly to its EDB data entry.

During the study of all paintings of the catacomb, it has been possible to indicate, at least in general lines, their chronology, and to develop an idea of the topographical, architectural and art-historical development. To give only one example, the typology of the *arcosolia*

of the so-called region of the *mensores* with their apsidal-like form, is connected to a specific kind of figural and decorative painting, best dated to the second half of the IVth century, and also the impressive polygonal architecture of the *cubicula* clearly indicates this dating.⁹

Obviously, we begin to have access to the complex situation of “context”, and of course each methodological/material approach (topography, architecture, paintings, and inscriptions) will benefit from the interconnection of the results in one of the fields (Fig. 5.5).

N.Z.



Fig. 5.5. Catacomb of Domitilla. Painted arcosolium with a related graffito: ICVR III 7652 = EDB 24367 (Photo A.E. Felle for EDB by kind permission of PCAS)

5.3. Interaction between EDB and Domitilla Projekt

Working at the same time in the catacomb of Domitilla with Norbert Zimmermann - thanks to the very kind permission by the Papal Commission of Sacred Archaeology - we established a positive interaction between our projects, by considering the different documentary bases

⁹ On this specific region and its paintings see ZIMMERMANN 2002, pp. 126-154.

of the catacomb as a whole: topographical development of the monument, sepulchral typology, frescoes and inscriptions. According to this perspective, with the aim to realize a different way to study the archaeological context by considering its various components together, a first step can be the creation of interactive maps by linking the data recorded in the two projects. Specifically regarding the inscriptions, a dedicated layer on the plans of every level of the catacomb displays the position of the inscriptions still in their original places by single markers. These markers directly point to the corresponding records in EDB, permitting a quick access to their detailed description: bibliography, transcriptions, and so on (Fig. 5.6).

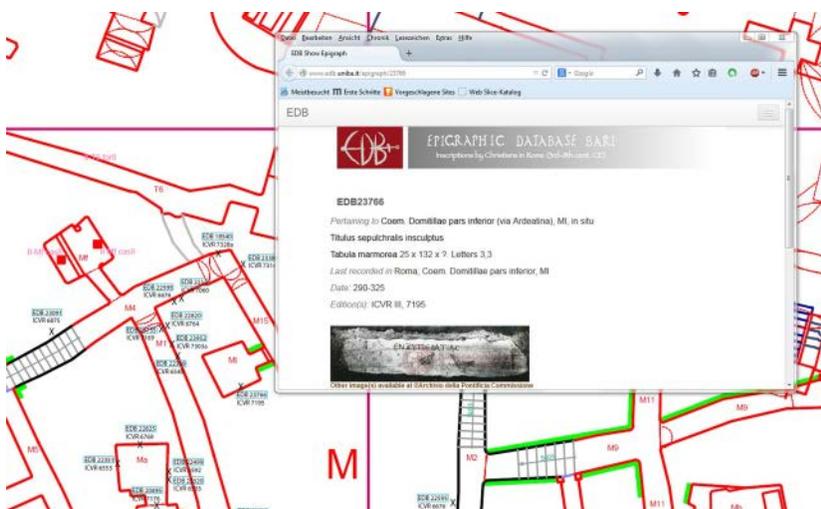


Fig. 5.6. Catacomb of Domitilla, region of the Flavi Aurelii. Detail of the plan of Domitilla Project with the link to an EDB record of an inscription *in situ* (Domitilla Project, N. Zimmermann and EDB, A.E. Felle. Photo of the inscription by the Archive of Papal Commission of Sacred Archaeology, PCAS)

In our point of view, a different way to use the epigraphic database is possible as well: the process to retrieve the data can be traced not only - as usually - from the texts to their contexts, but in the opposite direction: from the monuments to their documents.

5.4. An example: the region of the Flavi Aurelii

We present here, as a useful example, the so-called region of the Flavi Aurelii ("M", in the plan) on the second level of the catacomb.

This region is one of the earliest units of the later large funerary settlement (end of II cent. - first decades of IVth cent. CE). Therefore it is very important to understand the historical and topographical development of the entire catacomb: from private - and probably not exclusively Christian - early and small hypogea to the large collective Christian cemetery.

Because of these reasons, the region of the Flavi Aurelii has already been deeply studied and analysed, but almost exclusively from a topographical and archaeological point of view,¹⁰ without properly considering the epigraphic documents of the region [PERGOLA 1983, pp. 220-233].

However, in this region M there are many inscriptions still in their original place (42 - including the lost ones - of 116: 36%), also compared to other zones of the second level of the Domitilla catacomb.¹¹

By considering them together with other elements, the inscriptions (mainly those *in situ* but also the other ones) can be very useful indicators to define the different phases of the region of the Flavi Aurelii, their chronology as well as the users of this ancient funerary complex.

No inscription was found at the graves pertaining to the first phase (for the most part so-called "a mensa"), which is in the highest (consequently the most ancient) levels of the galleries. In a second phase, many modifications were realized: among them we can consider, to be concise, in particular the realization of a few *cubicula*, which today appear "suspended", because their entrances are now very high (more than 2 m) in respect to the present ground level of the galleries.

Three of the original lintels pertaining to the gates of these *cubicula* are preserved in the catacomb: one is still in its original place, in the *cubiculum* Mn, the only one decorated by frescoes in this region [NESTORI 1993, 123, no. 23].

A. E. F.

The *cubiculum* Mn is very important, because we now have the possibility to add more information to the archaeological and maybe historical

¹⁰ See at least the main studies by STYGER 1926 and PERGOLA 1983.

¹¹ For a general view about the epigraphic documentation of the catacomb, cf. FELLE 2013.

context: the rectangular *cubiculum* is of very small dimensions and has a flat ceiling, a typical case of a room of the first half of the III century. The painting is limited only to the ceiling and the main wall opposite the entrance, more precisely on the main niche of that wall (Fig. 5.7). On a white ground, we see a typical example of the so-called 'red and green line style' (Rot-Grüner Liniensstil), present in Rome mostly in the first half of the III century [MIELSCH 2001, pp. 107-122]. In a grid of fine red frames and green - and here also blue - lines that recall in a very simple way former architectural paintings, a purely ornamental décor is inserted: birds, flowers and chests with fruits. For the lack of structural stability this manner was often called an 'illusionistic style'. *Cubiculum Mn* is certainly a simple, but very interesting part of a larger group of monuments of this style in the Roman catacombs, dated generally to the first half of the III century. In Domitilla, three other famous early hypogea represent the same style, namely the so-called gallery of the Flavi [PANI ERMINI 1969; PANI ERMINI 1972], the so-called *cubiculum* of the Good Shepherd [PERGOLA 1975] and the *cubiculum* of Ampliatus [GIULIANI 2007].

While these examples from Domitilla still lack any Christian iconography, in the close-by catacomb of Callisto, in the so-called *cubicula* of the Sacraments, the first Christian scenes were inserted in a very similar painting system, and more or less in the same time.

As a last interesting element, we can also determine the specific purpose of the painting in *cubiculum Mn*, as we know from the excavation report that the unusual small main niche of the main wall originally contained the sarcophagus of a small boy with his portrait on the front. Today it is placed in the basilica of Ss. Nereus and Achilleus, in the same complex of Domitilla's catacomb (VIth cent.). We can suppose that the death of the boy led the family to acquire the sarcophagus, to invest in this specific *cubiculum* with its unusual small niche and to order the décor concentrated on the ceiling and the niche. By supplying the contextual interpretation of the epigraphic material, the specific moment of the burial of the boy occurred at a time we can now connect to the second phase of the *hypogaeum* of the Flavi Aurelii.

N.Z.

The other two lintels found in the same region are inscribed. The first one, found inside the *cubiculum Mc*, was replaced over the entrance, where it very probably was originally situated (Fig. 5.8).

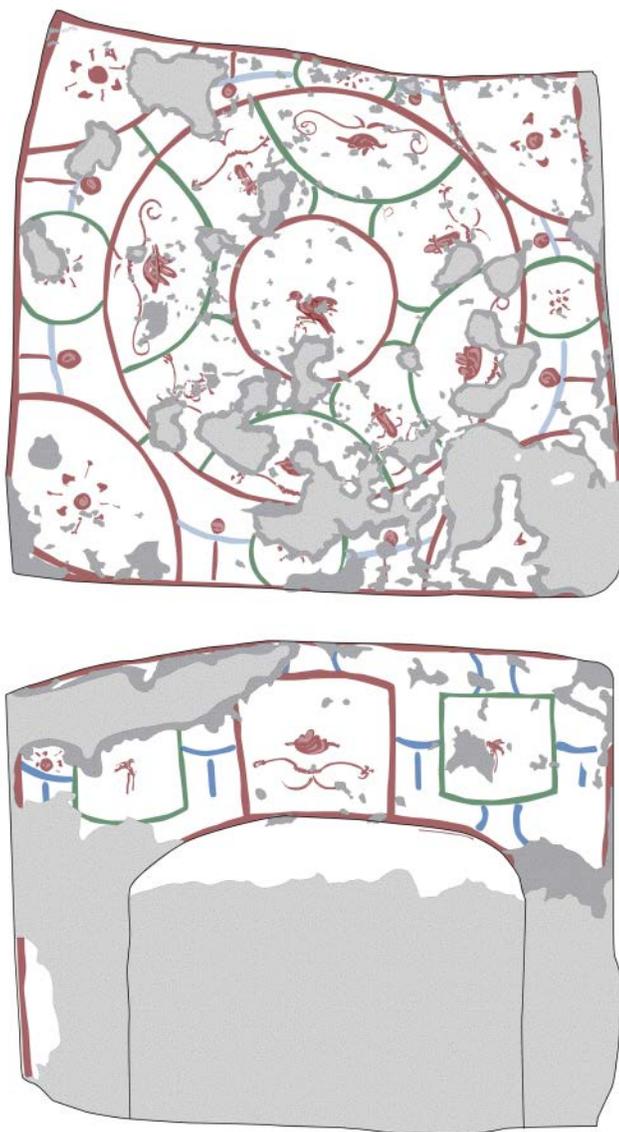


Fig. 5.7. Catacomb of Domitilla, *cubiculum* Mn. Drawing of the paintings on the ceiling and the main niche (drawing by E. Agirman, Domitilla Project; from Zimmerman – Tsamakda, forthcoming)



Fig. 5.8. Catacomb of Domitilla, *cubiculum* Mc. Lintel over the entrance [ICVR, III 6662 = EDB 22579] (Photo by A. E. Felle, on permission of PCAS)

It displays an inscription of property (*titulus possessionis*) in a plural genitive: *Eccleptiorum* [ICVR 6662] (an *hapax*: maybe it indicates a *collegium funeraticium*, such as the - contemporary? - *Innocentiores* in the complex of S. Sebastiano f.l.m.).

Another very similar lintel was found reverted (evidently re-used) as a threshold of the - surely later - *cubiculum* Mh (Fig. 5.9), on which another inscription of property can be found, also in genitive: *Grapti* [EDB 8366], which records the name of the patron of the - surely private - funerary chamber.¹²



Fig. 5.9. Catacomb of Domitilla, *cubiculum* Mh. Reversed lintel reused as a doorstep [EDB 8366] (Photo by A. E. Felle, on permission of PCAS)

This inscription had not been seen by Ferrua and so it is not in *ICVR*, III; it was published in 1983 by Pergola [PERGOLA 1983, 219 spec. and 222, n.95 and fig. 14], who forgot to consider another document that in my opinion is also relevant for the questions concerning the first phases of the region by its palaeography and, above all, its figurative appearance.

¹² Maybe it could be the lintel of the gate of the "suspended" *cubiculum* Mi (see the corresponding measures both of the lintel and of the entrance to Mi).

A marble slab in its original place, covering a still closed *loculus* in another "suspended" *cubiculum* (M1), displays the inscription (in genitive, as also the epitaph of Γαμικός, *in situ* in the *cubiculum* Mb [ICVR, III 7176]) of Ἐξουπερα<ν>τίας [ICVR 7195] (Fig. 5.10).



Fig. 5.10. Catacomb of Domitilla, *cubiculum* M1. Inscription *in situ* [ICVR, III 7195 = EDB 23766] (Photo by A. E. Felle, on permission of PCAS)

It consists of a bird; a second bird, very different and rougher than the first one, was clearly added in a later re-use of the grave, similar to others found in the catacomb [5.4]. This epigraph is very similar to other inscriptions still *in situ* in other places in the *hypogaeum*, as for example ICVR, III 6764 in the gallery M01 (Fig. 5.11), where we can observe another case of the re-using of a slab, on which we can actually recognize two different epitaphs.

The first epitaph consists of only the bird (as is also the case of another epigraph still *in situ* in the gallery M04 [ICVR III 7328a]); the second epitaph, with the dedication to Isidora by Pancratius, was not centred on the slab (as was the bird) and foremost was executed considering an already existing break of the slab. The writing in this second text is very similar to the writing of other documents of the last phase



Fig. 5.11. Catacomb of Domitilla, gallery M01. Inscription *in situ* [ICVR, III 6764 = EDB 22820] (Photo by A. E. Felle, on permission of PCAS)

of excavation of the complex, for example the epitaph of Q(uintus) Domitius Peregrinus [ICVR III, 6654], found in the gallery M02.

The strange use – because unusual in Late Antiquity – of *tria nomina* (also sometimes incorrect) has other occurrences in three inscriptions still *in situ* in the very near *cubiculum* Ma, pertaining to the latest phase of the development of the region [ICVR, III 6533, 6592, 6769] (Fig. 5.12).

One can establish many other relations between various epigraphs in their different aspects and elements, to realize a useful “net” that can be a reliable base to define the history of the funerary complex and, maybe, also the *officinae lapidariae* (Epigraphische Werkstätte) operating in the catacomb, whose distinguishing signs can be identified for example in the recurrent use of monograms (Fig. 5.13).

We can view some examples in the *cubicula* Mb [ICVR, III 7061 and ICVR, III 7229] and Mi [ICVR, III 7230] as well as in the gallery M04 [ICVR, III 7060]; or, also, in the way to realize the images in the figurative apparel of the epigraphs as anchors [ICVR, III 6645 in M02; 6875 in M04; 7314 in M15; 7315 e 7230 in Mi, etc.] or as the - already considered - birds. Exactly the same late and roughest type of bird



Fig. 5.12. Catacomb of Domitilla, *cubiculum* Ma. Inscriptions *in situ* with *tria nomina* ICVR, III 6533 = EDB 22320 and ICVR, III 6592 = EDB 22499] (Photo by A. E. Felle, on permission of PCAS)

seen related to a re-use of the inscription of Ἐ{ν}ξουπερα<ν>τίας, has other occurrences not only in the region of the Flavi Aurelii [ICVR, III 6857; ICVR, III 6909d and other examples], but also in other areas of the catacomb, and can be considered as a useful element for chronology both of the inscriptions and the regions, where it appears. We think that this method of studying inscriptions in their original contexts can also be done virtually, in a positive cooperation between similar projects of digital archaeology and digital epigraphy. Now, by clicking on the markers identifying the exact positioning of the inscriptions *in situ*, we can open their single records in EDB. But, also, we are planning that by clicking on the alphabetical identifiers of the various spaces in the map (galleries, *cubicula* and so on), we can retrieve all the inscriptions pertaining to them. For example, by clicking on the sigla “Mb”, EDB will show images and data of the epigraphs found in that *cubiculum*, so we also can compare them with other epigraphs in other regions or in other complexes (for example, consider the same way to realize the image of trees both in Domitilla and in the not too



Fig. 5.13. Catacomb of Domitilla, *cubiculum* Mb. Detail of an inscription *in situ* with two monograms [ICVR 7061] (Photo by A. E. Felle, on permission of PCAS)

far catacombs of Praetextatus or Calixtus). This method to use an epigraphic database opens a very interesting perspective to consider the entire contexts where we have inscriptions, from the points of view of both the epigraphers and the archaeologists. We can usefully and quickly compare the data derived from the epigraphs (chronology as well as the economic and social level of the users of the cemetery displayed by supports, techniques and writings) with those offered by the frescoes as well as by the typology of the graves. All these data can be grouped together, according to a topographical perspective as well as to chronological sets or results of the development of the cemetery in a given time-span, as actually the regions of a catacomb are.

A.E.F.

5.5. Conclusion

In conclusion, it is important to note that the present work is still in progress and is actually planned only for the catacomb of Domitilla.

The parts already finished are (and will be) available on the website of the Domitilla project and are linked to the EDB website. As much as we personally hope that this approach will succeed in favour of other sites (catacombs and other monuments), its success does not depend on very sophisticated 3D techniques or cost intensive methods.¹³ On the other hand, the application of 3D methods of documentation allows the interactive perception of the 'real' context of the inscriptions (not only) to scholars as well as to common audience.

A.E.F. - N.Z.

¹³ Of some of the catacombs as well as of many other archaeological sites or monuments, the exact digital plans or maps already exist, sub divo often also with geo-references. Subsequently, the making of plans like ours presented here is quite simple to achieve also for single scholars.

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6. Inscriptions Visual Recognition

A comparison of state-of-the-art object recognition approaches

Giuseppe Amato, Fabrizio Falchi, Fausto Rabitti, Lucia Vadicamo

Abstract

In this paper, we consider the task of recognizing inscriptions in images such as photos taken using mobile devices. Given a set of 17,155 photos related to 14,560 inscriptions, we used a k -NearestNeighbor approach in order to perform the recognition. The contribution of this work is in comparing state-of-the-art visual object recognition techniques in this specific context. The experimental results conducted show that Vector of Locally Aggregated Descriptors obtained aggregating Scale Invariant Feature Transform descriptors is the best choice for this task.

Keywords

Inscriptions Recognition, Object Recognition, Content-Base Image Retrieval, Bag-of-Features, VLAD

6.1. Introduction

The large availability of digital cameras, especially embedded in smart-phones and tablets, allows final users and researchers to make photos of their objects of interest at almost no cost. On one side, we have users making thousands of photos. On the other side, it is very common for archives to have photos of the objects that they are conserving or they have information about. In this context, there is a growing demand of information retrieval systems able to search by using images as query. The basic idea is to allow users to make a photo of the object they are interested on, recognizing the object between the ones stored in a repository, and then returning related information.

The research reported in this paper was conducted in the context of the Europeana network of Ancient Greek and Latin Epigraphy (EAGLE)

CIP-Best Practice Network.¹ In this work, we focus on searching for the most similar inscriptions in an archive with respect to the one represented in a photo. The dataset we used consists of 17,155 photos related to 14,560 inscriptions that were made available by Sapienza University of Rome, within the EAGLE project. This functionality will be integrated on an official EAGLE mobile application in order to allow a visitor of a site where one of the archived inscriptions is visible (museum, street, archaeological site, printed reproduction, etc.) to take a picture with a mobile phone, send the picture to the central repository and receive back the information associated with that picture.

For achieving the task of identifying objects in an image or video sequence, usually referred to as object recognition, research conducted in both Computer Vision and Multimedia Information Retrieval fields has focused on local features that provide a representation allowing matching local structures between images. First, distinctive key points are selected in each image. Second, a description of each selected region is given. Direct local features matching has been proved to be very effective in recognizing the same objects in two photos. However, to achieve scalability (i.e., to be able to search in large datasets) aggregation techniques are necessary in order to summarize the information reported for each key point.

Traditionally, object recognition has been successfully applied to consumer products, buildings, monuments and landmarks. However, we did not find any specific experiments conducted on ancient inscriptions. Moreover, state-of-the-art techniques are very effective on small sets (tens) of objects while approximate techniques are applied when millions of objects have to be recognized. The number of photos of inscriptions expected in the context of the EAGLE project is in the middle of these two extremes. Thus, in the following, we report the results obtained testing various state-of-the-art techniques in order to effectively recognizing inscriptions in photos given a medium-large scale set (tens of thousands) of known inscriptions.

The rest of this paper is structured as follows. In Section 6.2, we discuss related work. In Section 6.3, we give information about the tested approaches. Then, we specify the experimental settings and discuss the obtained results in Section 6.4. Finally, in Section 6.6, we report conclusions and discuss future work.

¹ www.eagle-network.eu

6.2. Related Work

In the last few years, research on object recognition has focused on local features [MIKOLAJCZYK et al. 2005, TUYTELAARS et al. 2008]. Following this approach, an image is represented by describing the visual content of typically thousands of regions of interest automatically selected. To achieve best effectiveness, images are compared by matching their local features and searching for a geometric transformation that can associate the regions of both images.

In the last few years, the problem of recognizing cultural heritage related objects, in particular landmarks, has received growing attention by the research community. As an example, Google presented its approach to building a web-scale landmark recognition engine [ZHENG et al. 2009]. The problem of landmark recognition is typically addressed by leveraging on techniques of automatic classification, as for instances kNN Classification [DUDANI 1976], applied to image features.

Between 2007 and 2010, the VISITO Tuscany² (VIsual Support to Interactive TOurism in Tuscany) project, has focused on technologies able to offer an interactive and customized advanced tour guide service to visit the cities of art in Tuscany. This project has investigated cultural heritage object recognition, (such as monuments, landmarks, etc.) developing a mobile application and related research papers such as [AMATO et al. 2011]. However, inscriptions recognition was out of the scope of the project.

6.3. Tested approaches

In order to recognize inscriptions in images, we selected and tested the most promising approaches from the recent literature. In this Section, we report brief information about these approaches. First we discuss the Scale Invariant Feature Transform (SIFT) that we selected as local feature. Then we discuss the Bag-of-Features (BoF) and Vector of Locally Aggregated Descriptors (VLAD) that make use of the local features (SIFT in our case) in order to achieve high efficiency and effectiveness via aggregation of the information they contain.

² <http://www.visitotuscany.it>

6.3.1. SIFT

SIFTs [LOWE 2004] are low level features extracted from key points selected using difference of Gaussians applied in scale space to a series of smoothed resampled images. The description of the region around this selected points relies on histogram of gradients. SIFTs are not only the most important and cited local features ever defined, but they are still almost unbeaten in terms of effectiveness. Recently, binary local features have been proposed in order to improve efficiency of direct local features matching with a reduced lost in effectiveness. In our experiments we achieve scalability aggregating features and thus we are more interested in effective representation of the images than efficient comparison of the features themselves.

6.3.2. Bag-of-Features

The Bag-of-Features (BoF) was initially proposed in [SIVIC et al. 2003] and has been studied in many other papers. The goal of the BoF approach is to substitute each local descriptor of an image with visual words obtained from a predefined vocabulary in order to apply traditional text retrieval techniques to Content-Based Image Retrieval (CBIR).

The first step is selecting some visual words creating a vocabulary. The visual vocabulary is typically built clustering, using k -means, local descriptors of the dataset and selecting the centroids. The second step assigns each local descriptor to the identifier of the nearest word in the vocabulary. At the end of the process, each image is described as a set of visual words. The retrieval phase is then performed using text retrieval techniques considering a query image as disjunctive text-query. Typically, the cosine similarity measure in conjunction with a term weighting scheme (e.g., TF-IDF [SALTON et al. 1987]) is adopted for evaluating the similarity between any two images.

The BoF approach can be also used in conjunction with geometry consistency checks typically performed using RANdom SAMple Consensus (RANSAC) [FISCHLER et al. 1981] to find homography transformations. In this case, the BoF representation allows fast matching between local features. In fact, any two local features assigned to the same visual words are considered to match.

However, as mentioned in [ZHANG et al. 2009], “a fundamental difference between an image query (e.g. 1500 visual terms) and a text query

(e.g. 3 terms) is largely ignored in existing index design". Efficiency and memory constraints have been recently addressed by aggregating local descriptors into a fixed-size vector representation that describe the whole image. In particular, Fisher Vector (FV) [SÁNCHEZ et al. 2013] and VLAD have shown better performance than BoF. In this work, we will focus on VLAD which has been proved to be a simplified non-probabilistic version of FV [JÉGOU et al. 2012]. Despite its simplicity, VLAD effectiveness is comparable to that of FV while, in terms of efficiency VLAD is preferable.

6.3.3. Vector of Locally Aggregated Descriptors (VLAD)

The VLAD representation was proposed in [JÉGOU et al. 2010]. As for BoF, a codebook $\{\mu_1, \dots, \mu_k\}$ is first learned using a cluster algorithm (e.g., k -means). Each local descriptor x_i in each image is then associated to its nearest visual word $NN(x_i)$ in the codebook. For each codeword, the differences $x_t - \mu_i$ of the vectors x_t assigned to μ_i are accumulated:

$$v_i = \sum_{x_t: NN(x_t)=\mu_i} x_t - \mu_i.$$

The VLAD representation is the concatenation of the accumulated vectors, i.e. $V = [v_1^T \dots v_k^T]$. Power-law and L^2 normalization are usually applied and L^2 Euclidean distance has been proved to be effective for comparing two VLADs.

VLAD descriptors have a high dimensionality. Principal Component Analysis has been proposed to have a more compact representation.

6.4. Experiments

6.4.1. Dataset

Being partner of the EAGLE project, we had the opportunity to access a dataset of 17,155 photos related to 14,560 inscriptions made available to us by Sapienza University of Roma. For our experiments, we also needed a ground truth, i.e., photos in which we want to automatically recognize the inscription together with the actual inscription represented in the image. We constructed this ground truth selecting 70 photos from the whole dataset and removing them from the knowledge

base. In other words, we removed these query photos from the ones that are given to the computer in order to understand the visual content of each inscription. This was only possible for the inscriptions that had more than one photo. We also carefully selected queries that could represent the various types of inscriptions. In Fig. 6.1 we report 5 query examples together with the other images for the same object available in the dataset.

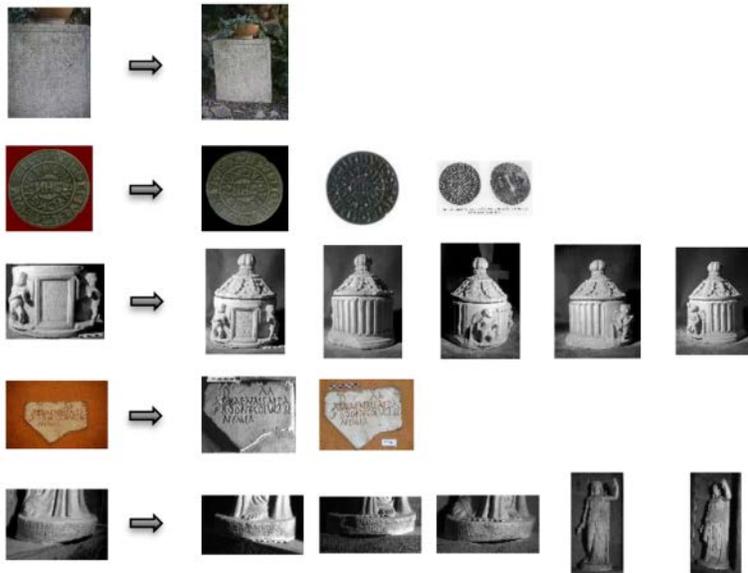


Fig. 6.1. Examples of query images and associated images of the same inscription.

6.4.2. Quality measures

In order to recognize the actual object in a query image, we basically perform a visual similarity search between all the images in the dataset. Thus, the main goal is to have one image of the same inscription as first result. Whenever this is not the case, it is interesting to understand at which position in the result list the most visually similar photo of the same object appears. In fact, while in this paper we are focusing on techniques able to scale up to the size of the dataset, traditional computer vision techniques could be applied on the results obtained in order to achieve better effectiveness. Given this considerations, we decided to report the probability p of finding an image of the same

object within the first r results. For $r = 1$, p also equals the accuracy of a classifier that recognizes the query inscription as the most similar that have been found.

For each technique, we report the probability p of finding an image containing the same inscription given as query between the first r results varying r between 1 and 100. Results are reported with the r values on a logarithmic scale.

A more common measure of effectiveness is mean-Average Precision (mAP). In this case, not only the first relevant image but all the images associated with the query are considered. This measure reveals how good is the approach in reporting the related images in the top positions of the result list.

6.4.3. Experimental Setup

We extracted SIFT from images using the OpenCV library.³ The BoF and VLAD approaches have been implemented by the Networked Multimedia Information Systems Laboratory of ISTI-CNR in Java as part of the Visual Information Retrieval library publically available on GitHub.⁴

Given an image, thousands of local features are extracted. In our case, we obtained an average of 1591 SIFT per image. However, the fact that some of them refer to bigger regions than others allows to select a subset of local features that are in principle more relevant [AMATO et al. 2011]. Thus, in the experiments we also tried to reduce the number of local features selecting only the most important ones up to about 250 local features per image. In the following, we refer to this second approach as *reduced-keypoints*. We tested all the approaches both on the whole extracted local features and on the ones obtained filtering by region size.

³ <http://opencv.org/>

⁴ <https://github.com/ffalchi/it.cnr.isti.vir>

6.4.4. Results

6.4.4.1. Bag-of-Features

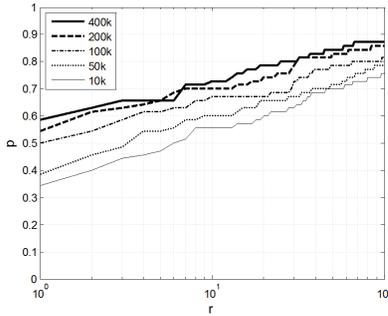


Fig. 6.2. BoF cos TF-IDF

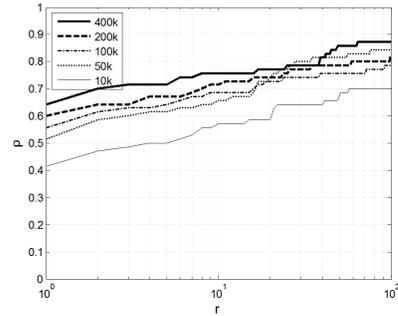


Fig. 6.3. BoF cos TF-IDF reduced-keypoints

Results in Fig. 6.2 have been obtained using the BoF feature approach using the cosine TF-IDF similarity measure, varying the size of the vocabulary between 10k and 400k. As expected, the larger the vocabulary the better the results. However, differences between 200k or 400k are only marginal. Thus, we did not tested larger vocabularies.

In Fig. 6.3, we report the same type of results considering only the most important local features. Results show that the SIFT selection (*reduced-keypoints* in the figures) is useful.

6.4.4.2. VLAD

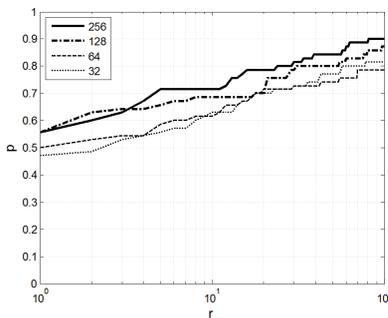


Fig. 6.4. VLAD

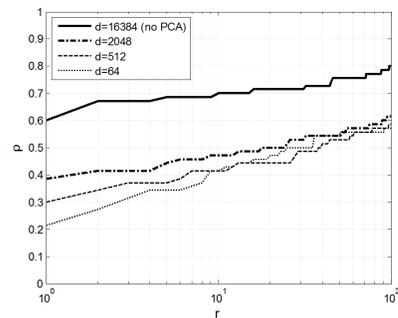


Fig. 6.5. VLAD reduced-keypoints

In Fig. 6.4 and 6.5, we report the results obtained by the VLAD approach varying the size k of the codebook between 32 and 256 using

all the extracted SIFT and the reduced ones respectively. It is interesting to see that the SIFT selection is useful when k is higher and r is smaller. In the other cases it can even decrease the quality of the results.

Considering that we are more interested on small r , which means having relevant images on the very first positions, the overall best results are the ones obtained for $k = 256$ and reducing number of local features.

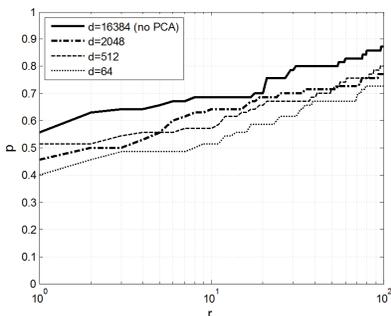


Fig. 6.6. VLAD-PCA, $k = 128$

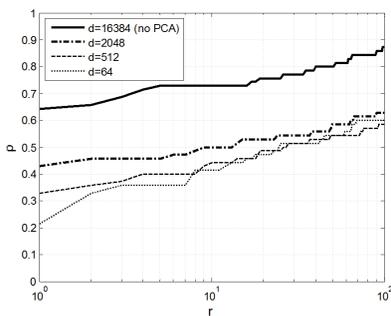


Fig. 6.7. VLAD-PCA, $k = 128$ reduced-keypoints

We also tried to apply Principal Component Analysis (PCA) on the VLAD vectors as in [JÉGOU et al. 2010], especially for trying to reduce the complexity of the comparison. We then selected $k = 128$ and applied PCA in order to reduce the dimensionality of the vector (16,384). Results are reported for VLAD vector reduced to 2048, 512 and 64 dimensions. Unfortunately, the dimensionality reduction significantly reduce the quality of the results.

6.5. BoF with Geometric consistency checks

All previously reported results have been obtained using techniques that are not able to verify geometrically the matching between any two images. In fact, aggregating local descriptors in a compact representation typically results in lost of the geometric information related to each single local feature. However, while with the VLAD approach is impossible to retain the keypoints location, the BoF has been extended in order to maintain and using the geometric information even if it results in a much higher search cost [PHILBIN et al. 2007]. In this section, we report the results obtained using BoF in conjunction with geome-

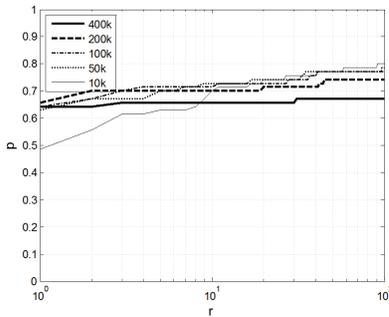


Fig. 6.8. BoF RANSAC

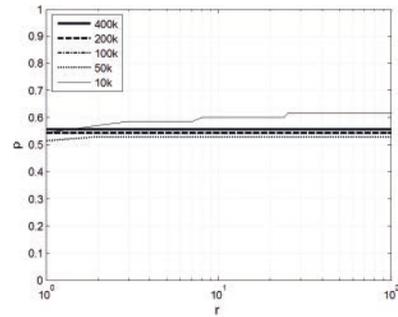


Fig. 6.9. BoF RANSAC, reduced-keypoints

try consistency checks performed using RANSAC and searching for a Homography transform.

The results reported in Fig. 6.8 and Fig. 6.9 reveal that, in this case, the keypoints reduction results in a significantly loss of effectiveness. The comparison between the results in Fig. 6.8 with the ones reported on previous sections suggests that RANSAC does improve effectiveness with respect to BoF with cosine TF-IDF similarity, but also that the best results that can be obtained with VLAD are not paired.

It is worth to mention that this approach is less efficient and cannot be indexed, even if some approximation have been proposed in the literature to this scope.

6.6. Comparison

In Tab. 6.1, we summarize the results obtained, ordered with respect to the mAP quality measure. Only the best approaches are shown. In the first column, we report a brief text about the approach. In the second column, the average number of SIFT considered is shown (i.e., 235 when local features reduction was applied and 1,591 otherwise). The third column reports the number of words used. While the words have been selected both for BoF and VLAD using k -means, their use is very different. Thus, in the “bytes” column, we computed the average size in bytes of the resulting representation. As quality measures, we used the probability p of having at least one related image between the first r results for $r = 1, 10, 100$ and the mAP .

In case we use these approaches to recognize the query image relying on the nearest image in the dataset, the best approach is the VLAD

Approach	avg SIFTs	code book size	Bytes	p $r=1$	p $r=10$	p $r=100$	<i>mAP</i>
VLAD	235	256	131,072	.69	.74	.84	.52
BoF / RANSAC	1591	200,000	19,092	.66	.70	.74	.52
BoF / cos TF-IDF	235	400,000	940	.64	.76	.87	.51
VLAD	235	128	65,536	.64	.73	.87	.49
BoF / RANSAC	1591	100,000	19,092	.64	.71	.77	.50
BoF / RANSAC	1591	400,000	19,092	.64	.66	.67	.49
BoF / cos TF-IDF	235	200,000	940	.60	.71	.81	.46
VLAD	1591	256	131,072	.56	.71	.90	.42
VLAD	1591	128	65,536	.56	.69	.87	.41
BoF / cos TF-IDF	235	100,000	940	.56	.69	.79	.42
VLAD	235	64	32,768	.53	.70	.86	.40
VLAD	1591	64	32,768	.50	.61	.79	.37
VLAD-PCA ($d'=512$)	1591	128	2,048	.44	.59	.79	.37

Tab. 6.1. Comparison of results obtained by the overall best approaches ordered by *mAP*

for a codebook size of 256 and selecting the 250 most relevant local features. In this case, the accuracy obtained is .69. The second best is the BoF approach in conjunction with RANSAC. However, this approach is not scalable and its effectiveness would not justify the extra cost in terms of efficiency. The more traditional BoF-cos TF-IDF approach obtained good results when a large codebook (i.e., 400k) was used (as expected). It is interesting to note that this approach outperforms VLAD for $r = 10, 100$. Given that recent works as [AMATO, BOLETTIERI, et al. 2013] have shown that VLAD can be more efficiently indexed than BoF, still VLAD is preferable.

6.7. Conclusions and Future Work

In this work, we tested state-of-the-art object recognition techniques on a inscriptions dataset consisting of 17,155 photos. The best accuracy was obtained by using the VLAD approach that has been recently proposed for performing object recognition on a large scale. Surprisingly, even the BoF approach in conjunction with geometry consistency checks was not able to outperform the VLAD representation that can be also more efficiently indexed than BoF [AMATO et al. 2013].

The obtained accuracy was of .69, which is good considering the difficulties of the task and the few images available for each inscription in the dataset. In fact, the dataset consists of 17,155 photos related

to 14,560 inscriptions. This results in most of the inscriptions been represented by only one or two photos. However, we plan to improve this results performing re-ranking of the images obtained using these scalable techniques performing direct local features matching. To this goal, we also reported the probability of having a relevant images between the retrieve images. The results show that it is possible to have a relevant image between 100 retrieved ones with probability .90 using the VLAD approach with a codebook of size 256 and filtering the SIFT. Thus, we plan to try binary local features and other techniques in order to improve the obtained .69 accuracy up to the .90 obtainable, in theory, by re-ranking the 100 obtained using VLAD.

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7. Morphological Residual Model

A Tool For Enhancing Epigraphic Readings Of Highly Eroded Surfaces

Hugo Pires, João Fonte, Luis Gonçalves-Seco, Maria João Correia Santos, Orlando Sousa

Abstract

Epigraphic inscriptions that present high level of surface degradation are usually difficult and tricky to read. Until now, most epigraphic readings have been accomplished by empiric procedures, supported by the visual and tactile perception of the observer, which is naturally subjective, and, often, complemented by lightning techniques, like raking light, that enhance surface texture and detail by casting dramatic shadows on the surface.

What if some of these heavily eroded inscriptions that are no longer perceived still keep traces of engravings? To address this challenge a simple and cost-effective method is presented, the Morphological Residual Model (M.R.M.). This method creates high contrast depictions of surface irregularities using 3D scanning data and morphological filtering algorithms. In most cases, the main epigraphic reading problems are overcome by this methodology as exemplified in the case-studies presented.

Keywords

Morphological Residual Model, 3D Scanning, Digital Epigraphy

7.1. Introduction

Ever since, humans have been carving stones and other materials. The surfaces that were preserved until present show, in most cases, different conditions from those found by who carved them: several agents, of natural and anthropic origin, act together as a slow erosion mechanism directly on the superficial levels, fainting the original forms.

A number of documentation procedures have been evolving over decades to overcome epigraphic reading difficulties in damaged or severely eroded surfaces. Photography provided so far the truest reproduction of inscriptions, however it is often marred by aspects like

difficult lighting conditions, complex surface textures or cracks and damaged areas that can be misread as carved lines. One of the most common photographic techniques, is the raking light [VELÁZQUEZ SORIANO 2008; RAMÍREZ SÁNCHEZ 2011], consisting of illuminating the surface tangentially with a bright spotlight, creating dramatic shadows that enhance the perception of relief.

This technique allows for good results when characters still consist of a homogeneous defined shape, but has one major drawback: incisions become perceptible only when light incidence is transversal to the groove direction. Capturing photographs of the same scene with different light directions doesn't overcome the problem as the result is a fragmented set of images that are not possible to merge in a single record.

A recent digital technique, called Polynomial Texture Maps (P.T.M.) [MALZBENDER et al. 2001], uses a set of photographs captured from a unique point of view with different light directions that allow to virtually reconstruct colour and shadows. Several shading models and reflectance function transformations can then be applied so to increase the visual perception of shape. Nevertheless, and in spite of being, undoubtedly, a major contribution for archaeological record and documentation, the P. T. M. results present some constraints. Although enhancing relief perception and resembling a virtual 3D interaction, the P.T.M. visualization tools don't calculate any information about the shape of the scene, and thus are not able to surpass the difficulties that highly eroded surfaces present to light techniques in real world conditions.

When applying the same lightning techniques to 3D scan models, the results are similar to those achieved with P.T.M. or raking light photography (Fig. 7.1), still very ambiguous and tricky to interpret and, if characters are not clearly perceived, the texts will not be fully understood, thus leading to highly subjective and, eventually, controversial interpretations.

An algorithm recently developed, the Morphological Residual Model (M.R.M.) [PIRES et al. n.d.], allows to go further. This new method is able to detect and contrast archaeological evidences from point-cloud derived 3D models, revealing itself as an effective tool for enhancing epigraphic readings, even in the surfaces afflicted by severe erosion.

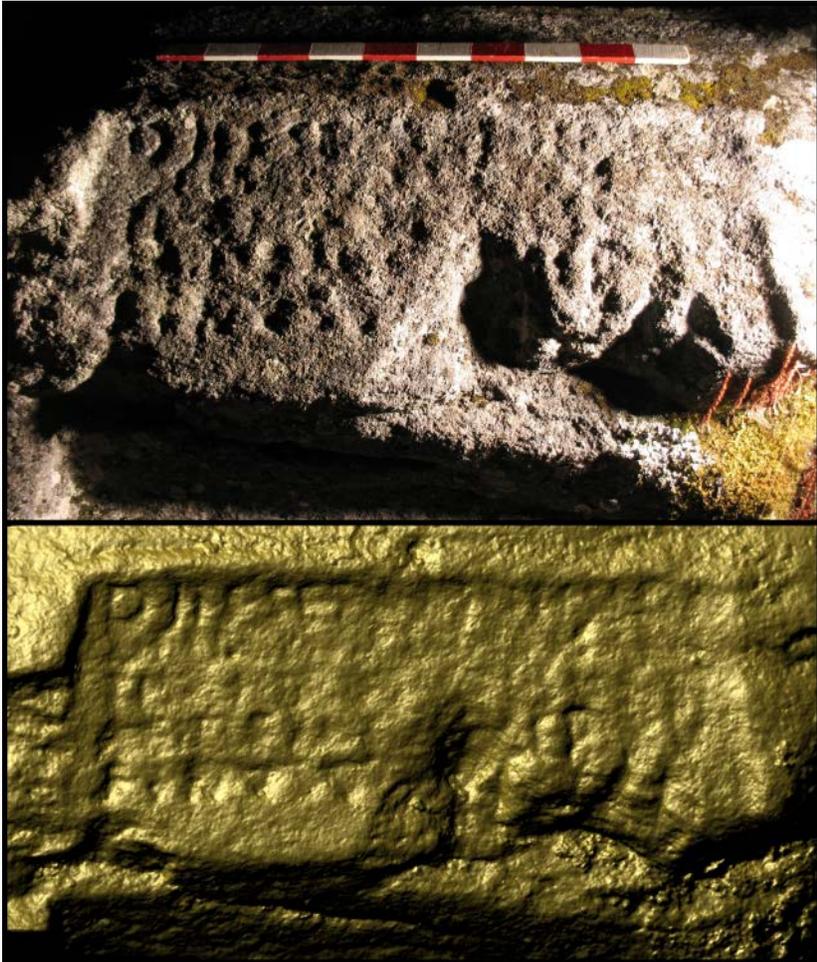


Fig. 7.1. Comparison between real and virtual raking light techniques in the heavily eroded granite surface where the Panóias inscription CIL II 2395a stands.

The case-studies presented in this article, all of difficult reading and affected by different degrees of erosion, had, until now, different and controversial readings according to each author. Using the M.R.M. approach, a significant part of these inscriptions have become clear, leading to new readings and interpretations.

7.2. Data Capture

The process of M.R.M. calculation can be applied to any kind of 3D model obtained from scanning devices that can produce dense point clouds from real world objects or scenes. The main requirement to consider is that the 3D models should have enough resolution to faithfully represent the surface elements that shape the carvings.

For the first three case-studies, data acquisition was performed through digital photogrammetric procedures, which implied capturing sets of photographs with approximately 80% overlap, using a digital camera Canon 450D with stable optical geometry along each of the survey campaigns. These sequences of images allowed the calculation of a digital surface model for each inscription, with an average spatial resolution of 0,5mm.

The fourth case, a statue representing a warrior with an inscription on its shield, was surveyed using a structured light scanner, producing a point- cloud of three million points at an average sampling step of 0,5mm. This survey was accomplished in 2011 by a INCIPIT-CSIC team of researchers.¹

7.3. Methodological Approach

Once visual perception depends on the movement and position of the observer at each moment, it is impossible to perceive simultaneously all the levels of shape and detail, both in the physical world situations as in 3D virtual interfaces. Far points of view give us a clear sense of the main shape of objects or sites, what is called the trend relief, while close observations give us information about the small morphological details of each surface.

One of the most effective digital visualization techniques for 3D models in archaeology are the trend removal procedures [CHALLIS et al. 2011; BENNETT et al. 2012]. These methods use smoothing algorithms to create trend surfaces that, when compared to the original ones, reveal local small- scale morphological features.

The M.R.M. is based in the trend removal principle but instead of calculating trend morphology by applying smoothing algorithms directly to the full 3D data sets, the M.R.M. introduces a previous calculation step: a mesh decimation algorithm [GARLAND 1999] that

¹ <http://digital.csic.es/handle/10261/40264>

produces a resampled model, coarser, but very similar to the original one and free of small morphological details, thus improving the effects of the laplacian smoothing filters in highlighting the carvings (Fig. 7.2).

This method allows the calculation of the morphological residuals, or in other words, details which are not part of the trend shape. The results are presented in a way that allows a clear and contrasted visual perception of small morphological anomalies in most kinds of surfaces, strongly contributing to improve the documentation of archaeological features.

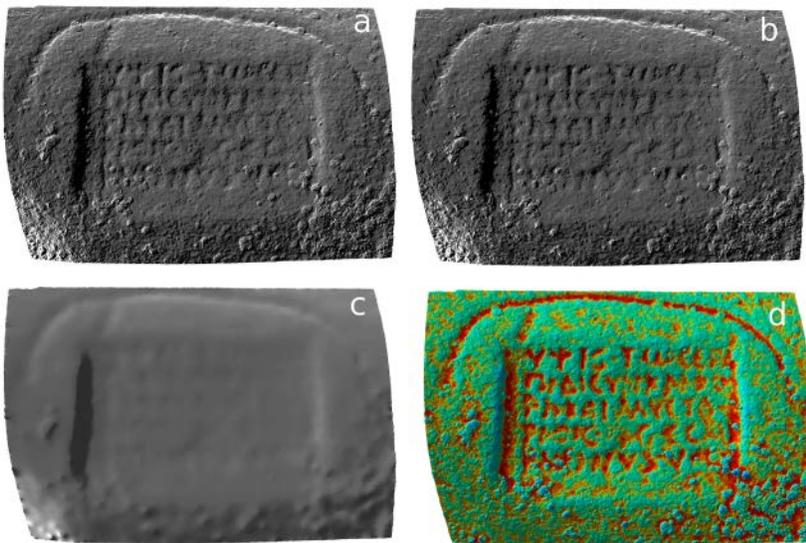


Fig. 7.2. Steps for M.R.M. calculation in the epigraphic case-study CIL II 2395c of Panóias, Vila Real: a) original 3D model, b) decimated model, c) Decimated model smoothed with a Laplacian filter and d) MRM results in colour coded values, obtained from the subtraction of the smoothed model from the original data set .

In theory, the decimated mesh can be understood as a distant view of the same object, therefore presenting lower spatial resolution. Applying smoothing algorithms after this step, improves the calculation of the trend surface. An optimal result is achieved when the trend model does not contain almost any of the carving or engravings that are intended to be detected. This procedure allows to detect and to contrast subtle irregularities imperceptible to the human eye using a process of morphological data segmentation at multiple resolutions. The resulting morphological residuals correspond to the difference between any of

these scales, and can be adjusted to detect different levels or types of carvings in the same object.

As a final step, the numeric residuals are converted in a colour coded image, contrasting negative from positive shapes. The colour values representing the residual morphology are then projected in the original 3D data set as a per-vertex colour feature, allowing the 3D visualization of M.R.M. results in any kind of 3D visualization software and the production of perspective views or orthographic images.

7.4. Visualization of M.R.M. results for epigraphic reading: four case-studies

According to the four case-studies, all granite inscriptions severely affected by erosion, the method revealed new readings or allowed to clarify certain epigraphic details that may be highly relevant for its interpretation.

A thorough and detailed explanation about the new epigraphic readings of the inscriptions supported by the M.R.M. results, its achievements and its implications on the epigraphic field, can be found in another paper submitted to this conference [28.3.1.1].

The first case-study (Fig. 7.3) concerns the two inscriptions from the sanctuary of Panóias - CIL II 2395a, CIL II 2395c -, where new readings, supported by M.R.M. results, implied a reinterpretation of this cult-place as a whole [28.3.1.2].

A second case-study (Fig. 7.4) is the inscription of Penedo de Remeiros [CIL II 2476], a particularly cryptic text with a series of abbreviations that makes of it a real challenge for interpretation. Its reading became now much more clear [28.3.2].

The third example is the one of Penedo das Ninfas [CIL II 5607], in which the M.R.M. results allowed to resolve a persistent doubt of reading (Fig. 7.5).

Last, the case of the shield of the warrior statue of Lesenho [CALO LOURIDO 2003, 10-11, n 11; SILVA 2007, p. 683, Est. CXXI, nº 1], in which the M.R.M. allowed seeing, for the first time, a decoration pattern and, engraved over it, a funerary inscription, which, on its own, implies the revision of the general interpretation of these statues.



Fig. 7.3. M.R.M. colour-coded results for the inscriptions CIL II 2395a (top) and CIL II 2395c (bottom).



Fig. 7.4. Orthographic view of the M.R.M. results in greyscale for the Penedo de Rameseiros inscription CIL II 2476.

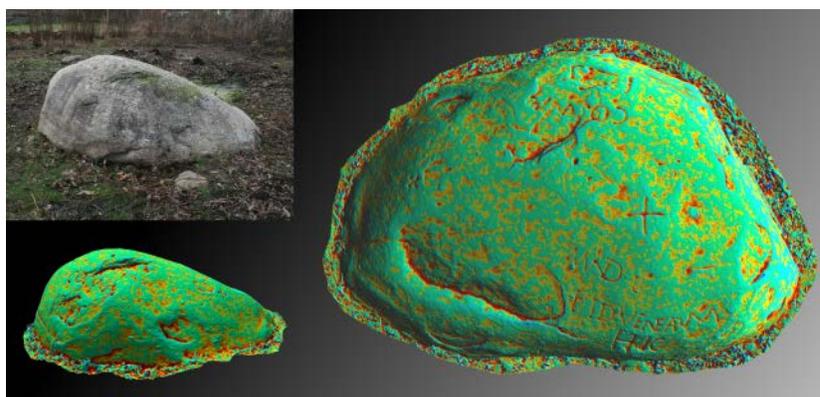


Fig. 7.5. Orthographic top view of Penedo das Ninfas M.R.M. results (right), a perspective view from the same model (bottom left) and a photograph from a similar point of view.

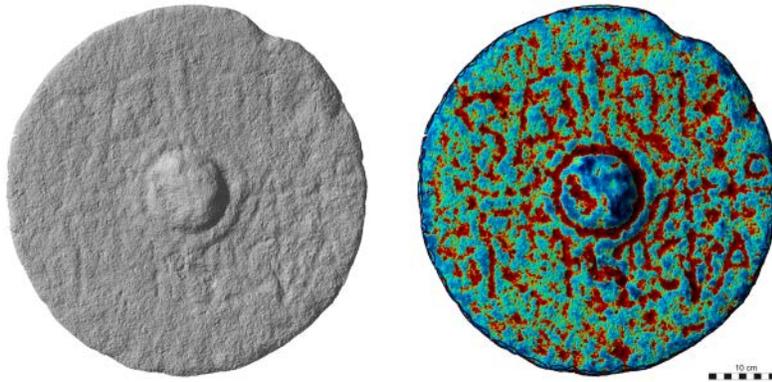


Fig. 7.6. Digital surface model (left) and M.R.M. results (right) of the shield of the Lesenho's warrior statue.

7.5. Conclusions and Future Work

As stated above, the M.R.M. allows the improvement of epigraphic reading, simultaneously representing a low-cost and effective method for heritage conservation.

It uses accurate 3D scan data for creating digital replicas of the original objects or scenes, allowing the calculation of several types of visualizations that would be impossible to undertake on the physical surface of the objects. At the same time, all the collected data is an important record for future research, as well as for the preservation of the archaeological object itself.

Using these data, the M.R.M. results allowed the revision of former interpretations, making clear the major contribution of this method for the enhancement for epigraphic readings even in surfaces that present severe erosion.

This method bridges the different members of the scientific cultural heritage community and the public, contributing to improve best practices concerning professional standards on presentation, interpretation and preservation of cultural heritage, as it provides an amount of data that can be easily available, according to different standards, both to fellow colleagues as to the general public.

New archaeological fields of application for the M.R.M. are currently being studied with results that show major improvements when compared to other conventional techniques.

To promote a broad dissemination of this technique within the archaeological community, the next step will be the development of an automated application for M.R.M. calculation.

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8. Image Editing Programs as Tools for the Study of Ancient Inscriptions

A practical example from the epigraphic dossier of Luna (Italia - regio VII Etruria)

Federico Frasson

Abstract

This paper shows how image editing programs can help decipher ancient inscriptions. As a significant example, it illustrates the case of a painted text from Luna.

Keywords

Image editing programs, Luna, statue base, erasure, painted inscription

8.1. Photos of inscriptions from Luna

As I examined the inscriptions of the Roman colony of Luna, I investigated possible applications of image editing programs to the study of epigraphy. Although there are many examples to choose from, I would like to focus on a case in which the aid of image editing programs has proved to be vital because it has allowed me to improve substantially the readability of a text by manipulating a series of digital photographs taken with both natural and artificial light. In fact, while studying the epigraphic material kept in the Museo Civico Archeologico "U. Formentini" of La Spezia, I glimpsed the faint traces of a text painted on the front surface of a marble base,¹ which usually was considered to be without any inscription by scholars.² Sensing the possibility of

¹ La Spezia, Museo Civico Archeologico "U. Formentini", depots (inv. F 1864); measures: cm 67-68 x 64,5 x (36). Autopsy 2008, 2010 and 2012.

² Cf. the bibliographic references quoted in ANGELI BERTINELLI et al. 2012, pp. 243-248, where a reading of the text was published for the first time (see also [EDR132133 - F. FRASSON]). The first author based her observations also on the material I provided her with, including a preliminary version of an edited digital photograph. Since then, I have had the opportunity to refine the edited images and to conclude clearer results presented in this paper.

highlighting the traces of the writing and, in general, of facilitating the study of the monument thanks to an image editing program, I decided to take pictures of the front of the statue base at different angles of sunlight and light intensity. I also took photographs with artificial light, both straight and at a grazing angle. The pictures taken with grazing light [Fig. 8.1] showed a large and irregularly shaped lowered area on the front surface of the monument (approx. cm 13-20 x 50-52.5; visible to the naked eye). Although no clear traces of the inscription (almost certainly arranged in two rows) that originally occupied that space are visible, the area, chiseled in ancient times, shows several hollows ascribable to the grooves of letters no longer identifiable. As well as highlighting the erased area, the increase in contrast, achieved with the help of a common photo editing program, has also put further emphasis on the clearly visible guidelines etched over most of the front surface of the base, including the erased area. The grid, formed by at least one vertical line (to define the left margin) and sixteen horizontal ones, testifies that the surface underwent preparation before the painting of the new inscription, which was at most eight lines.

The photographs taken with natural light [Fig. 8.2] have proved especially useful for the study of the new text painted on the surface with a red-orange pigment (perhaps red lead), at a time certainly subsequent to the obliteration of the first epigraph (engraved with a chisel). Having selected the photographs in which the traces of the letters looked clearer, I have worked with different parameters of the digital pictures and made various attempts of editing.³

³ I briefly report here the main steps I followed to edit the pictures with Adobe® Photoshop® CS5: 1) contrast enhancement (Image>Adjustments>Brightness/Contrast; Contrast value set at 100); 2) adjustment of color saturation (Image>Adjustments>Hue/Saturation; Saturation value set at -100 for Yellows, Greens, Cyans, Blues and Magentas; Saturation value set at around +60/70 for Reds); 3) vibrance enhancement (Image>Adjustments>Vibrance; Vibrance value set at +100); 4) selective color (Image>Adjustments>Selective color>Reds; Cyan value set at -5%; Magenta value set at +10%; Yellow value set at +60%; Black value set at +50%). Note that similar results can be obtained with different procedures and other image editing programs.

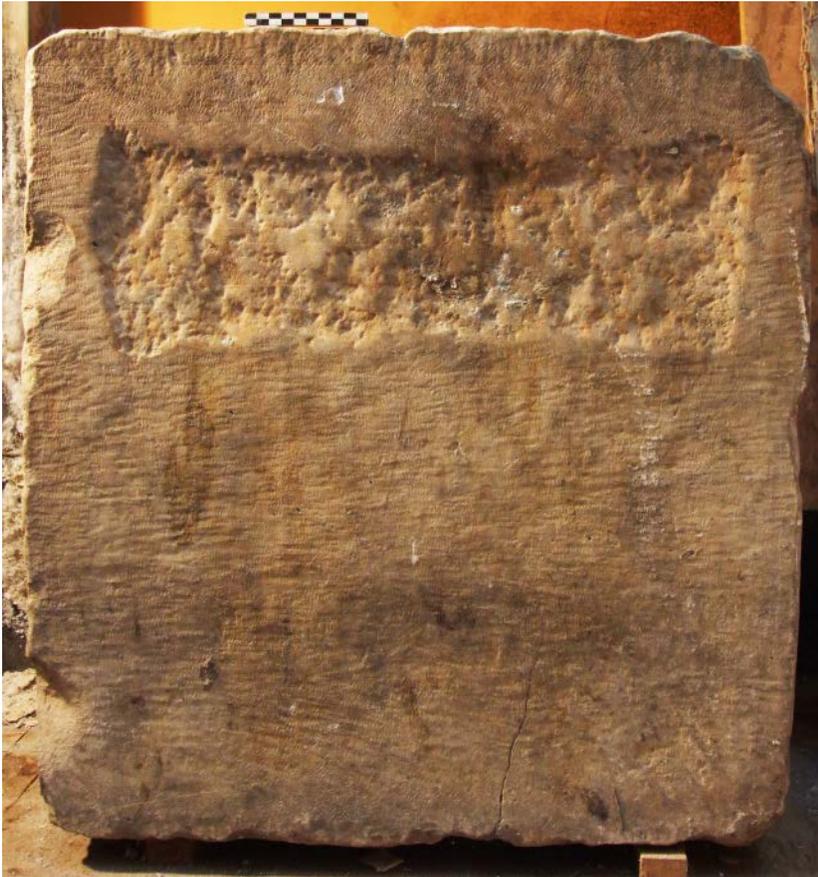


Fig. 8.1. Statue base. Picture taken with grazing light

8.2. Results

The result of the process is satisfactory [Fig. 8.3]:



Fig. 8.2. Statue base. Picture taken with natural light



Fig. 8.3. Example of edited photograph of the front face of the base

- a large number of remains of three lines of writing including several integral and well recognizable letters plus a series of strokes belonging to other incomplete letters are recognizable;⁴
- the lines of visible text follow (with a slight encroachment) the guidelines discussed above confirming that they had actually been traced for the painted inscription;
- almost all of the letter remains are enclosed within the chiseled area perhaps because the greater porosity of the erased surface, compared to that of the rest of the face (more smooth and compact), has allowed the colour to penetrate more deeply and to settle better;
- some stains and spots of colour prove the inscription actually covered much of the base front;
- although there is evidence of many other kinds of stains, the edited photographs show two extended patches which run from the lower edge of the erased area to that of the front surface and which are perhaps due to colour leaking from the inscription.

⁴ Height of letters: approx. cm 5; interline spacing is fixed (cm 2).

After examining the monument and analyzing the edited digital images, I propose a possible transcription of the text:

[- - - - -] / « $\eta\iota\omicron$ + η [- c.3 - C?]ε ρ vo»/«nio Aemi[lio] P ρ apo
V!»+ / «++ $\eta\iota\omicron$ +++[- c.3 -]++++»[.] / [- - - - -] / [- - - - -] / [-
- - - -] / [- - - - -]

Since the exegesis of the text goes beyond the topic of this paper, I will just note that the inscription celebrated a certain Cervonius (?) Aemilius Papus, probably someone famous although not otherwise known and whose onomastic formula survives in large fragments.⁵ In origin, therefore, the base held a statue erected in honour of an important person who probably lived at the end of the Roman Republican age or in the early Empire. At that time, the monument mostly likely stood in the center of town together with other honorific bases that like this one were re-used later under the floor of the church of St. Mary at Luna [FROVA 1984, p. 20]. More than two centuries later, after erasing the first inscription (probably carrying the name of the honoured person or the one of who offered the base),⁶ the pedestal was re-used to celebrate another person, as the traces of the painted text show.⁷ However, it is not clear whether the painted inscription is a final solution or, less probably, whether it represents a rare and interesting example of *ordinatio* with brush-drawn letters.⁸ In the latter case, however, the work on the monument should be considered incomplete, since the engraving of the letters, for some reason, was never performed [ANGELI BERTINELLI et al. 2012, pp. 244, 247].

8.3. Conclusions

Regardless of the interpretation that can be given to single issues, thanks to the digital treatment of the photographs, we have certainly discov-

⁵ The polynomous nomenclature of the honoured man and the fact that a statue (for real or planned) has been dedicated to him suggest that the man was of high rank; note that in Imperial times his likely nomina are combined with the cognomen Papus for example in the names of two consuls (see PIR² II, p. 151, C 684; DEGRASSI 1952, pp. 39, 67; PIR² V 2, p. 267, M 526).

⁶ See similar bases from Luna: [CIL 11 01353, 01373, 06956-06964].

⁷ The palaeographic examination of the characters suggests that the later inscription dates back to the 3th-4th century AD; this solution does not contradict the use of multiple names for the honoured person.

⁸ On this kind of *ordinatio*, cf. e.g. DI STEFANO MANZELLA 1987, p. 127; BUONOPANE 2009, p. 109.

ered a great deal of information. Although tools that are more sophisticated may be used for reading inscriptions similar to the one examined here, this example demonstrates that acceptable results can also be achieved by using simple and easily accessible computer programs.

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PART II

TRANSLATING EPIGRAPHY: CHALLENGES AND RESEARCH
OUTCOME

9. Attic Inscriptions Online (AIO)

Attic Inscriptions in English Translation

Stephen Lambert, Finlay McCourt

Abstract

This paper presents Attic Inscriptions Online (AIO),¹ a website launched in December 2012 and designed to make the inscriptions of ancient Athens and Attica freely available in English translation . It explains the rationale for the site, against the background of existing on-line provision in the field, describes target users, key features, and technical aspects, and outlines progress so far and plans for future development.

Keywords

Inscriptions, Greek, Athens, Translations, Epigraphy, History.

9.1. Background to AIO

Inscriptions on stone are the most important contemporary written documents that survive from ancient Greece. By far the largest and arguably historically most important regional corpus is that of the ancient city of Athens and its surrounding region, Attica. Amounting to some 20,000 inscriptions in all, it is continually being enhanced by the publication of new inscriptions, and by the progress of scholarship. The inscriptions include laws and decrees, of the city of Athens and local groups, financial accounts and inventories, sacrificial calendars, dedications to the gods, boundary markers, and funerary monuments, and supply an immensely valuable window on the history and culture of ancient Athens and Attica. Even in a city as rich in other types of written evidence as Athens, well over 90% of all ancient Athenians known to us by name are known from inscriptions.

¹ <https://www.atticinscriptions.com>

Since the nineteenth century the Berlin Academy has been the internationally recognised body responsible for the publication of authoritative editions of Attic inscriptions, along with those of the rest of mainland and island Greece. Volume I of its Corpus (*Inscriptiones Graecae*) covers the ca. 1500 inscriptions dating before the archonship of Eukleides (403/2 BC, the date of an official change in the Athenian alphabet), the much larger volume II (strictly speaking II and III) inscriptions dating from 403/2 BC to AD 602. New editions are published every few generations: the third edition of *IG* I appeared between 1981 and 1998, and the third edition of *IG* II (most of which was last revised between 1913 and 1940) began to appear in 2012. *IG* aspires to the highest standards of textual scholarship and most of the greatest figures of Attic epigraphy have been associated with it. However, in its hard copy editions *IG* publishes Greek texts only (supported, more recently, by photographs). The textual apparatus and commentaries are in Latin and there are no modern language translations. It is a publication aimed at experienced scholars, well-trained in the conventional disciplines of classical scholarship. *IG* has also begun publishing some of its Attic Corpus online,² in parallel Greek text and German translation. To date *IG* I³ fasc. 2 (dedications, funerary monuments etc.) and *IG* II/III² fasc. 5 (inscriptions of late antiquity) have appeared in this form.

The second resource of major importance is the *Supplementum Epigraphicum Graecum* (*SEG*), which presents an annual digest of new scholarship on Greek inscriptions, including publications of newly discovered texts. In effect, for Athens, *SEG* supplements *IG*, updating it in line with the progress of scholarship in the years between new *IG* editions. There is a website,³ which charges for access.

Since 1976 *SEG* has been published in English, but it does not include translations.

The third important resource is the Packard Humanities Institute (PHI) website.⁴

It does not publish original work, but makes freely available already published Greek texts, from *IG*, *SEG* and elsewhere, in a conveniently searchable database. The site is very useful, though it is becoming

² <http://pom.bbaw.de/ig/editionindex.html>

³ <http://www.brill.com/publications/online-resources/supplementum-epigraphicum-graecum-online>

⁴ <http://epigraphy.packhum.org/inscriptions>

rather out of date, with no coverage of *SEG*, for example, since 1997. It also includes no translations.

A few English translations have been available in standard hand-book collections of inscriptions,⁵ but much less than 5% of Athenian inscriptions have previously been published in English, or any other modern European language, whether in print, or online. This has seriously impeded access to this source material by students and researchers who do not have the knowledge and skills of the traditional classical scholar. In this area epigraphists have fallen behind their colleagues dealing with literary texts, who have long since supplied readers with English translations of all the major works of Greek literature, and some of the most useful recent collections are in English only. The main purpose of AIO,⁶ which we launched on 10 December 2012, is to broaden access to Attic inscriptions by making new, authoritative, English translations of them freely available online.

9.2. Target users of AIO

AIO is targeted primarily at three groups of users:

1. at teachers and learners, mainly of ancient history at University level, but also less advanced students, and members of the general public with an interest in ancient Athens;
2. at researchers interested in the history of Athens and Attica, particularly those without advanced knowledge of Latin and Greek, of Greek history and epigraphy, or of modern European languages other than English;
3. at researchers with good linguistic skills and background knowledge, but seeking quick and easy access to an authoritative and up-to-date translation and textual bibliography. This includes those who may have good knowledge of literary Greek, but be less familiar with the peculiarities of epigraphical Greek. In addition to researchers interested in individual translations, the site will also be useful to those seeking to interrogate the epigraphical corpus as a whole or groups of inscriptions within it.

⁵ Most notably recently in RHODES et al. 2003, revised 2007, in which the majority of the 102 inscriptions are Athenian

⁶ <https://www.atticinscriptions.com>

9.3. Key features of AIO

AIO has a number of design features which have been developed specifically with this user profile in mind:

9.3.1. Site navigation and search

The site has been structured to enable access to the translation of an inscription in a user-friendly and intuitive manner. At present there are two ways a translation can be accessed: by source reference, and by word search.

Source reference The “Browse”⁷ page provides a list of relevant published sources for the Greek texts of Attic inscriptions, including *IG*, *SEG* and other works. Each of these leads to a page displaying, in the right panel, bibliographical information about the source, and, in the central panel, a list of specific entries.⁸ Each of these leads in turn to a page which displays the translation of the relevant inscription.⁹ One of the difficulties with using Attic inscriptions in research is that an individual inscription may have a long and complex bibliographical history, which can be difficult for the non-specialist to navigate. AIO is structured to help the user navigate through this “maze”, allowing for quick and easy access to the same, up-to-date, translation regardless of which bibliographic reference is used. For example, the translation of *IG* I³ 10 can also be accessed through *SdA* II 149, *ML* 31, and *SEG* 51.27, the other source references under which the inscription is listed.

Word search The site’s search functionality¹⁰ also provides a means for users to navigate the inscriptions on the site on the basis of the content of the translation. Searches can be effected for a given word or set of words within the text of a translation. The search results page provides a list of links to inscriptions that contain the query terms, along with an extract from the text of the translation highlighting the first occurrence of the search term.¹¹ When a

⁷ <https://www.atticinscriptions.com/browse/bysource>

⁸ E.g. <https://www.atticinscriptions.com/browse/bysource/IGI3>

⁹ E.g. <https://www.atticinscriptions.com/inscription/IGI3/10>

¹⁰ <https://www.atticinscriptions.com/search>

¹¹ e.g. <https://www.atticinscriptions.com/search/?q=law>

translation is accessed through the link provided on the search results page, the word or words used to make the query are highlighted in red.

9.3.2. Translation display

Although accessible via a number of different source references, all the inscriptions on the site are treated as translations of the Greek text from a single bibliographical source, so that they can be accessed at stable, semantic URLs. These URLs are built using the abbreviated reference to the prime textual source, and the numbering (or other identifier) of that inscription within the source. The translation of *IG I³ 10* can therefore be found at <https://www.atticinscriptions.com/inscription/IGI3/10>. The use of stable URLs of this type also aids our aim of serving the translation and inscription data in different standard formats, such as TEI/Epidoc XML, so as to ensure compatibility with other projects in the field.

The text of the translation is presented in the central panel of the page, headed by a brief title (e.g. “Athenian judicial relations with Phaselis”), reference to the source of the text translated (*IG I³ 10*) and date (469-450 BC). Greek texts of Attic inscriptions are, as noted above, readily available, online and elsewhere. We have taken the view so far that it would be superfluous to duplicate that provision on AIO. However, we do propose to include links to on-line Greek texts, and AIO does supply transliterations, e.g. of key terms, words which are difficult to translate and phrases which are only partially preserved. As these transliterations can be turned on and off, they accommodate both those with some knowledge of ancient Greek, and those with none at all. This feature is designed to enhance the utility of AIO as an educational resource, especially where Greek history is being taught on the basis of texts in translation.

Translations on the site have been released under a Creative Commons Attribution-ShareAlike Licence.¹² This ensures that they are freely available and can be reproduced in other websites or publications so long as their origin is acknowledged and they are in turn made freely available.

¹² http://creativecommons.org/licenses/by-sa/3.0/deed.en_GB

9.3.3. Translation metadata

Other key bibliographical references to the inscription translated are displayed in the right panel, in this case (*IG I³ 10*): *SdA II 149*, *ML 31*, and *SEG 51.27 (l. 4)*. The addition “(l. 4)” indicates that the translation diverges in l. 4, in a manner recorded in *SEG 51.27*, from l. 4 of the “text translated”, i.e. that in *IG I³*. In the right panel is also displayed the name of the translator, together with key information about the inscription: the monument type (e.g. stele), inscription type (e.g. Decree of the Council and People), original location (where, as commonly in the case of decrees, this is specified in the text of the inscription) and findspot. All translations are freshly prepared specifically for AIO (thus avoiding copyright issues), with the aim of ensuring that they are based on the most authoritative and up-to-date Greek texts, and are broadly consistent in translating recurrent words and phrases. Translations are updated in line with feedback from users and new publications, and at the bottom of the right side panel there is an indication of the date a translation was added to the site and the date it was most recently updated.

“Side notes” to a translation can also be found in this right hand panel, similar to the “footnotes” conventionally used in print publications (see e.g. <https://www.atticinscriptions.com/inscription/SEG/21541>). We have used these quite sparingly so far, but there is potential to develop this feature to supply further explanatory information about the inscriptions translated. The fullest annotation is to be found in the recently launched translations of *IG II³ 1, 1135-1255*.

9.3.4. AIO Papers

In March 2014 we launched the first in the series *AIO Papers*,¹³ accessible, for reading on the screen or download, from the left panel of the home page. This series, publications in which are subject to peer review, complements the translations in AIO:

- a by supplying a forum in which the Greek texts underlying the translations published in *AIO* may be clarified. Thus e.g. *AIO Papers* no. 1 discusses the texts of inscriptions of the Marathonian Tetrapolis, no. 5 the text and date of *IG I³ 377*, the difficult reverse face of the “Choiseul marble”.

¹³ <https://www.atticinscriptions.com/papers>

- b** by publishing essays designed to equip the user of AIO with the background knowledge necessary to understand the inscriptions in historical context.
- c** by publishing other papers consistent with the objectives of AIO. This includes translations of important articles written by scholars in languages other than English but which deserve a wider circulation among an Anglophone readership.

AIO Papers are at present mostly made available free of charge, but a charge is levied for those that have been produced without financial support from academic institutions or grants.

9.4. Technical aspects of AIO

The implementation of AIO proceeded on the basis that there was no existing content management system (CMS) or other software solution that would suit the requirements of translations of inscriptions and the associated metadata and that a custom solution was therefore needed. The site is built using Django,¹⁴ a widely used Python web application framework, which allowed access to a range of existing applications for the implementation of generic elements of the website.

For the inscription data itself, a Django application, named “Stele”, was developed by McCourt specifically for the project. While the text of the translation in isolation could be served by any number of content management systems, the metadata associated with an inscription is key to identifying and retrieving a given translation. Currently the site uses the source references of a translation to allow for browsing of inscriptions on the site. However, navigation should not be limited to this method only, and the Stele application was structured in such a way that the navigation of the site, and searches upon the data, could eventually be effected or augmented with any of the metadata associated with an inscription. The translations of inscriptions and associated metadata are described using Django’s object-relational mapping and stored in a relational database (currently PostgreSQL, though MySQL was used for the initial version of the site).

Text indexing and search is effected through the Haystack Django library in conjunction with the Whoosh search engine. A “Python

¹⁴ www.djangoproject.com

only” solution for these aspects of the site make setup and deployment considerably easier, and given the scale of the dataset at present, a more fully featured search engine is not required.

Translations can be typed onto the website directly via the admin. interface or transferred from MS Word Documents using scripts that enable direct importation into the Stele application. A lightweight markup language has been defined to allow for the various features of a translation, i.e. transliteration or side notes, to be input without the need for any HTML to be written directly.

9.5. Progress so far

As of 10 July 2014, i.e. ca. 19 months into the life of AIO, the key statistics for the site are as follows (source: Google Analytics):

- number of visits: 10,894
- number of visitors: 6668
- average pages per visit: 6.68
- average minutes per visit: 2 minutes 58 seconds
- total page views: 72,729
- locations (“cities”) from which AIO visited: 1603 in 93 countries

Top ten countries (in order of number of visits): UK, USA, Greece, Germany, Italy, France, Canada, Netherlands, Japan, Australia.

On this date the site carried 316 translations and a further 153 were scheduled for publication on 27 July, 469 in total (increased to 471 on 14 September).

Even in its current embryonic state, it would seem that the site is already attracting a fair number of serious users from all around the world.

9.6. Future plans and EAGLE context

The large majority of the inscriptions published on AIO up to 27 July were not previously available in English translation, on-line or in print, but this still amounts to a mere 2% or so of the total Attic corpus. Our first priority is to increase the number of translations available on the

site. Translations currently in preparation should boost the total to over 1,000 in 2015. After that we plan to give some priority to (a) translations of newly published *IGs*; (b) inscriptions from before 403 BC, a relatively small and manageable group, likely to be most used for educational purposes at undergraduate level and below, and including the texts which generally present the most difficult Greek.

A second priority is to ensure that existing translations are kept up-to-date with the progress of scholarship, and to build out the supporting information about the inscriptions, both in the “side-notes” to individual translations, and via AIO Papers.

The site architecture has been designed to facilitate interrogation of the data via a range of different searches, both simple and multi-faceted: for example by date, by findspot, by original location, by monument and inscription type; and key data in the translations (e.g. place names) is being tagged so as to enable their presentation and deployment in useful ways in teaching and research. We plan to implement these features progressively as the number of inscriptions increases.

We are keen also to ensure, as the site develops, continuing compatibility and complementarity with other websites in the field of Greek and Latin epigraphy. At the time of writing we shall shortly implement plans to serve the translations and inscription data in XML and JSON. This, along with similarly formatted indices of inscriptions on the site, will provide a simple API to allow for enhanced collaboration and integration with the EAGLE project. At the time of writing we are also developing plans to link individual translations with Greek texts on the PHI and IG websites, as well as considering work needed to integrate with Pelagios and Pleiades and other relevant emerging linked data projects.

AIO looks forward to further fruitful collaboration and exchanges within the context of EAGLE, which we hope will provide stimulus and a framework for further much needed development of, and integration of AIO with, other on-line resources in the field, including photographs, as well as resources for inscriptions from other regions of Greece.

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10. Towards an EAGLE Standard in Translating Inscriptions

Francesca Bigi

Abstract

The paper deals with the translation of inscriptions, a crucial and innovative aspect within the EAGLE project that allows the non-scholarly public to approach and understand texts written in dead languages. As a result of first hand experience, a series of basic guidelines are proposed for future work in this field, ranging from who should be in charge of such task to how it should be dealt with. In particular, attention is paid to the question of how to render the lapidary language and stereotyped formularies and consequently to what extent the translation into a modern language should differ from the original text.

Keywords

Inscriptions, Translations, Modern Languages, Formularies, Diacritic Signs.

10.1. Introduction

Within the EAGLE project, translations of Greek and Latin epigraphies into modern languages represent a crucial task and one of the project's most innovative aspects. The importance of translations is patent to all of us, since reaching the widest possible audience and thus extending the fruition of inscriptions to the non-scholarly public represent the keys to the success of this project.

10.2. Translations: an innovation

If we go through the most well-known handbooks and manuals of Latin epigraphy we will not only see that translations appear very seldom, but also that no theoretical base has been established for such practice. All manuals are furnished with an appendice containing the most common epigraphic abbreviations with the relative Latin resolutions, but

very few of them offer their translation.¹ The same can be said for the inscriptions discussed or taken as explanatory examples within the text. Clearly this depends on the fact that full knowledge of dead languages is given for granted and that it is implicitly understood that even beginner's manuals are intended for a public acquainted if not fully fluent with Latin. This is most true of the Italian tradition of studies.²

As far as finding a theoretical base for the proper manner to translate, manuals fail completely to help. The process of understanding, recording and editing an inscription is always discussed at length, but no matter how detailed the publication might be, such process inevitably starts from the bibliographical research, goes through the autopsy and ends with the edition of the Latin text, with no mention of the possibility to translate it.³ The 'profession of the epigraphist' is fully theorized, that of the translator isn't.

Thus, what do we do when faced with the task of rendering inscriptions into a modern language? To the present day we should rely on and draw inspiration from the existing online *corpora* and from the examples scattered in single publications, although these normally regard specific geographical or chronological contexts.⁴

10.3. An EAGLE vocabulary for translations?

Another answer to the question just asked naturally lies in the possibility of establishing an EAGLE template vocabulary which would ideally contain translations into the most important modern languages of the most commonly found Latin epigraphic expressions.

¹ Translations appear in the English handbooks of GORDON 1983 and KEPPIE 1991 and in the Spanish one by ANDREU PINTADO 2009, pp. 407-419, which also contains a very detailed glossary for the appropriate rendering of specific architectural terms.

² All the following Italian manuals supply translations for neither inscriptions nor formularies: CALABI LIMENTANI 1968; SUSINI 1982; DI STEFANO MANZELLA 1987; BUONOPANE 2009; the same in CAGNAT 1964 and in T. Elliott's Abbreviations in Latin Inscriptions available on line at <http://classics.case.edu/asgle/bookshelf/abbreviations-in-latin-inscriptions/>. No translations also in FRIGGERI et al. 2012, even though it is a publication intended for the wider public: «Un catalogo di epigrafi ... realizzato con intenti scientifici, ma anche divulgativi».

³ See the titles listed above and also PANCIERA 1998.

⁴ As a mere example see TANTILLO et al. 2010 which contains a translation into Italian of ca 100 inscriptions from Lepcis Magna (Libya) or CÉBEILLAC-GERVASONI et al. 2006, selected epigraphs with French version from Ostia.

The advantages of a similar set of tools are patent. First, making use of ready-made, pre-determined, fully acknowledged and approved versions of standard *formulae* would speed the translation process enormously, as it would spare the burden, so far laden on each translator, of researching for the best way to render such *formulae*. To say it in a word, it would be time and energy saving.

Second, and most important, it would guarantee a good level of homogeneity within the enormous bulk of translated texts which will populate the database. And homogeneity reduces end-users' confusion. Seeing that *Dis Manibus* is rendered with 'to the Gods below', 'to the Gods of the Afterlife' or 'to the spirits of the dead', and with 'agli Dei Mani' or 'aux Dieux Manes' won't certainly help the user in understanding who these *Di Manes* were and why they appeared in the epitaphs of dead Romans.

Last but not least, it would reduce the risk of inaccurate translations.

Appendices of translated common abbreviations like Keppie's and glossaries like Andreu Pintado's may very well be the starting point of a discussion on an Eagle common vocabulary.

10.4. A vocabulary: some suggestions

Whether for an EAGLE vocabulary or simply for future reference, are here collected a few suggestions on the translation practice, as sprung from a first-hand experience on the *Inscriptions of Roman Tripolitania*, mainly Latin epigraphies already translated into English which required an Italian version.

As a general remark, we may note that if the inscriptions belong to an already translated corpus - as the *IRT* or for example Aphrodisias in Late Antiquity (*ALA*) - it would be advisable to accord the new translation to the existing one in order to respect the linguistic choices made by the earlier translator, especially if the latter is also the editor of the texts.

Turning to more specific issues, the rendering of lapidary language is certainly a question for anyone attempting the translation of an epigraph. The linguistic structure of Latin with cases, the use of stereotyped formulas and abbreviations, the frequent omission of words are all characteristic traits of the lapidary language, developed as a mean to express complex concepts with few words and to convey as many information as possible within a limited amount of space. Naturally,

when translating it is quite impossible to maintain the same degree of conciseness, however it is advisable to render the meaning with the least number of words possible and to comply with the inscriptions' paratactic style, especially when enumerating, say, the titles of an emperor or the *cursus honorum* of an officer.

10.4.1. To whom should the job be assigned

It may seem an idle question, but it isn't.

The *Inscriptions of Roman Tripolitania* came with an existing English translation made by J. Reynolds. At first sight the task appeared like a sheer translation from one modern language (English) into another (Italian) and thus like a job that could be assigned to anyone fluent in those two languages. First hand experience proved us wrong, showing that translating straight from English into Italian, without taking into account the original Latin text, was highly unsatisfactory as the resulting Italian texts had lost all connections with the original Latin ones, they ended up being extremely inaccurate and they presented but a few linguistic problems.

We may all agree then that it is necessary that no matter how many versions there might already be, each new translation has to be done straight from the original Greek or Latin text, and the translation task must therefore be assigned to people with specific knowledge in the field, such as epigraphists, archaeologists, philologist, etc.

10.5. What is to be translated

Although fragmentary inscriptions and fragments containing only minor portions of the text or even of a single word do form a consistent part of epigraphic collections and *corpora*, within the EAGLE project they should not be considered as translatable. Their publication is of interest for the scholarly, but the non-specialist would make very little if not no use at all of it, even when translated.

Consequently in dealing with the *IRT*, texts like the following have been left aside, even if J. Reynolds had in most cases attempted to render them in English.

[...] honoratus / [cisto]forus Cirten(sis) / [...]ris deum
v(otum) s(olvit)
(IRT 272)

or

[...]ENIO[...] / [...]MA[...]
(IRT 285)

or

[...]di / [...]tis / [... Ne]ptuni / [...]n
(IRT 307)

Too fragmentary parts of an otherwise translatable texts can also be left aside and properly signalled with diacritic signs:

[Imp(eratore) Caes(are) Nerua Tr]aiano [Au]g(usto)
Ger(manico) D[acico] / [pontif(ice) max(imo) trib(unicia)]
pot[est](ate) XVII im[p(eratore) VI / co(n)s(ule) VI p(atre)
p(atriciae)] / [· ? ·]VEV[· ? ·] / [---] // [· ? ·]nio[· ? ·]
// [· ? ·]ell[· ? ·] // [· ? ·]h[onora[· ? ·]] / [· ? ·]rauit[· ? ·]

When the emperor Caesar Nerva Trajan Augustus Germanicus Dacicus was chief priest, holding tribunician power for the seventeenth time, acclaimed victor six times, consul six times, father of the country [...] (IRT 354)

10.5.1. Titles

In the MediaWiki page translations into modern languages are furnished with a title. In this instance I decided to drift slightly from what had been previously done by J. Reynolds. She had given quite simple titles which referred strictly to the text, whereas I preferred to consider also the monument in which the inscription is to be found. Consequently I labelled:

“Base di statua/lastra con dedica ad Augusto” (= Statue base/panel with dedication to Augustus)

“Iscrizione dedicatoria dell’arco di Tiberio” (=Dedicatory inscription of the arch of Tiberius)

“Stele con iscrizione sepolcrale per Flaminia Agave” (Stele with funerary inscription for Flaminia Agave)

When labelling honorific inscriptions, the title may also contain an indication of the rank of the honorand, as done in the *Last Statues of Antiquity* database (e.g. *LSA 2*: "Base for statue of Theodorus, governor of Achaea"), and eventually the awarder (e.g. *ala2004 26*: "Fl. Eutolmius honours Arcadius"). However, it would be best to opt for short or medium length titles in order to avoid burdening the landing page with too many information.

10.5.2. Diacritic signs and punctuation

Editing an ancient inscription implies the use of diacritical signs [KRUMMREY et al. 1980, PANCIERA 1991], but what about them when translating? Generally, it would be best to avoid them as much as possible: scholars interested in the critical reconstruction of the text will look only at the Latin edition and won't be particularly concerned by their absence in the translation, whereas the profane user might get very confused by their proliferation.

Round brackets conventionally used for resolving an abbreviated word should never appear in the translation:

Annobal prae(ectus) sacr(orum) Himilchonis Tapapi
f(ilius) Rufus d(e) s(ua) p(ecunia) fac(iendum) coer(auit)
idemq(ue) dedicauit.

Annobal, in charge of sacred things, son of Himilcho
Tapapius Rufus, saw to the construction at his own expense
and also dedicated it.

Square brackets should also be omitted when the whole text is restored to full intelligibility and/or the proposed integrations are marked by the editor as certain. This applies for example to names of Gods and persons, religious, administrative and military posts, parts of the imperial titlature or parts of single words, etc:

[Deo Her]culi gen[io] colon[iae] Lep[icitani] p[ublice].
(IRT 287)

not: [To the god He]rcules, genius of the colony, the
people of Lepcis (set this up) publicly.

instead: To the god Hercules, genius of the colony, the
people of Lepcis (set this up) publicly.

Similarly

[XV]vir sacris faciundis

or

[Hadriano] divi Traiani f(ilio)

should be

Quindecemviro addetto ai riti sacri

Hadrian, son of the deified Trajan

There are however instances in which diacritic signs are required also within the translation. When employed, such signs should comply with the epigraphic standards.

As previously remarked, a typical characteristics of ancient inscriptions is the suppression of certain words, often but not always verbs, which were considered understood. A classic example is an inscription mentioning the name of a woman followed by that of her husband with no further indication of their relationship:

Caeciliae Q. Cretici f. Metellae Crassi

or the *formulae* for statue dedications which are frequently devoid of the verb *ponere*, *conlocare* and similar:

Deo Herculi genio coloniae Lepcitani publice
(IRT 287)

In such cases the omitted words are hardly ever integrated by the editor, but in order to render the original meaning properly, the translator should instead add their correspondent. The insertion should be easily detectable and thus properly marked within round brackets:⁵

⁵ PANCIERA 1991, p. 17 refers to round brackets within the Latin text as «un intervento chiarificatore dell'editore» and that certainly applies also to our case.

To the god Hercules, genius of the colony, the people of
Lepcis (set this up) publicly

Lost portions devoid of integration, either at the end or at any other point of the inscription, should be signalled like in original text by means of [...] or [---] and never with

Titus Flaviu[s ·]arinus centurio legionis [...]

Titus Flavius [...]arinus, legionary centurion [...]

As far as punctuation is concerned, even when lacking in the Latin edition, translators should be encouraged to use it. The insertion of commas, semi-colons and especially full stops when the end of text is preserved is a simple yet very useful mean of increasing the text's intelligibility.

10.6. Names

As current practice among humanities, proper names should generally be transcribed in the nominative case, except for those personages that boast a long storiographic tradition, namely emperors: i.e., in Italian, Giulio Cesare (Julius Caesar); Augusto (Augustus); Costantino (Constantine) as opposed to Quintus Marcius Barea; Quintus Servilius Candidus, and local names surviving from pre-Roman cultures, such as - in the *IRT* case - Suphunibal, Muthunbal, Iddibal Caphada, etc.

For most modern languages this is a futile statement, yet there are those languages, like Italian, in which ancient names tend to be translated, so Quintus very often becomes Quinto.

The tendency to 'Italianize' applies also to the *cognomina ex virtute*, thus Germanicus, Parthicus and similar are rendered with Germanico and Partico, as opposed the English 'victor over the Germans' or 'victor in Parthia'. This is one of those cases when the less lapidary translation is certainly to be preferred: 'victor over the Germans' fully renders the meaning of the Latin expression and annihilates the risk of misinterpretation. Note that for an Italian non-specialist reader Germanico means of *German origin*.

One last remark. In inscriptions, emperors are often referred to by means of a long titulature which may omit the name with which they are commonly known. Caracalla is called *M. Aurelius Antoninus Augusto Septimi Severi filius*, Caligula is *Gaius Iulius Caesar Germanicus* and so on. It should be decided whether the emperor's conventional name should appear within the translation in round brackets: *M. Aurelius Antoninus Augusto Septimi Severi filius (Caracalla)*, or whether such clarification can be more easily expressed in the title: *Inscription in honour of Caracalla*. Personally I would opt for the second form.

10.7. Offices and formularies

Lastly, offices and formularies, the rendering of which is perhaps the most tricky and troublesome aspect faced by the translator, as it is not always easy to maintain the balance between loyalty to the Latin text and reader-oriented transcriptions. Moreover, languages like Italian have again derivative words (e.g.: *flamen/flamine*) which one might be tempted to employ, but if 'flamine' is not furnished with further indications, no one outside the academic world will understand what the text is referring to. A good compromise - already adopted in the *IRT* online - could be to use the modern word closest to Latin and have it followed by its synthetic explanation: *flamine (sacerdote)*, *sufeta (magistrato locale)*, etc.

Specific parts of the imperial titulature, such as *tribuniciae potestates*, imperial salutations and the already mentioned *cognomina ex virtute*, should again be translated in a manner that allows the reader to grasp the meaning, thus *imperator X* should be rendered with 'acclamato imperatore per la decima volta' (acclaimed emperor for the tenth time) e not simply 'imperatore per la decima volta' (emperor for the tenth time).

While discussing the matter in the previous months, it has been suggested by U. Gehen that we should ideally be able to mark up these expressions like it is done in a Wikipedia page, so that they could be linked to an external resource which would allow further explanations, should the reader wish them.

All the other expressions, which for brevity reasons cannot be examined here, like *publice*, *votum solvit libens merito*, *faciendum curavit*, *in fronte pedes in agro pedes*, *ornator patriae* and all the most common stereotyped epigraphic phrases do deserve discussion and need to be the object of a joint reflection between translators.

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11. Translating Greek and Roman Inscriptions

Camilla Campedelli

Abstract

Giving some examples I would like, with this contribution, to add to the almost non-existent discussion about the need to provide epigraphic editions with a translation in a modern language, and to stress its high scientific value. Translating ancient inscriptions is not easy and for exactly this reason it is absolutely necessary. Most of the problems in translating inscriptions arise from 1) the absence of the original context, 2) the text's elliptical form of expression, and 3) the specific cultural lexicon.

Keywords

Inscriptions, translation, edition, editor, Suetonius

Although the translation of literary sources is a long-standing practice among philologists, the same certainly cannot be said for epigraphists. From the traditional Berlin corpora – *Corpus Inscriptionum Latinarum* and *Inscriptiones Graecae* – to the most important annual publications (*Année Epigraphique* and *Supplementum Epigraphicum Graecum*) and the majority of articles, it is only rarely that a good translation into a modern language accompanies the critical edition of an epigraphic text of short or medium length.

Famous inscriptions such as that of the imperial biographer and functionary in the imperial service C. Suetonius Tranquillus from *Hippo Regius (Africa Proconsularis)* have not been translated. The inscription [AE 1953, 0073] reads:

C(aio) Suetoni[o - - -] / Tran[quillo], / [f]lami[ni - - -], /
 [adlecto] int[er selectos(?) a di]vo Tr[a/iano - - -], pont(ifici)
 Volca[n]i, / [- - - a] studiis, a byblio[thecis], / [ab e]pistulis
 / [Imp(eratoris) Caes(aris) Tra]iani Hadrian[i Aug(usti)]
 / [Hipponienses Re]giū d(ecreto) d(ecurionum), p(ecunia)
 p(ublica).

What, for example, does *adlectus inter selectos* mean? An expression like this is not immediately clear. It is attested in only four inscriptions and means, according to the dictionary, ‘judge selected by the *praetor*’. Is this still the most precise and up-to-date interpretation? In the most recent article on this inscription [WARDLE 2002, 462–480.] the meaning of this office is not even mentioned and, for Suetonius’ position as a secretary in the imperial household, only the Latin expression *ab epistulis* is used. Why? I would like the most recent publication to tell me what exactly this expression means. Certainly, this point has been discussed before and does not require a lengthy repetition of the current state of research, but the simple translation of the expression would clarify the matter without taking up more space than a few words. I get the impression that authors often use Latin expressions as a way to avoid giving their personal interpretation.

Among the few exceptions I note, among the digital editions, EAGLE and the *Inscriptions of Aphrodisias Project*, and, among the print editions, the new volumes of the *Corpus Inscriptionum Iudaeae Palaestinae* [COTTON et al. 2010, pp. V-VII.] in which every text is translated into English.

The presence of translations in editions of Greek and Roman inscriptions mostly depends on the editor’s philosophy. There is today no consensus view on the appropriateness of translating ancient inscriptions, except in the case of the so-called ‘historical inscriptions’ such as the *Res gestae Divi Augusti* or the *Senatus consultum de Gnaeo Pisone patre*.

With my contribution I would like to add to the almost non-existent discussion about the need to provide epigraphic editions with a translation in a modern language, and to stress its high scientific value.

Translating ancient inscriptions is not easy and for exactly this reason it is absolutely necessary. It requires knowledge not only of the source’s language but also of the archaeological, historical, religious, social and administrative context. Through the translation the editor

is forced to take a position on the text's meaning, which consequently relieves the burden on the commentary. Most of the problems in translating inscriptions arise from

1. the absence of the original context;
2. the text's elliptical form of expression, and
3. the specific cultural lexicon.

11.1. Absence of the original context

This is, for example, the case with inscriptions that mention the construction of a *semita*. In literary sources, *semita* sometimes indicates narrow streets or footpaths in the city center or in the countryside, and sometimes the sidewalk, as can be inferred from the context. In the law of the *tabula Heracleensis* [CIL 01 (2), 00593 cf. p. 724, 739, 916 = ILS 6085, v. 53–55], *semita* means sidewalk but in other Italian epigraphic sources, which have by now been completely decontextualized from their archaeological milieu, the ambiguity of meaning remains, so that it is impossible for the editor now to take a position on the question [CAMPEDELLI 2014, 13–14, 199]. For example, CIL 10, 05055 reads:

L(ucius) Arruntius L(uci) f(ilius) / co(n)s(ul), XVvir / sacrieis faciundis, / viam, semitas faciundum, / clouacam reficiundam, / d(e) s(ua) p(ecunia) c(uravit).

L. Arruntius son of Lucius, consul, XVvir sacris faciundis (one of the fifteen priests having charge of the Sibylline books and the ceremonies prescribed in them) made the road and the lanes (or sidewalk) and remade the sewer at his own expense [CAMPEDELLI 2014, 114–115 n. 4].

11.2. Elliptical form of expression

Interpreting inscriptions can often be complicated by the fact that the texts often omit basic linguistic elements such as verb, or direct object. In this regard, I would like to show you two milestones from Pisoraca (Herrera de Pisuega – Palencia) in the Roman province Hispania citerior Tarraconensis.

The first milestone [*CIL* 02, 04883] reads:

Ti(berius) Caesar divi Aug(usti) f(ilius) / divi Iuli n(epos)
Aug(ustus), poñt(ifex) / max(imus), trib(unicia) pot(estate)
XXXV, / imp(erator) IIX, co(n)s(ul) V. / A Pisoraca m(ille)
passuum).

The second one [*CIL* 02, 04884] reads:

Nero Claudius divi Claudi / Aug(usti) f(ilius) Ger(manici)
'Caesaris' n(epos) / Ti(beri) Caes(aris) Aug(usti)
pron(epos) divi / Aug(usti) abn(epos) Caes(ar) Aug(ustus)
Ger(manicus), / pont(ifex) max(imus), tr(ibunicia)
pot(estate) IIII, co(n)s(ul) / <II vel III>./ A Pisor(aca)
m(ille) passuum).

As you can see, the verb is missing in both inscriptions. Modern editors have translated both inscriptions very cautiously without giving a verb. In the first case:

Tiberius Caesar, hijo del divino Iulius, augusto, pontífice máximo, con el poder tribunicio por 35 vez, el consulado por 5a vez y el imperio por 8a vez. Desde Pisoraca I milia (Tr. SOLANA 1981, 211 n. 2) [FERNÁNDEZ 1965, p. 201; SOLANA 1981, 211 n. 2; PÉREZ GONZÁLEZ et al. 1992, 74 n. 2.]

In the second case:

Nero Claudio, hijo del divino Claudius, augusto, nieto de Germánico, César, bisnieto de Tiberio César Augusto, tataranieta del divino Augusto, César, augusto, germánico, pontífice máximo, con la tribunicia potestad por cuarta vez y el consulado (por segunda). A Pisoraca I milia. (Tr. SOLANA 1981, 212 n. 3.)

The so-called antiquiores (the editors who published inscriptions before the creation of the *CIL*) translated the final part of the inscriptions, after the name and powers of Tiberius and Nero, as follows:

- the Tiberian inscription [CIL 02, 04883]:

... mandó aderezar este camino, y mandó poner en él este mármol á una milla de Pisuerga (Tr. DE MORALES 1792, 54f.)

commanded the enhancement of this road and commanded that the marble be put in it about a mile from Pisuerga;

or

compuso una milla de este Camino desde Pisoraca (Tr. FLORÉZ 1750)

built a mile of this road from Pisuerga.

- the Neronian inscription [CIL 02, 04884]:

aderezó aquel camino mil pasos del rio Pisuerga (Tr. DE MORALES 1792, p. 55)

enhanced this road about a mile from Pisuerga.

Thus, in their translations of both inscriptions, the *antiquiores* supplemented the verbs *muniuit* ('mandó aderezar' = commanded the enhancement) and *fecit* ('compuso' = built) and the expression *miliarium posuit* ('mandó poner este mármol' = commanded that the marble be put). In the case of the Tiberian milestone both translations can be accepted, epigraphic evidence confirms that the road was built under Tiberius, but we can not exclude that the road had already been drawn in the Augustan period or before. It should also be correct that 25 years later (under Nero, in the second inscription) the same stretch of road was enhanced by a new milestone by Nero to legitimize his power. Appropriately, the *antiquiores* distinguish between the two texts in their translations: it would be wrong to translate both with the verb *fecit*, as the chronological interval of 25 years is insignificant for a robust piece of infrastructure like a Roman road.

11.3. Specific cultural lexicon

Roman inscriptions contain a high percentage of vocabulary from a specific cultural lexicon which is very difficult, sometimes impossible, to translate. This is the case e.g. with Roman public offices. *Quaestor* can be translated as 'financial official', but you can't translate *consul* with

any word other than ‘consul’. *Praefectus praetorio* (or *praetorii*) means during the Roman Empire up to the Late Antiquity the commander of the Praetorian Guards. Under Constantin the *praefectus praetorio* lost the military power and became one of the four highest “provincial” administrators of the Roman Empire.

A translation is always done on two bases: grammar and lexicon. Attaining grammatical adaptability is the easier task... The accommodation of the source language’s lexical structure to the target language’s semantic requirements causes more difficulties for translators... Contemporary linguists distinguish lexical differences on three levels:

- the first is the level where we can easily discover the equivalent;
- the second is the level that includes denominations that signify different objects in different cultures, but which have the same functions;
- the third level – as already seen – contains specific cultural attributes, and here it is impossible to avoid the target forms and expressions, especially if there are differences in cultural type.[SIRAKOVA 1998, p. 79]

To these three levels, in my view, a fourth level could be added, namely that of deliberately untranslatable words such as the *voces magicae* in the *defixiones* (binding spells). *Voces mysticae* or *magicae* were words not immediately recognizable; they represent the language of the demons, which only the magician and the demon can understand [GAGER 1992, p. 9].

To conclude: Greek and Roman inscriptions are normally read for research and not for pleasure. Our texts are for the most part far from the sphere of literary production: most funeral inscriptions do not, of course, have the appeal of the epitaphs of Spoon River. Consequently, in my opinion, the goal of translating inscriptions should be to make the text comprehensible but not to produce a literary work – except perhaps for the *Carmina Latina epigraphica*.

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12. The EAGLE Mediawiki

A fully collaborative database for academics,
data engineers and the general public

*Pietro Maria Liuzzo, Andrea Zanni, Luca Martinelli, Lorenzo Losa,
Pietro De Nicolao*

Abstract

In this paper we present the setting up and the development of the first use of Wikibase outside of Wikidata, its benefits, and the challenges of its implementation. The extension installed in the EAGLE Mediawiki allowed to import major online corpora of inscriptions with translations and allows simplified ways of creating triples and connections with Wikimedia Commons, meeting the needs of high quality data modelling with those of user engagement.

Keywords

Wikibase, Epigraphy, Translation, Wikidata, User engagement, Revision control.

12.1. EAGLE and Wikimedia Italia

Wikimedia Italia and EAGLE cooperation is active on two different levels and types of contents related to inscriptions: the first one is related to the upload of all photos of inscriptions which have a compatible licence with Wikimedia Commons¹; the other is a platform for aggregation, annotation and collaborative editing of translation of inscriptions, based on the Wikibase extension – the same one developed for and used by Wikidata.

¹ Wikimedia Commons is a free media file repository of educational media content (images, sound and video clips), acting also as a common repository for the various projects of the Wikimedia Foundation. It hosts more than 21 million media files in public domain or with a compatible license, of which the most used and preferred is the Creative Commons Attribution-Share Alike 3.0 Unported (CC-BY-SA 3.0).

Wikimedia Italia, the Italian chapter of the Wikimedia Foundation², and the EAGLE Best Practice Network created a structure for the simplified harmonization and upload of content in Wikimedia projects, to be put side by side with the provision of many items to Wikimedia Commons when they will be available via the EAGLE portal.

On one side, EAGLE Content Provider started to contribute images to Wikimedia Commons systematically.³ On the other, a multilingual wiki has been set up. This paper addresses this latter topic, and specifically the development and characteristics of a website that is a *unicum* in its kind (it is the first and, at the moment, the only use of the Wikibase extensions outside Wikidata) and as a method to join needs of the users and contributors with those of the information technologies scientists and academics dealing with epigraphy.

Among the members of the consortium, EAGLE has content providers with materials which are still to be made available online. In this regard, EAGLE acts as a facilitator to encourage them to share their material through Wikimedia Commons, to increase visibility of resources, which become immediately available for every user and act as a framework for crowdsourcing of content curation.

Adding Wikibase to the picture enables also the reuse of linked data by further projects, thus enhancing the usability of contents.

The project started in early 2013, and even if Wikibase was still in an early stage of development, it seemed the ideal fit since the very beginning, because it both supports structured data (for each inscription we have identifiers, pictures, original text, peer-reviewed translations and other data), and it simplifies online collaboration also for people who have no knowledge of wiki-code. As of May 2014, EAGLE Wiki gathers more than 7,000 items with up to three translations each, from several institutions and several countries, and is to date the biggest existing database of translations of Ancient Greek and Latin inscriptions.

In this paper, we will show the benefits of using Wikibase for the EAGLE Best Practice Network, as well as the next steps that we are

² Wikimedia chapters are independent organizations that share the goals of the Wikimedia Foundation (WMF) and support them within a specified geographical region. They have no legal control of or responsibility for the websites of the Wikimedia Foundation and vice versa. Wikimedia Italia (<http://www.wikimedia.it/>) has been founded in 2005 and supports WMF projects within Italy, San Marino and Vatican City.

³ Media already uploaded on Wikimedia Commons are available in a specific Category: https://commons.wikimedia.org/wiki/Category:Media_contributed_by_EAGLE

planning to make, also taking into consideration the plans for the development of Wikidata and its integration with Wikimedia Commons.

12.1.1. Objectives

EAGLE aims to build a multi-lingual online collection of millions of digitised items from European museums, libraries, archives and multimedia collections, which deal with inscriptions from the Greek and Roman World. The aim of the network is to make available the vast majority of the surviving inscriptions of the Greco-Roman world, complete with the essential information about them and with a series of peer-reviewed translations in several European languages. These are notoriously unavailable for inscriptions. Although keeping in mind the ideal to reach a broader audience and get people involved, it seemed a major goal to gather and curate on the wiki so that they would also encourage new entries. It turned out that some ideas on the matter of translations of inscriptions all together had to be revised: translating an inscription is not always a trivial exercise, and the discussion which can rise from different translations is very important for the settlement of what the meaning of an inscription is, especially for long texts or metrical inscriptions.

Mediawiki⁴ is the software installed on the EAGLE website, with the additional extension Wikibase⁵ to work on data as in Wikidata,⁶ the Wikimedia Foundation newest project dealing with structured data. This space specifically is intended to be our multilingual wiki and performs these functions:

- gathers in one place all available translations of inscriptions on-line;
- allows a simplified way to directly contribute data with no technical infrastructure or support locally;
- allows comparison, multiple interpretations and solutions;

⁴ Mediawiki is a free software open source wiki package written in PHP, originally for use on Wikipedia and its sister projects, and now used by many other wikis (even non related to the Wikimedia Foundation). For more information, see <https://www.mediawiki.org/>

⁵ http://www.mediawiki.org/wiki/Extension:Wikibase_Repository and [wikiba.se](http://www.wikiba.se)

⁶ http://www.wikidata.org/wiki/Wikidata:Main_Page

- supports multiple languages and authorships;
- fosters the addition and simplified creation in a unified database of more translations of selected inscriptions;
- easily links images already available on Wikimedia Commons⁷ to contents with translation;
- demonstrates the usefulness for the general public of translated document, the challenges of an uneasy task and the opportunities offered by this content when well interlinked;
- guarantees best possible integration with the EAGLE portal.

12.1.2. From scattered sources to a growing unity

Both the resources built by independent academic projects and the contents contributed by individual users in Wikimedia Commons benefit from some organization and curation.

Wikimedia Commons has more than 6000 records in the category “roman inscriptions”, most of which are without any link to an academically curated databases. Contents come mainly from users and, sometime, contain only the image without information or metadata.

From the epigraphists community side, databases with translations of inscriptions are a large series of very small, but, most of the time, high quality corpora. There are high numbers of translations of inscriptions, but they are very scattered and fragmented in different projects, and the EAGLE project is the first real attempt to gather them all in one place.

After briefly considering Semantic Mediawiki as a software, we have opted for the Wikibase extension, although there were no precedents. We chose Wikibase as this would allow direct Linked Open Data export in RDF and a public API, and would therefore follow the current best practices agreed upon within the EAGLE BPN and Europeana.

Wikibase enabled us to import and export data, as well as directly edit them.⁸

⁷ Wikimedia Commons (https://commons.wikimedia.org/wiki/Main_Page) is a project of the Wikimedia Foundation as Wikipedia and Wikisource to archive and make available photos and media.

⁸ Wikibase is a platform for the open collaboration on structured data, an open online database which is also wiki-syntax free.

Some data from Content Providers of the EAGLE BPN, both original members and newly affiliated members, have been mapped to a series of “properties” (metadata elements which constitutes the relationships inside the Wikibase model). The list of properties was as minimal as possible, but rich enough to gather all identifiers available, all languages and all bibliographic data.

The minimal element where based on the model prepared by Epigraphic Database Rome and further developed from that.

We started uploading a subset of metadata including all available identifiers and URIs (the Trismegistos identifiers)⁹ and the text of the translations. All other information have been omitted as this will be in the EAGLE portal and in all the databases part of the EAGLE network.

The EAGLE Mediawiki is, to our knowledge, the biggest existing database of translations of inscriptions as well as the first ever attempt to use Wikibase outside of Wikidata: EAGLE and Wikimedia Italia opted for this tool as the only one flexible enough to guarantee the achievement of all required objectives.

12.2. The EAGLE Mediawiki in place

12.2.1. Some Numbers

Table 12.1 shows the number of inscriptions by language of the translation provided along the lifespan of the EAGLE Mediawiki. Several things can be noted. Large increments correspond to bulk data imported with mappings. This is for example evident from November to January, when Pietro De Nicolao, developer hired by Wikimedia Italia, used it’s scripts for batch uploadings of inscriptions. The following datasets have been imported:¹⁰

- Inscriptions of Roman Tripolitania (contributed by King’s College London)
- Hispania Epigrafica Online (a test subset)
- Ubi Erat Lupa Translations from School projects
- PETRAE online translations from EpiDoc files

⁹ www.trismegistos.org

¹⁰ Data taken 1 July 2014.

	EN	FR	ES	DE	HU	IT	HR	Total
November			1096					1096
December	1018	480	1096	73				2667
January	2287	480	1096	102	69			4034
February	2316	480	1096	115	69	30	1	4107
March	2761	480	1096	187	69	55	1	4649
April	2761	737	1096	234	69	70	1	4668
May	4689	737	1096	245	69	150	1	6987
June	4764	737	1096	245	69	184	1	7096
July	4770	737	1096	245	270	184	1	7303

Tab. 12.1. Translations in the EAGLE Mediawiki

- Attic Inscriptions Online
- Inscriptions of Aphrodisias [Reynolds2007] (contributed by King's College London)
- Inscriptions from Brigetio (contributed by Eötvös Loránd Tudományegyetem)
- Inscriptions from Dacia (contributed by Universitatea Babeş Bolyai)

In each case some modification to the scripts was needed to import the data, and some adaptation to the set of properties in use. In all cases a minimum set of information as been imported, including at least one link, at least a text of a translation, at least a description and a label for the item. In most cases also Source information could be imported.

In February, during the first EAGLE workshop in Ljubljana, a first presentation and editathon of contents was carried out and previously in January a collaborator from the University of Oxford started to actively work on the Wiki. In March members of Rodopis association in Italy started to enter texts as well. What can be observed comparing this data is the following: where an import of data has been made

some editing could follow from contributors, but only where minimal introduction and presentation was made. The contributions from individual users are on the German, English and Italian translations only. The mere possibility to edit is therefore not alone enough, if that needs saying, to foster contributions.

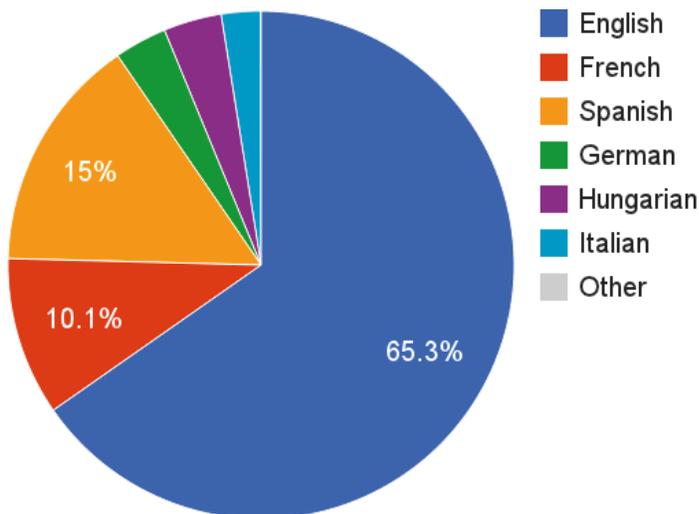


Fig. 12.1. Percentage on the total of translations present in the Mediawiki

12.2.2. Curation

Imported or contributed data are not static, and they can be built upon. We would like to make examples of how data curation and enrichment was made possible in the EAGLE Wikibase. The following examples deal with: content matching and harmonization among content providers (the IRT case); content enrichment with Wikimedia Commons images (the Sarmizegetusa example); direct publication using Wiki projects tools (The Inscriptions from Brigetio case).

12.2.2.1. IRT 469 case

The case of Inscriptions of Roman Tripolitania is interesting as a case in which the import in Wikibase allows alignment of different identifiers as well as different interpretations.

Some of these inscriptions are in fact published in this reissue of Joyce Reynolds' book of 1952 [REYNOLDS et al. 1952], in Last Statues of

Antiquity¹¹ and in the book by Francesca Bigi and Ignazio Tantillo on Lepcis Magna [TANTILLO et al. 2010].

In IRT 469 the text imported was a translation of the text in IRT2009 [REYNOLDS et al. 2009], and therefore reflected the interpretation of the text of that publication.

To our lord Flavius Claudius Constantine, most noble and excellent Caesar (all erased). b. To our Lord Flavius Julius Constantius Pius, Felix, always Augustus.

The Italian translation was instead based on the interpretation of the text by Tantillo-Bigi:

Al nostro Signore Flavio Claudio Costanzo (?) nobilissimo e fiorentissimo Cesare. Al nostro Signore Flavio Giulio Costanzo, Pio Felice per sempre Augusto [i Leptitani a spese pubbliche?].

Wikibase allowed not only to gather with proper reference both translations but also to put on a same level the different interpretation providing the user with the possibility to further research and enrich the data available. There are in fact now two more translations in German, which are based on the more recent edition of Tantillo-Bigi [TANTILLO et al. 2010].¹² The Wikibase can store therefore not just the latest version but the history of the interpretation of this text and make it visible to a larger public, of people speaking one of three languages.

12.2.2.2. The Brigetio example

The collaborators of the EAGLE project in Budapest decided to contribute their updated contents directly with Wiki tools. The first test set of translations of Inscriptions from Brigetio [BORHY 2006] was uploaded in December 2013 via two different channels. Images were uploaded to Wikimedia Commons, while inscriptions were uploaded to the Wikibase and consequently linked. The task was simplified by the predisposition of Wikibase to contain images from Wikimedia Commons as a data type, which could therefore straightforwardly be added with no need for file conversions, metadata editing, etc. This first test allowed a lot of improvement to the workflow to be made. Among the available categories in Wikimedia Commons, a defined set was chosen to include,

¹¹ <http://laststatues.classics.ox.ac.uk/>

¹² Epigraphic Database Heidelberg (<http://edh-www.adw.uni-heidelberg.de/home/>) has now an updated edition of the texts, curated by Francesca Bigi.

- categorization within EAGLE contents;¹³
- AE categories;¹⁴
- CIL categories;¹⁵

The connection of data on Wikimedia Commons allowed also discovery of further images of inscriptions from Brigetio, which could be also linked. By the 1st of April, a sample item of the Brigetio inscription in the Wikibase is too long to fit into a screen-shoot for this paper.¹⁶

12.2.2.3. Learning from experience: the case of inscriptions from Dacia

The mapping from EpiDoc¹⁷ was the most valuable and reusable of the mappings done and much has been learned from that experience.

Capitalizing on this achievement, a slightly different workflow was set up for the inscriptions of Dacia, taking two separate roads for translations and photos.

1. Photos were independently uploaded to Wikimedia Commons
2. data was input from EpiDoc xml with reference to the URI of the corresponding photos constructed with the correct filenames.

The import process directly generated content with links to images which could then be just enriched from Wikimedia commons via the systematization of categories put in place.

The existence of the identifiers and the photos available promptly recognized by scholars allowed the improvement of content already in Wikimedia Commons, as in the case of Item Q4783¹⁸ where a new photo could be linked to a database on the bases of image recognition by a user which add access to the links in the Wikibase, for the first time gathered all in one place and ready for comparison and research.

¹³ https://commons.wikimedia.org/wiki/Category:Media_contributed_by_EAGLE

¹⁴ https://commons.wikimedia.org/wiki/Category:Ann%C3%A9e_%C3%89pigraphique

¹⁵ https://commons.wikimedia.org/wiki/Category:Corpus_Inscriptionum_Latinarum

¹⁶ Cfr. e.g. and as an example of an inscription photographed by an external user which is already well linked and categorized and can therefore be integrated in the EAGLE Mediawiki

¹⁷ Carried out for IRT2009 and InsAph2007. Cfr. for EpiDoc ELLIOTT et al. 2007.

¹⁸ <http://www.EAGLE-network.eu/wiki/index.php/Item:Q4783>

Translation EN

(Two texts on opposite sides of a tile. Most scholars agree that the two texts refer to each other and form a dialogue; it is much discussed, however, who the discussants are, and which text is the first in order. Moreover, some of the words are difficult to read, and their reading is the object of an ongoing discussion;) Iulius, bookkeeper of the brickworks; because Anthinus has paid me the quantity of 533 (tiles) I say thank you, my lord. – (LITERALLY: Resolve what you done less, and so show your gratitude, and two more, because you counted less) Replace as many ("quod" here read as a typing error for "quot") as are of lower quality (minus fecisti), and then redeem (gratias age); and two more because you counted too little.

[\[edit|edit in Perseids\]](#)

[▶ 1 source](#)

[\[add|add via Perseids\]](#)

Translation IT

Concludi quel che non hai fatto e ringrazia! E chiudi il conto con due (partite di tegole) in più, poiché ne hai contato meno (del pattuito!) Iulius, alla contabilità delle partite di tegole: ne abbiamo inviate 533, con le quali il conto è pareggiato. Ti ringrazio, signore.

[\[edit|edit in Perseids\]](#)

[▼ 1 source](#)

[\[edit\]](#)

Author	I. Di Stefano Manzella
Periodical Title	Archeologia Classica 33
Year	1981
Page(s)	383-386
Publication title	Review of G. Pereira Menaut, Inscripciones romanas de Valentia (Valencia 1979)

Fig. 12.2. An item with minimum data from the Content Provider, enriched by autonomous contribution

12.3. Networking the Mediawiki

12.3.1. Engaging users

Usability and easiness are two key factors for users, as we noticed during the Ljubljana “editathon”¹⁹ and in individual and group test cases carried out. The level of intuition and the absence of syntax made it extremely straightforward for scholars and students to contribute, with no technical obstacle in front of them.

Wikimedia Italia dealt with the technical and organizational aspects of the EAGLE Mediawiki, with constant counselling on best practices and direct effort to implement requirements. The result is a common and collaborative database collecting translations of inscribed documents from the ancient Greek and Roman world.

¹⁹ An editathon is a workshop done with users and volunteers with the aim of contributing to a wiki project. Participants gather to work on specific topics or articles, often on Wikipedia. It’s a term born within the Wikimedia world, and used very informally.

Nevertheless it is not quantity what we aim at but to foster the production of new translations by engaging scholars and students with a tool fit for their needs. In the future of the wiki less import are planned, and much more individual contributions.

Once EAGLE will be online all photos with the correct copyright will be published in Wikimedia Commons and we look forward to integrate that wealth of data within the EAGLE Mediawiki.²⁰

12.3.2. Interactions with international projects

In EAGLE Mediawiki we want high quality, reusable and reliable translations. We try to achieve this in collaboration with other major international efforts and projects. A good cooperation has already started with the Perseids project²¹ in order to build a tool to enable users to edit data via a controlled board of editors managed by Perseids, the SoSOL²² instance connected to the Perseus project. Contributors will have the opportunity to enter data via two interoperable ways and the guarantee of a double check by two boards of editors: the one in Perseids and the one in the EAGLE Mediawiki. Users could then trust translations provided, but still be able to comment, object, further interpret and enhance discussion.

Many of the ongoing collaborations between Wikimedia chapters and GLAMs concern importing pictures in Wikimedia Commons, or texts in Wikipedia or WikiSource. Wikimedia Italy is trying to expand those collaborations also to the field of open data.

12.4. Future developments

The EAGLE Mediawiki will be in the future a source of quality translations for the EAGLE portal and for the Wikimedia Foundation projects. After the development of interfaces for editing via Perseus and the implementation of the EAGLE portal this will continue to be used to check and add new translations of inscribed materials. New users will

²⁰ New members of the consortium are encouraged to publish their photos directly on Wikimedia Commons and to follow the workflow which has been tested. As things happened for the inscriptions of Brigetio and from Dacia, they will soon be followed by the inscriptions of Montenegro and a small corpus from Turkey contributed by the University of Belgrad.

²¹ <http://www.perseids.org/>

²² <http://sites.tufts.edu/perseids/> and <http://wiki.digitalclassicist.org/SoSOL>

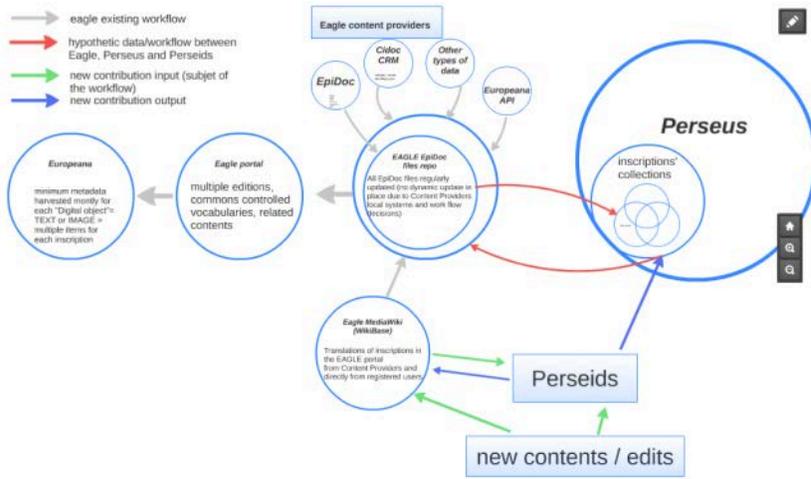


Fig. 12.3. Perseids and EAGLE interaction

be engaged and a wider variety of languages will be there. Currently very few greek inscriptions are represented and these will be added via collaborations with other projects as it is one of the priorities also according to the international community represented in the EAGLE Working Groups.

There is also the possibility of a further collaboration and dissemination of EAGLE data to Wikimedia Foundation projects, even though this opportunity depends on and is strictly connected to an ongoing discussion in the Wikimedia community about how to deepen the Wikidata – Wikimedia Commons relation.²³

The proposal considers the introduction of a new entity type, designed especially for Wikimedia Commons, that will allow a better storage of all metadata of Wikimedia Commons' images. This will allow, in turn, a better description of the images – i.e. by defining what is the image about (e.g. a Latin inscription), where it has been taken, if it is related to something or someone (e.g. the inscription mentions Emperor Trajan or Legio XII 'Fulminata').

In such scenario, EAGLE data would acquire an even greater value: all data, as well as their source, about an inscription would be integrated in the inscription's image (which has been already uploaded

²³ https://commons.wikimedia.org/wiki/Commons:Wikidata_for_media_info

to Wikimedia commons) as its metadata, in the very same fashion data are stored and organised in the EAGLE Mediawiki.

Unfortunately, there are two major issues to take into consideration. The first one is that, as we stated before, the discussion in the Wikimedia community is still ongoing and there are no concrete signals that a consensus solution will be reached soon. The most optimistic guess is that the proposal will be reconsidered in the light of the last upgrades of the Wikibase software, meaning that no solution will be reached before 2015.

The second issue is related to the fact that, at the time, EAGLE Mediawiki does not deal with other metadata than translations, identifiers, and links to existing Wikimedia Commons images, meaning that the great part of eligible metadata are still not integrated in the common database. However, this does not constitute a major problem to deal with at the moment, given that the proposal for a Wikidata – Wikimedia Commons deeper integration is still to be approved by the Wikimedia community.

12.5. Conclusions

By establishing a multiply controlled platform to insert new translations and by making that easy enough to edit in various ways, we hope that a gap can be closed, slowly and carefully, in this field of research and that many more translations of inscriptions will be available not just to scholars but also to a wider public, to promote their reuse and therefore the epigraphic knowledge in many sectors and context.

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PART III

USERS, EPIGRAPHY AND THE SOCIAL WEB

13. Epigraphy as a tool for learning Latin

The case of the Prežihov Voranc Primary School in Ljubljana, Slovenia

Anja Ragolič

Abstract

The Prežihov Voranc Primary School in Ljubljana is the only state primary school in Slovenia that has continually maintained a tradition of early learning of the Latin language. The Latin teacher, Aleksandra Pirkmajer Slokan, has introduced new programmes to stimulate children's interest in the classical language, some of which are based on epigraphy. The results have included several exhibitions and a small guide through the *lapidarium* of the National Museum of Slovenia, written specifically for young people.

Keywords

Primary School, Latin, epigraphy, research papers, guide to *lapidarium*

13.1. The Prežihov Voranc Primary School in Ljubljana

The Prežihov Voranc Primary School in Ljubljana is the only state primary school in Slovenia that has continually maintained a tradition of early learning of the Latin language (11–15 year-olds). The beginnings of classical education in Slovenia date back to 1563 (at the initiative of the Protestant reformer Primož Trubar), and it was in 1899 that the Classical High School in Ljubljana moved into a newly built facility; the Prežihov Voranc Primary School is now located at that site.

Since the beginning of the 20th century, the situation of teaching classical languages has changed significantly. Soon after World War II, the eight-year high school was cancelled and an eight-year primary school was founded, the higher classes of which became the heirs of the former lower high school. Soon after this school reform (1958), the early learning of Greek (13–15 years) faded away completely, while Latin was marginalised and, since 2003, has been an optional subject solely

for the students of the last three years of Primary school education with two lessons per week. Nevertheless, school statistics show that the interest for learning Latin is far from decreasing. Not only the interest of children but also the results of the selfless work of Latin teachers, especially Aleksandra Pirkmajer Slokan, prove that children want to learn a new language, the language for which research papers on primary schooling have repeatedly proven is far from dead, as might have been incorrectly believed.

Since 1991, under the supervision of Aleksandra Pirkmajer Slokan, Latin extracurricular activities called *Per vias antiquas* ('On Ancient Paths') have been carried out. This name encompasses several different activities that strive to bring the Latin language closer to children, to motivate them, and to make the Latin class more interesting with diverse approaches. In the 6th year, Latin is incorporated into these activities with the intention of both familiarising children with Latin and of making their decision whether or not to choose it as their optional subject for the following three years easier. *Per vias antiquas* also includes the school bulletin *Rustica Latina* (published since 1993), drama-recitative performances (recitations, skits, drama plays), excursions in Slovenia and abroad (e.g. Aquileia, Ptuj and the shrines of Mitra, Pula, Venice, etc.), visits to collections and exhibitions of museums and galleries, walks in ancient Emona (present-day Ljubljana), while in the autumn of 2010 a free course of Latin was organised for parents. For epigraphy, three areas of the primary school students' research activities have exceptional importance: research camps, research papers, and the research project entitled 'Epigraphy', all of which will be dealt with in detail below.

13.2. Research camps

Under the influence of the school astronomy camp and as a part of the extracurricular *Per vias antiquas* activities, the first research camp was organised in 1991. To date, the school has organised 23 such research camps in various places across Slovenia, which have lasted from three to eight days and are known by the name *Lingua Latina laeta* ('Merry Latin'). The common goal of all the camps is the research of the interdisciplinary usefulness of the Latin language and the search for the connections between ancient and modern civilisations. The camp programme is composed of three different interconnected sections (lin-

guistic, cultural-civilisation, and recreational). The research work is carried out at several levels of difficulty and according to interest groups (drama, journalistic, arts, music workshop, etc.) and is reflected in the writings for the camp bulletin, which has since then become the all-school bulletin *Rustica Latina* (Fig. 13.1), as well as in gathering of ideas for project and research papers, etc. Therefore, these research camps have become the source and workshop of ideas for the entire school work of *Per vias antiquas* and vice versa. The slogan *Per vias antiquas* has gradually integrated all Latin extracurricular activities at school, including the drama-recitative performances, the bulletin *Rustica Latina*, research papers, and epigraphic workshops in addition to camps, trips, and museum visits.

13.3. Research papers

Since 1994, students have participated in annual gatherings of young researchers and their mentors. Twelve research papers have been written thus far, seven of which have received prizes. The mentor of these papers is Aleksandra Pirkmajer Slokan, who chooses appropriate themes for research papers in cooperation with the students, encourages students in their ideas and the development of their hypotheses, aids them in finding reference literature, and facilitates cooperation with scientists from various fields of expertise. Research papers are devoted to different themes from Roman culture and civilisation, from describing everyday Roman life, the research of preserved archaeological remains to considering their presentation and potential solutions regarding how to better present these to the public. It should be emphasised that more than a half of these 12 papers deal with epigraphy.

In the first research paper, students researched Roman monuments; they were primarily interested in *Archaeological monuments on facades of houses in Ljubljana* [AVSEC et al. 1996]. They focused on Roman inscriptions immured into the Ljubljana cathedral of St Nicholas and seminary (in the years 1701–1713), which represented the first lapidarium in Ljubljana, the Thalnitscher Lapidarium. They chose eight inscriptions and analysed each of them according to the standards established in epigraphy and also used for electronic epigraphic databases. Thus, for every monument a description, place and time of discovery, and the location where it is kept were added. They also wrote out the full Roman inscription and added its Slovenian translation. For them, an



Fig. 13.1. The school bulletin Rustica Latina

important aspect was represented by the art message on the monument; therefore, the depictions on the stones were described in detail, and each one was drawn (Fig. 13.2) and individually photographed. This paper is primarily focused on the linguistic discussion of the Roman monuments; a part of the paper deals with the detailed analysis of the Latin vocabulary, with which students could use their knowledge of Latin on a practical and (most importantly) original Roman inscription after only two years of learning the language.

The title of the second research paper was *Among the Roman inscriptions in the lapidarium of the National Museum in Ljubljana* [M. HERMAN et al. 1997]. This paper was written when the lapidarium of the National Museum was inaccessible due to a reorganisation. The hypothesis was that lapidaria are generally not primary-school-student-friendly but arranged by adults for adults. The theme of the paper was various types of inscriptions (altars, tombstones), which were described according to the above-mentioned steps: the time and place of making or discovery, followed by the precise transcription with additions, translation into Slovenian, the analysis of the vocabulary and they also added a precise explanation of the realia and the description of the monument (whether there were any ligatures used, punctuation marks, damage, etc.). The descriptions were accompanied by a drawing of the entire slab or only one detail (Fig. 13.3), and a photograph; the entire work was concluded with their opinions and thoughts about the monument. Four monuments (on which professions of the deceased are depicted) were discussed in this manner, three monuments with the stonemason's errors, and a few monuments containing abbreviations. As the students wrote, they used their knowledge of Latin as a key to uncovering the initial secrets of epigraphy.

The lapidarium of the National Museum of Slovenia was also the subject of the next research paper but with the focus shifted to the lapidarium itself: *The lapidarium of the National Museum in Ljubljana: yesterday, today, tomorrow* [BEG et al. 1997]. The children described the attitude towards ancient remains in the past, when Roman monuments were used as building material, immured into churches, castles, and houses as a decoration on facades. We can only speak about the existence of the first lapidarium in the time of Janez Gregor Dolničar, who had 14 Roman inscription slabs immured into the Ljubljana cathedral and seminary at the beginning of the 18th century. When the museum was founded in 1821 and its building opened to the public in 1885, most



Fig. 13.2. Picture of the tombstone for Secco (CIL 03, 03871 = AIJ 195 = Iupa 3709)



Fig. 13.3. Picture of the tombstone for the slave Flavos (*CIL* 03, 10775 = *AIJ* 187 = *ILJug* 314 = *RINMS* 51 = *Iupa* 3702 = *EDR* 129071)

of the Roman monuments were transferred there, but the lapidarium had not yet been arranged. Thus, these stones were randomly arranged along the ground floor hallways, and most of them were immured into walls. In the spring of 1995, the stones were taken out of the walls and placed into the lapidarium, where the monuments were freestanding and information boards were added. The outer lapidarium in the museum garden, opened in 2006, was intended for milestones, sarcophagi, urns, mosaics, and other larger monuments. There are plans to turn the basement into a space for the presentation of additional monuments. The focus of the research paper was primarily the manner in which the lapidarium could be appropriately presented to young people, especially primary school children. The message of the research paper was the following: stone monuments lose their value if their message is not communicated to general public.

The communicative power of stone monuments was the topic of a research paper in 1997/1998 entitled *Artistic image of Roman stone monuments in the lapidarium of the National Museum in Ljubljana* [AHLIN et al. 1998]. In the lapidarium, they chose eight Roman stelae, which some of the most richly decorated monuments, and described them according to the known protocol, mostly emphasizing their depictive aspects. The paper was illustrated with pictorial material (Fig. 13.4 and 13.5) and commentary about the students' impressions during the study of an individual slab was given.

Several years of observing and describing stone monuments encouraged the teacher and her students to continually think about the ways to bring the lapidarium closer to young people. Hence, the next research paper was devoted to the *Lapidarium for primary school children* [A. HERMAN et al. 1999]. Specifically, when reviewing the relevant educational brochures, the students discovered that most were intended for adults, even experts, while primary school students who are also interested in ancient monuments lacked any appropriate guide. Their assumption was that 'a guide helps you see more'. This research paper thus developed a model of a guide that would contain a great deal of pictorial material, while the accompanying text would be short and concise but still appropriate for students, and the newly acquired knowledge would be deepened with worksheets. The National Gallery in Ljubljana, where many educational brochures and leaflets are available for the youngest visitors, served as an example for the preparation of the guide. In the last part of the paper, students suggest how the slightly dull



Fig. 13.4. Picture of the tombstone for Surus and Quarta (CIL 03, 03815 = AIJ 141 = RINMS 87 = lupa 3681 = EDR 134931)



Fig. 13.5. Picture of the tombstone for Publius Nertomarius Quartus (CIL 03, 010794 = AIJ 236 = RINMS 145 = ILSl 85 = lupa 373)

and grey space of the lapidarium could be livened up: one could be taken through the exhibition by a guide dressed in a toga, Roman music could be heard in the background, the museum shop could sell souvenirs with epigraphic motifs, while at the exit Roman coins would be distributed for good luck and as souvenirs.

In 2006/2007, students again dealt with epigraphy for their research paper, that year's title being *Roman inscriptions from Ig* [GORUP et al. 2007]. They primarily focused on the personal names on the Roman monuments found in the area of Ig and kept at the church of St Michael in Iška vas and the lapidarium of the National Museum of Slovenia. They investigated whether the intermingling of indigenous people with the Romans can be verified by research. They established that the indigenous and the Roman names on the tombstones of the families from Ig often appear next to each other; most frequently, the older generation bears indigenous names while the younger bears Roman ones, but there are exceptions. The monuments most frequently attest male names, while from the linguistic perspective the contents of the inscription are also simple and understandable for primary school students.

When analysing the names, especially when determining various groups of indigenous names, children sought help with Marjeta Šašel Kos, PhD, who was the co-mentor of all epigraphically-focused research papers.

13.4. Research project Epigraphy

As early as in 1992, Aleksandra Pirkmajer Slokan decided that Latin classes could be enriched with epigraphy. Inscriptions on Roman monuments represent the only original Roman text that can help students deepen and develop their knowledge of Latin. Help with the realisation of the project was also offered by the National Museum of Slovenia, which is located in the immediate vicinity of the school, so the lapidarium is easily accessible, and its staff is hospitable and ready to help. Regular visits to the lapidarium helped the children read the messages written in stone by their predecessors in this region, while during other extracurricular activities they depicted ancient monuments in various techniques: chalk, pencil, clay (Fig. 13.6 and 13.7) etc.



Fig. 13.6. Milestone (made of clay) (CIL 03, 04620 = 11319 = RINMS 179)

Fig. 13.7. Tombstone for Aurelia Ursa (made of clay) (CIL 03, 03844 = 13398 = AIJ 172 = RINMS 43 = lupa 2923 = EDR 129063)

Their objets d'art, which in past years lay forgotten at the school, were exhibited twice: first in 1995 at the National Museum of Slovenia during the time when the lapidarium was not open to the public (Fig. 13.8), and four years later when the artwork of stone monuments was exhibited at the epigraphic exhibition upon the 100th anniversary of the school. The final goal of the Epigraphy project was the production of the primary-school-students' guide to the lapidarium of the National museum of Slovenia.

13.5. Guide to the lapidarium for primary schools

The result of a decade (1992–2002) of visiting the National Museum of Slovenia lapidarium, learning about epigraphy, and research work led to the publishing of the *Guide to the lapidarium for primary school students* (Fig. 13.9) [PIRKMAJER SLOKAN 2004]. It is intended for students of primary school higher classes and knowledge of Latin is not necessary for its use. The introduction contains a brief history of the lapidarium, which is followed by a glossary explaining the words that appear in several different places in the guide (e.g. epigraphy, ligature, stele, milestone, inventory number).

The guide's main part is composed of four worksheets arranged according to the level of difficulty from the easiest to the most demanding. On the first worksheet, students review general information about the lapidarium by circling the correct answers, and during their walk through the lapidarium search for motifs typical for certain monuments (a dolphin, rosette, bear, or the motif of a funerary banquet). Worksheets nos. 2–4 focus on selected monuments where children observe their motifs and primarily their inscriptions written in the Latin language and accompanied by the Slovenian translation. They record the monument's basic data, such as measurements, material from which it is made, inventory number, date, etc. Simpler grammatical exercises help them gradually acquire new Latin words, the explanation of names as well as the basics of onomastics. The importance of the guide is not merely in its pedagogical role but in the fact that this is the first such guide to a lapidarium for primary school students.

13.6. Conclusion

A long tradition of teaching Latin and, in particular, the more than two decades of the pedagogic work of Aleksandra Pirkmajer Slokan



Fig. 13.8. Exhibition of the pictures made by the school children of the Prežihov Voranc Primary School in Ljubljana

have elevated the teaching of the Latin language at the Prežihov Voranc Primary School in Ljubljana to a level unparalleled in Slovenia. Selected themes from epigraphy used by Pirkmajer Slokan in her classes (also the epigraphic section of the textbook 'Lingua Latina') [PIRKMAJER SLOKAN 2007] to diversify the learning of Latin and introduce the children to authentic Roman inscriptions, Roman culture and civilisation have proven to be an important link within the pedagogic work. The immediate vicinity of the lapidarium of the National Museum, research camps, research papers, and other extracurricular activities have helped children to enjoy visiting the dark space of the lapidarium. *The Guide to the lapidarium for primary school* has taken a further step and brought the place where Roman monuments are kept closer to younger people. This school is far from lacking ideas and interest; they are talking to the Slovenian School Museum about the joint exhibition on the teaching of Latin in the Slovenian eight-year primary school (1958–2008), which should help the school once again prove its unique role in Slovenia.



Fig. 13.9. *A walk through the Roman lapidarium of the National Museum of Slovenia: a guide for young people*

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14. The Ashmolean Latin Inscriptions Project (AshLI)

Bringing epigraphic research to museum visitors and schools

Jane Masségli

Abstract

AshLI is a new collaboration between two UK universities, eleven UK schools and a major UK museum, aiming to bring a neglected corpus of Latin inscriptions to a wider audience. The project is a test-case for how 'pure' epigraphic research can be transformed into something of interest and value to the public, through online resources and new gallery displays.

Keywords

Epigraphy, Latin, Schools, Teaching, Engagement, Outreach

14.1. A Neglected Corpus

The Ashmolean Museum in Oxford owns around 300 Latin inscriptions, which it has accumulated over the centuries since 1683. The core of the collection consists of the Arundel marbles, but the museum has made further acquisitions since the seventeenth century, most recently of inscriptions from the estate of the late Sir Howard Colvin. The inscriptions originate from Britain and other parts of the Roman world and date from the late Republic down to mediaeval times. The collection includes a wide range of types of inscriptions: many are monumental inscriptions such as epitaphs, religious dedications, and commemorative building-inscriptions, but many more are inscribed upon everyday objects, including pewterware, pottery, and even a set of panpipes. None of the inscriptions on its own is of any especial historical consequence, but together they offer insights into the Roman world, its commemorative habits, social hierarchy, economic networks, and uses of literacy.

The main publication of the collection remains Richard Chandler's *Marmora Oxoniensia* (1763), which included the 134 monumental inscriptions then owned by the Museum. No modern edition of the collection exists, and no photographic record of the monumental inscriptions, or corpus of the non-monumental inscriptions have ever been published.

14.2. Gauging the Needs of Users

Schools Roman life topics are extremely popular in UK primary schools (age 5-11), and are an essential part of the syllabus in Classical Civilization and Latin at GCSE-level (age 15-16) and A-Level (age 17-18). In the academic year 2012/3, however, the Ashmolean Education Department hosted around only 20 primary school visits with a Roman focus (compared with around 250 with an Egyptian focus), and offered online only two Roman-themed learning resources, both of which could only be used in conjunction with a museum visit. In the same year, the museum recorded around only 50 secondary schools who requested teaching sessions on Classical (i.e. Greek or Roman) topics. In short, the Roman collection is currently underused as a teaching resource by visiting schools. In a survey of teachers conducted by the Ashmolean Latin Inscription Project in 2013/14, the most common reason given for a museum visit was the perceived relevance of the collection to the syllabus. It became clear that the museum displays, gallery sessions and online resource provision needed to be reviewed specifically in light of schools' needs, and links with the syllabus made more explicit.

The Visually Impaired It was also noted that the provision of 'touch tours', designed specifically for visually impaired visitors had fallen into obsolescence since the Ashmolean was renovated in 2009. There was a clear need for both displays and teaching resources which were accessible to the blind and partially-sighted, and the popularity of Roman life topics and the nature of the texts make the Ashmolean's Latin inscriptions an excellent test-case for such a provision.

The Academic Community (Local) As an Oxford University museum, the Ashmolean is also an important part of the University's teaching and research provision. Students and researchers engaged

in epigraphic study have access to online and published corpora, and the extensive squeeze collection housed at the Centre for the Study of Ancient Documents (CSAD) in the Faculty of Classics. But few stones are currently on display in the museum, and it was apparent that any increase in provision would be welcomed by both teachers and students.

The Academic Community (International) The absence of an up-to-date catalogue was also felt to be anomalous for such a large collection in a major institution. In order to allow these inscriptions to be accessible to the greatest number of users, an online catalogue was deemed to be most appropriate, using EpiDoc conventions which would ensure its compatibility and durability, and allow its integration into international epigraphic online databases, including EAGLE.

14.3. Proposing a Solution: AshLI

In October 2013, a new three-year project was begun under the banner of the Arts and Humanities Research Council, to address these needs. The project retains its formal title '*Facilitating Access to Latin inscriptions in Britain's Oldest Public Museum through Scholarship and Technology*', but is more usually referred to as *The Ashmolean Latin Inscriptions Project*, or **AshLI**. It is a three-way collaboration between Warwick University, the Centre for the Study of Ancient Documents at Oxford University, and the Ashmolean Museum, and comprises a complete inventory of the museum's Latin inscriptions followed by a new EpiDoc catalogue with digital photography, new gallery displays, and a dedicated programme of outreach and pedagogical provision. It will end in September 2016, after which time all the project's outputs will remain in place, and available to users in perpetuity.

14.4. The Team

- **Dr Alison Cooley**, Warwick University: Principal Investigator, responsible for overall project and epigraphic study of the inscription collection.
- **Dr Charles Crowther**, CSAD, Oxford University: Co-Investigator, assisting with EpiDoc formatting and digitization.

- **Dr Susan Walker**, Ashmolean Museum: Co-Investigator, assisting with access and integration with Museum resources.
- **Dr Jane Masségli**, CSAD, Oxford University: Research Fellow, responsible for teaching resources and public engagement.
- **Dr Hannah Cornwell**, CSAD, Oxford University: Research Assistant, responsible for EpiDoc cataloguing and digital media.
- **Ben Altshuler**, The Classics Conclave and CSAD: Imaging Specialist, responsible for Reflectance Transformation Imaging (RTI) and image capture.

14.4.1. Academic Engagement Vs. Public Engagement

AshLI's aim is not simply to create an epigraphic catalogue, but to engage users with the material contained within it. Our two main audiences are **Academic Users in Higher Education**, and **members of the Public (including schools)** who have an interest in Roman topics.

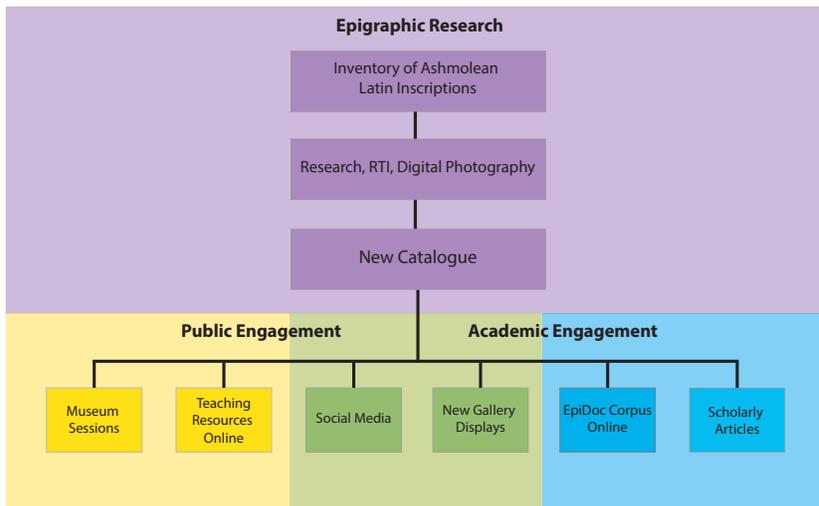


Fig. 14.1. The transition from Epigraphic Research to Engagement

We hope to engage academic users primarily through the integration of our EpiDoc catalogue into familiar research provisions, such as EAGLE, but also to draw attention to our project through scholarly articles, conferences such as this, and social media.

But engaging non-traditional users, such as school children and museum visitors, presents a greater challenge. While academic users are accustomed to seeking out epigraphic material and dealing with 'raw' evidence, non-academic users may need more explicit guidance towards points of interest within an inscription. They may also be put off by epigraphic jargon, the perceived obstacle of the Latin language and feel uncertain about what inscriptions were for. In AshLI's provision of new gallery displays and teaching material, we assume no prior epigraphic knowledge and (with the exception of certain teaching materials specifically aimed at students of Latin) no prior knowledge of the Latin language.

14.4.2. Engaging with Schools

To ensure the suitability and effectiveness of our public engagement provisions, a group of eleven schools has been engaged to take part in a pilot scheme from autumn 2014. The group comprises primary, secondary, and sixth form, as well as a specialist school for the blind and partially sighted. They represent a mix of local schools, able to test the full range of online resources, gallery displays and museum sessions, and those from elsewhere in the UK who will test only the online resources. Not only will our pilot schools help us to tailor our provisions to their needs but, we hope, will spread the word about the available resources.

14.4.3. Public Engagement: an Overview (R>L in fig. 14.1)

From an initial survey of our eleven pilot schools, it became clear that teachers preferred material to be presented according to topic, such as *Roman Religion*, the *Roman Army*, and *Roman Families* which they could then slot into their existing teaching. We have, therefore, selected inscriptions for display online and in the museum primarily according to their suitability as teaching aids for these topics.

a New Gallery Displays

Planning for the introduction of inscriptions into three galleries is currently underway:

1. The Rome Gallery: Into the existing thematic displays, we intend to introduce inscribed funerary reliefs showing mounted

horsemen (topics: *Roman Army, the Geography of the Roman Empire, Roman Families, and Roman Death*), and a series of inscriptions commemorating public feasting (topic: *Roman Religion, and Roman Daily Life*). An additional information board, with images of inscriptions too large and heavy to be displayed, will show information about multilingualism in the Empire (topics: *Geography of the Roman Empire, Language and Literacy in the Roman Empire*).

2. Reading & Writing Gallery:

Cracking Codes An information panel on common abbreviations and formulae will be complemented by hands-on activities, including a ‘Build your own Roman Tombstone’ display with interchangeable pieces, and a touchable replica stone (topics: *Roman Death, Roman Families, and Language and Literacy in Rome Empire*).

Columbarium More ambitious is the proposal to reconstruct a Roman columbarium by displaying ten funerary plaques, each below a decorated, three-dimensional niche, reconstructing the display contexts of the original objects (topics: *Roman Death, Roman Religion, and Roman Families*).

Small Objects Additional objects will be introduced into existing displays, such as inscribed amulets (topic: *Roman Religion*), lamps, bricks and manufacturer’s stamps (topic: *Roman Life*).

3. Cockerell Building: In a structurally reinforced area near the Main Entrance, a large inscription (ca. 60x 110cm, ca. 350kg) honouring a Roman veteran will be installed on a specially designed mount (topic: *Roman Army*).

b Social Media

1. Progress reports on the project, and short studies of stones with interesting histories are published regularly on our blog Reading, Writing, Romans (www.ashmolean.org/ashwpress/latininscriptions). Blogs are intended for enthusiasts but not necessarily epigraphic specialists, and technical terminology is glossed. Vodcasts (video podcasts) sometimes replace blogs, where members of the AshLI team provide commentary over a short film, edited in-house.

2. We use our Twitter handle @AshmoleanLatin primarily to advertise the release of a new blog. Our followers include a variety of people self-identifying as epigraphers, archaeologists, and classicists, as well as a number of institutions (including museums), and general history enthusiasts. We have been pleasantly surprised by the number of school Classics departments who have followed us, and who appear to use Twitter as part of their enrichment programme, by retweeting Roman-related news for their pupils. We have also found that establishing support from other users is essential in securing traffic and followers for our tweets: especially useful has been the support of the main Ashmolean Museum feed, Oxford Classics Outreach Officer Mai Musié, Warwick Epigraphy, and EAGLE, who retweet our news items.

c Museum Sessions

1. School Sessions: A major legacy after the end of the project will be the school sessions designed to incorporate the new displays, and to communicate findings from AshLI's research to visiting groups. These are being designed by AshLI and the Ashmolean Education team, and will be administered, delivered and monitored by the Education team. It is hoped that the new sessions, tried-and-tested by our pilot schools, will increase the currently low number of groups coming for Roman-themed visits.
2. AshLI will also provide support for secondary teachers who wish to use more archaeology in their classroom teaching. An INSET day is already planned at the Ashmolean for November 2014 in conjunction with JACT (Joint Association of Classical Teachers), at which Warwick and Oxford staff will demonstrate how sculpture, coins and inscriptions can be used in the teaching of Classical Civilization, Latin and History.
3. A major family event, 'Death in Rome' is planned in conjunction with the Ashmolean Education team and both Warwick and Oxford postgraduate helpers, to coincide with the Feast of Parentalia in 2016. The new inscriptions on display will be showcased in 'focus tours' on Roman burial and commemo-

rative practices. Other events on the day will include a craft workshop making ancestor masks, story-telling of Aeneas' trip to the Underworld, guided tours and a public lecture.

d Teaching Resources Online

1. Pilot Study: Teaching resources are being devised according to the topics requested by our surveyed schools, and tested by them and their pupils in a pilot study during the academic year 2014-15. After this, any necessary changes will be made and the resources will be made available online.
2. Online availability: In order to optimise the use of the new resources, AshLI will place its worksheets, digital images, video clips and other resources in three locations: the AshLI project page; the Ashmolean Education Resources pages; and the Times Education Supplement (TES) Connect resources portal. This is a highly popular, national hub for the exchange of teaching materials, and AshLI is able to take advantage of Oxford's position as a featured partner on the site.

14.5. At the end of our first year – what we've learned

Although at an early stage of our project, we have already learned a great deal about some of the challenges facing an epigraphic engagement project. We would make the following recommendations to any similar projects:

1. Do find out exactly what your target users want by asking them directly. In answering our survey, every school requested Roman-life topics. Not one asked for teaching resources on ligatures, serifs or Latin cursive. Epigraphic topics can be introduced, but best within the context of a familiar topic.
2. Do know the syllabus and curriculum requirements of your target schools.
3. Do engage schools and user groups from the beginning. Not only does it ensure the success of your resources as they develop, but it improves goodwill towards your institution(s), and generates good press. Many schools are extremely good at celebrating new projects, trips and experiences in their newsletters, websites and even in local press.

4. Do integrate your resources and museum sessions into the existing provision by your museum's Education team. They have expertise in what works, what people expect, and can keep the programme going after your project has finished. Offer to provide their staff with study sessions on any new material that you introduce into the museum so that they are familiar with it.
5. Don't expect to save an entire epigraphic collection from storage and put it on display. Space is often at a premium in museums, and in-house protocols can be very strict about cluttering walls and floors. Be realistic about how many objects will be allowed, and consider which inscriptions 'double-up', i.e. can be used for teaching multiple topics.
6. Do ask your museum about the structural limitations of floors, walls and cases, which may not be suitable for displaying stones. You may have to decide between changing your plans and paying for their reinforcement.
7. Don't expect users to come directly to your project pages via the address bar. Use sites which already attract high traffic to direct attention to your work. For example, use EAGLE to engage users with your catalogue, use TES Connect for your teaching resources, and take advantage of Twitter to advertise blogs and upcoming museum events.
8. Don't expect teachers to be comfortable pronouncing Latin words. They may need an additional crib sheet to help them feel confident in discussing an inscription with their class.
9. Don't expect the public to be excited by inscriptions in isolation. You may need to combine them with other forms of evidence and activities which illustrate the same phenomenon.

We would be happy to hear from colleagues engaged in, or planning, similar projects. Enquiries may be directed, in the first instance, to jane.masseglia@classics.ox.ac.uk.

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15. (Digital) epigraphy as viewed by Romanian Archaeology/Classics Students

Rada Varga

Abstract

The current paper is based on a survey having as target group the Archaeology/Classics students from the History departments of Romania's top 3 universities; the questionnaire was presented to them live, as well as on-line. It was meant to underline the students' understanding of (digital) epigraphy, as well as their expectations regarding this research area.

Keywords

Survey, Students, Virtual Museums, E-Learning, Romanian Universities.

15.1. Target groups and method

The current presentation is the result of an investigation undertaken among Classics/Archaeology students (BA, MA and PhD levels), from the three major universities of Romania: Babeş-Bolyai from Cluj-Napoca (UBB)¹, Alexandru Ioan Cuza from Iaşi (UAIC)² and the University of Bucharest (UB)³. The survey was conducted in March-May 2014. In order to see if there are discrepancies or differences in the attitude of the respondents, the questionnaire was presented to students in class, as well as on Facebook.

¹ We thank Professor Dr. Radu Ardevan and Lecturer Dr. Sorin Nemeti for their help in making the survey known among students.

² We thank Professor Dr. Lucreţiu Mihăilescu-Bîrliba for his support in distributing the questionnaire to his students.

³ We thank Junior Researcher Dr. Florian Matei-Popescu for delivering the survey to the students from Bucharest.

15.2. The survey

We cannot proceed with presenting our results without first presenting the survey in itself. So, our questions were:

- *Name (optional):*
- *E-mail (optional):*
- *Age:*
- *Gender:*
- *Level:*
- *Do you also have a degree from another college/attend the classes of a different college:*
- *Primary foreign language:*
 1. *Do you have a main research theme connected to epigraphy?*
 2. *If no, do you believe that a more interactive approach could have modelled your options differently?*
 3. *Do you believe e-learning is suited for the university environment?*
 4. *Do you believe e-learning can be implemented in your university? Why?*
 5. *Would you consider an on-line Latin course, supported by an interactive platform (discussion groups, webinars, games etc.) as useful? Would you use it?*
 6. *Would you attend epigraphy-connected workshops (Roman and Greek culture, Roman provinces)?*
 7. *What workshops would you be interested in?*
 8. *What is important in an epigraphy exhibition?*
 9. *And in a virtual museum?*
 10. *What should be present in a virtual museum dedicated to Roman Dacia's epigraphy?*
 11. *How many epigraphy exhibitions have you visited?*
 12. *But virtual museums?*
 13. *What web sites do you frequently use for educational/scientific purposes?*
 14. *Please name 1-2 historical books/movies about the ancient world that you have liked.*

15.3. The general outline

Some of the above questions were strictly asked for exact information, some were aimed at outlining an image of the students' scientific and cultural horizon (i.e. no. 13, no. 14), as well as academic expectations (i.e. no. 3, no. 4).

The results were, in our opinion, a rather good reflection of the Romanian university environment. Most of the students were in the age range of 18-22 years (with a notable specificity from Bucharest, where 23% of the interrogated students are over 30 and have already graduated another college) and quite importantly, most of them do not have a research subject connected to epigraphy (61%). Regarding the gender ratio, classics still seem to be in Romania a rather masculine field, as 66% of the respondents are boys. Interesting enough, while in Cluj-Napoca and Bucharest the majority opted for anonymity (70%) – with the notable exceptions of PhD students and the 1st and 2nd years ones attending a facultative class – in Iași most of the participants offered their names and contact details. Regarding the on-line presence, the 2nd year MA students and the PhD candidates hold predominance. When looking for the real education level, we find that while the students from Iași attend solely the classes of the History Department, about 30% from the Cluj-Napoca respondents and 23% from the Bucharest ones have graduated from or are currently attending a different college as well. When it comes to the primary foreign language – important for access to bibliography and generally to information – the overwhelming majority opted for English; only an incredibly small percentages (5%) voted for French, while Spanish (3,7%) and Italian (1,9%) appear numerically insignificant. German wasn't listed by any of the students as a primary foreign language. Of course, many of them might be able to read in more foreign languages than the primary one.

Regarding their cultural horizon, we thought it relevant to see what historical movies and books the students prefer. The answers as a whole were as diverse as possible: from "classical" books such as *Quo Vadis* and *Memoirs of Hadrian*, to truly "classical" literature (*The golden ass* and *The Satyricon* were mentioned), from old movies (*Spartacus*, *Ben Hur*) to newer ones (*300*, *Troy*, *Pompeii*) and from perfectly decent ecranisations (the series *Rome* and even *Gladiator*), to disastrous displays (*The eagle*, *The centurion*). One of the most popular films was *Agora* – rather surprising from my point of view, as the competition includes much more spectacular, dynamic and "flashy" movies.

When it comes to using Internet resources for education/scientific purposes, the students from Cluj seem to be more at ease in the virtual environment, listing numerous specialized sites (EDH,⁴ Ubi erat Lupa,⁵ Perseus,⁶ Livius,⁷ Lacus Curtius,⁸ etc.), besides the regular Jstor,⁹ digitized books sources or blogs. The students from Bucharest have a medium variety of listed sites, with predominance held by academia.edu and on-line books sites. A very interesting case occurred at this point, as a 2nd year BA student listed a bogus website (epigrafie.ro). On the other side, the students from Iași listed fewer web sites, with predominance held by Wikipedia, Facebook groups and Jstor. One particular case was that of a student interested in Egyptology, who listed profile sites (The Oriental Institute, KVS, The Amarna Project) – as well as Mika Waltari's *The Egyptian* at the books/movies section. The great popularity of Academia, Facebook groups and even blogs (the latter unexpected to us) underline the need of personal interaction and maybe of guidance, as a substitute for the rather cold and impersonal teacher-student interaction at pre-PhD levels.

Asked which is the utility and place of e-learning in the university system, most of them offered positive and optimistic answers (with 100% positive answers from Bucharest). The main utility younger students saw in e-learning platforms was easier access to bibliographical information, while the advanced (or those older in age) underlined the interactive elements and the possibility of debating subjects that are more or less neglected, due to lack of time, during classes and seminars. As well, a PhD student remarked that the digital availability and a minimum degree of interactivity in presenting the information would help increase the number of students studying part time or engaged in distance education.

15.4. Epigraphy and digital epigraphy

Most of the respondents are not particularly interested in epigraphy or epigraphy-related research fields – and this perfectly reflects reality, as

⁴ <http://edh-www.adw.uni-heidelberg.de>

⁵ <http://www.ubi-erat-lupa.org>

⁶ <http://www.perseus.tufts.edu/hopper/>

⁷ <http://www.livius.org>

⁸ <http://penelope.uchicago.edu/Thayer/E/Roman/Texts/>

⁹ www.jstor.org

few students from Romanian academia opt for these “harder” research fields. Even so, a vast majority (90%) declared they would use an on-line platform dedicated to Latin. Unexpectedly, many showed their interest (57% from Cluj, 82% from Bucharest and 92% from Iași) in workshops. Besides very general themes (religion, army, urbanization – though in the UBB programme there is an urbanization MA course – even ancient history, suggested by representatives of all student groups), some of the suggested topics are interesting and reveal particular interest: Greek epigraphy and literature (a very important implicit observation, as the scarce Greek classes and vague interest for it is one of the minuses of the Romanian university programmes), ancient power structures, marital relations through inscriptions, differences in everyday life between Roman provinces, stone carving and related processes, reception of antiquity, chromatics of the Roman art, even cultural heritage (suggested by a Bucharest student; while UBB and UAIC have postgraduate heritage programmes, UB doesn’t), etc.

The part of the questionnaire strictly related to digital epigraphy (though all aspects were intertwined) was based on the idea of a virtual museum exhibition. We considered that the answers to these questions would be relevant, as stand-alones as well as in correlation to other answers. Curious to see how students see the differences between a classical epigraphy exhibition and a virtual one, we have asked several questions (nos. 8-12). Generally, for both museum types, the students declared that as many information as possible is in order (normal for this target group), stressing upon visual details for the virtual exhibition. Only 4 (less than 6%) students underlined a very simple but vital aspect: good light. As well, they considered reconstructions, maps (with interactive features, GIS hyperlinks), rotating functions, etc. important for the on-line application. They saw rather well the benefits of a virtual exhibition, mentioning as possible features: electronic references with links to bibliographical sources, linkage to researches made on stone/paint/carving techniques, interactive exercises and games (such as epigraphy exercises), even sound effects and presentation movies. One of the students from Cluj (3rd year BA level, but 32 years old) remarked very well that short stories regarding the characters from inscriptions would be mostly welcomed, where possible. Another interesting suggestion, coming from a MA student (who says he visited 7-10 virtual museums and has a research subject linked to epigraphy, though seems interested in the matter), and a PhD

candidate working on a religion-related theme, concerns reconstructing the original natural and/or architectural context of the monument. Once again at this point, the students from Iași and Bucharest seem to be less descriptive, while the ones from Cluj generally seem to find the idea of a virtual epigraphic exhibition more appealing. At this point, we are not sure if the UBB environment is really more prone to embracing new ways of dealing with culture or humanities, or if the interrogated students simply put more heart into the survey due to the more or less personal relationship and interaction with us (detailed presentation of the survey-project, of Eagle, discussions, etc.)

15.5. Conclusions

The results of this narrow study are rather straight forward. While the majority of students seem interested in the idea of virtual education and culture, they also seem to be rather uneducated in these matters. The ones that display knowledge in the field and have creative ideas are generally PhD and 2nd year MA students. The lack of digital epigraphy (and generally digital humanities) classes in Romanian universities is evident and their necessity has been underlined by this survey. Besides focusing on a local education necessity, this research could and should be the base of a future larger and more refined survey, regarding the awareness of educated people for digital epigraphy and the cultural role it could and ought play.

16. Meeting the Needs of Today's Audiences of Epigraphy with Digital Editions

Laura Löser

Abstract

This paper argues in favour of a primary focus on the needs of contemporary audiences of epigraphic publications for the development of editorial conventions. For too long, users have been put in charge of the communicative effort between edition and audience, but the responsibility must lie with the editors. I present the results of my "Epigraphy – Who cares?" survey to show how diverse audiences are and I go on to illustrate how digital editions can attempt to meet various needs and expectations. This line of argument aims to free innovation from having to follow unnecessary traditions.

Keywords

Epigraphy, Publication, Editing, Markup, Digital, Customisation

16.1. A focus on purposes and needs

Information Technologies for Epigraphy. Anyone attending a meeting with these words in its title is most likely fairly convinced that digital editions of inscriptions are useful. Furthermore, many participants have been confronted with concerns about moving epigraphy into the realm of IT. Lastly, there are some who are concerned themselves that digital epigraphy breaks with tradition and does not actually bring more advantages than disadvantages. The ultimate question is, how do we make a decision on the quality of an epigraphic publication? Is there a way of convincing others as well as ourselves of the assets of digital editions? The answer is yes, there is, and it lies in the *purpose* of epigraphic publications.

All editions of source material share one essential goal, and that is to communicate to the edition's user the source's contents and contributions towards knowledge about the ancient world. Editors of papyrus

editions have been acknowledging this fact for decades. Here are some examples: After recommendations for papyri editors were adopted at an international congress in 1968, Eric Turner published a whole article on the process of publishing papyri in 1973. In *The Papyrologist at Work*, he argues that the familiar process of making and documenting conjectures is the first step of editing a text; however, the creation of an edition does not end there:

“He [the papyrologist] will not do it well unless he attempts a further step – to reconcile what is new with what was already known.” [TURNER 1973]

Turner refers here to what is known as “contextualisation” and also Louis Robert’s “mettre en série”. The *Oxford Handbook of Papyrology* contains a chapter called *Editing a Papyrus* where Paul Schubert explains what the purpose of a papyrological publication is: to give readers from outside the specialised discipline both insights and access to the source material. To this end the editor should contextualise the source and inform the reader about the contribution which it makes towards our understanding of the ancient world [SCHUBERT 2009]. This is no task to be mastered by a single person, as Turner acknowledges:

“But since he [the papyrologist] cannot be a universal polymath, he will defer here to the opinions of others.” [TURNER 1973]

Contextualising documents (in other words, completing the documents’ editions) is a community effort. Moreover, the more conventions the community has in common, the easier this process becomes. Thirteen years ago, at the 23rd International Papyrology Congress, Peter van Minnen presented two simple sets of *Ten Commandments*, for preparing and publishing papyrus editions respectively [VAN MINNEN 2001]. There can now be no doubt about the purposes and aims of a papyrological publication, and about how these aims are meant to be attained by different parts of a publication.

When one looks at epigraphy, the picture is extraordinarily different: Where are the *Ten Commandments for preparing and publishing epigraphic editions*? Where is the article *The Epigraphist at Work*? Where is the *Oxford Handbook of Epigraphy* and its chapter on *Editing an Inscription*?

Of course, there are many introductory chapters in books on epigraphy, however they mostly only provide information on how to *consume* editions, but not how to *do* epigraphy and to *make* an edition. Allison Cooley, for example, in her *Cambridge Manual of Latin Epigraphy*, devotes a subchapter to dealing with the CIL and its characteristics [COOLEY 2012]. Alternatively, there can be descriptions of how to edit an inscription, but these barely contain more than a list of Leiden conventions; in other words, Cooley and Klaffenbach [KLAFFENBACH 1966] deal with the mere representation of the text, but not with the parts of an edition that actually make it useful to any non-experts. Di Stefano Menzella [1987] also fills a whole book with guidelines on dealing with epigraphy, but lacks advice on how to put together a meaningful and useful edition.

Asking about the publication process rather than the usage does not turn the attention away from the user – quite the contrary: the aim is to acknowledge that the communication effort must not in the first instance lie with the audience, but rather that the audience must be the aim of the communication. The epigrapher’s focus must be on the audience’s needs because his work is only “use”ful if it is easily processed by the reader. In an online survey which I recently carried out on the audiences of epigraphic publications, one participant sums up the problem that would have to be solved for the discipline to remain up to date:

“I thin[k] that []epigraphy is no more an attractive field of study. I am facing a lot of problems attracting students to this field[]. All[]though I know what importance we have in epigraphy.”¹

The first step towards meeting audiences’ needs is to be aware of them and subsequently explore ways in which they can be met. Epigraphy has been neglecting this duty, which is absurd, because it must be the aim of anyone editing source material to communicate with the edition’s users, not to follow a tradition that is based on anything but usefulness. A focus on audiences will enable the discipline to reconnect with the people who most urgently need its attention.

John Davies recounts an eye-opening moment in his chapter on the discipline’s future. He asked a group of students on their opinions on how inscriptions should be edited.

¹ Participants were promised anonymity. Only slight changes have been made to correct grammar and spelling.

“The use of Latin was given an emphatic thumbs-down; the need for translations of the Greek texts was taken for granted; paper publication was seen as expensive, inconvenient to handle, and restrictive of access; on-line publication was universally preferred; and the problem of access to a commentary written in an unfamiliar vernacular language was seen as easily overcome by the use of language-option channels as used by ATMs or by on-line booking systems in the airline industry. ” [DAVIES 2009, p. 270]

I will come back to ways in which the tradition is problematic in a later part of this paper. Firstly, though, I will comment on how a focus on aims can defend progress and subsequently demonstrate who the audiences of epigraphy are, according to my survey’s results.

16.2. Aims in support of progressive development

It is hardly surprising that epigraphers are able to disagree on whether digital editions of inscriptions are “useful when they have not set out what uses their editions ought to have. The need for clear awareness of aims becomes most crucial where new opportunities make members of the discipline disagree about the best ways to attain these aims in the future. Nobody will be able to answer the question of whether digital editions meet the audience’s needs without a clear idea of what their needs are specifically.

Papyrology sets a good example, which epigraphy should follow. While papyrologists can examine the compatibility of digital editions with their long-established guidelines, and even complement their sets of *Ten Commandments* with one for digital editions [VAN MINNEN 2001], epigraphers have no such approved conventions or recommendations to fall back on. It is therefore essential for epigraphers to get started on such an analysis in order to come to agreements about the usefulness of digital editions.

Many scholars today are concerned that digital editions will carry practice away from well-established traditions and are therefore wary of online publishing. Thus, universal recommendations for epigraphic activity will not only give us a way to check if new developments are useful and in line with the aims of epigraphy (and our aims are quite a different thing than its traditions): it will also provide a reference frame

for defence and promotion of novel approaches against ever-critical conservatives.

Lastly, focusing on what is really urgently needed by different groups can provide inspiration for the development of new tools and ways of representation that are closer to purposes and aims than to traditions, and can therefore justify a potentially inconvenient change for the sake of an easier future. It may have taken the *Année Épigraphique* sixty years to adapt Leiden conventions, but in the end they took this inconvenience of changing their methods because it was more useful and closer to the discipline's aims than continuing a tradition just for the sake of it.

16.3. Today's diverse audiences for epigraphy

Anyone learning about the ancient world and being taught to appreciate that our knowledge comes from sources rather than from textbooks deserves to hear in some form or other about the qualities of epigraphy. Whether epigraphy is regarded as a *Hilfswissenschaft* or as a legitimate independent subject area, it derives its legitimisation to exist from its usefulness to the understanding of the past. Therefore it must strive to serve anyone who is trying to learn about history. All audiences deserve the attention of those putting together epigraphic publications, because they are the ones who need to be able to use them. Davies explains:

"[Today's British students] and their colleagues of earlier years, along with their counterparts elsewhere in the world, are the primary future 'user community' for any and every epigraphical publication we may plan. If we care about their interests, then their needs, their preferences, the technologies with which they are comfortable, and the economics of provision have to take precedence over tradition, with all that entails for transforming the many current experimental publications of epigraphic material into the mainstream style of provision." [DAVIES 2009, p. 270]

Between March and June this year (2014), I carried out an online survey to which I invited anyone who makes use of inscriptions. There

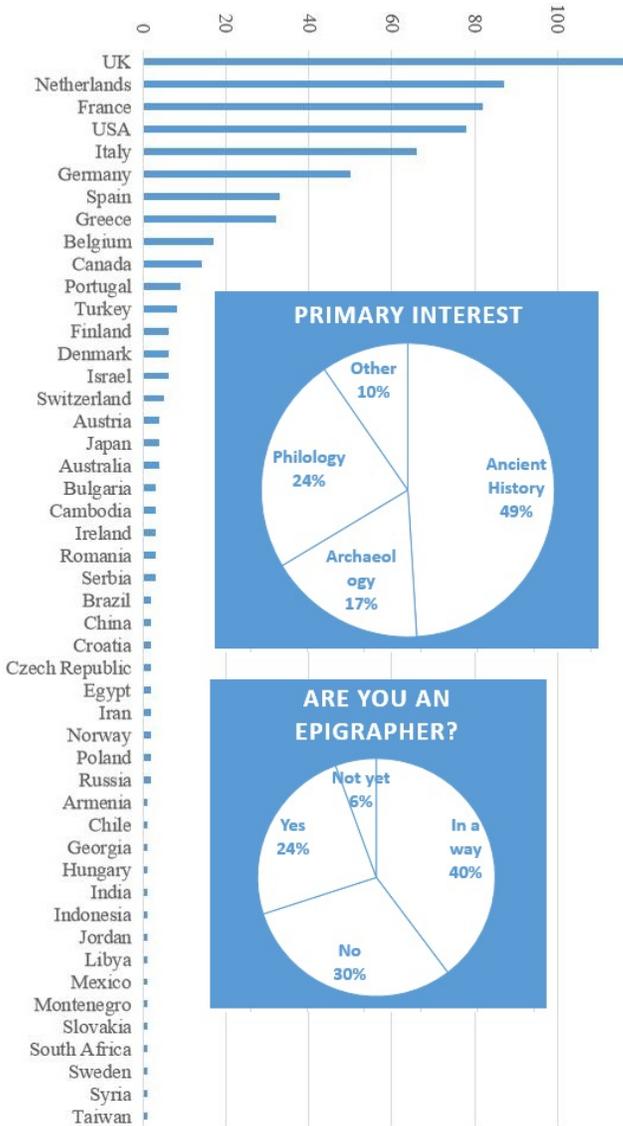


Fig. 16.1. Some results of the survey “Epigraphy - Who cares?”

were 575 participants working in 48 countries of all continents (Figure 16.1): hands-on epigraphers, scholars from related disciplines, students, and those who are just fascinated by inscriptions took part (Figure 16.1). About a quarter of the participants identify themselves as epigraphers, slightly more indicate that they are not. Nearly 50% say either that they are in a way or that they are not yet. Moreover, around 49% say that their primary interest is Ancient History, 24% Philology and 17% Archaeology. The remaining 10% indicate other disciplines, such as History of Art, Papyrology or Numismatics.²

Of course these results must be handled with care. While the survey was sent to the *Classics List* in Britain, it was disseminated amongst narrower groups like an archaeology or digital humanities list in other countries such as France and Spain. However, it is sufficiently clear that Ancient Historians are by no means the only sizeable interest group. Also, the way the survey was disseminated probably attracted relatively more epigraphers than people who only irregularly, yet repeatedly, use epigraphy.

Interests are as diverse as the source material itself. There is a large group especially of those working in ancient languages and literature and looking to complement their ideas about the ancients through epigraphic material. This is hardly surprising, given that they are then more likely to overcome the boundary set by the absence of a translation. In addition, archaeologists may have a special connection with inscriptions since they often discover and occasionally publish them in excavation reports, e.g. in the case of Olympia.

Even though the survey mainly reached scholars, it is highly desirable for undergraduate students as well as secondary school teachers to be able to make use of epigraphic materials. It is not always the globetrotter international scholar that goes inscription-hunting; cities across Europe feature inscribed stones. Although the survey bears only few testimonies from the wider public, the space for participants' musings was sometimes filled with some heart-warming comments:

“In my country [Italy] you may see many [inscriptions] mainly written on stone. They are messages which came from men who lived many centur[ies] ago, and they were

² The survey as well as the complete results are available at <http://epigraphywhocares.wordpress.com/full-results/>

written to speak to [the] next generations, thanks [to] the [stones'] lasting support. I am always fascinate[ed] when I can read them, because I feel [like I] listen the voices of th[e] ancient men speaking to me."

The most important revelation, and indeed limitation, of this survey is that the audiences of epigraphic publications are large and diverse, while some groups to whom inscriptions can be interesting are not easily reached at the moment.

However, epigraphers should not only feel a responsibility to cater for anyone who wants to learn about inscriptions: they could also profit from groups which may currently feel excluded. After all, the Daily Mail can get excited about Sappho, and a Dutch secondary school teacher is one of the most enthusiastic contributors to *papyri.info*. There is a small public audience enchanted by the idea of hearing the ancients speak and demanding access to epigraphy, and they are a considerable part of the lobby out there to keep epigraphy alive. In fact, to "equip the broad public with a way to understand and easily appreciate interesting and geographically dispersed inscriptions", is one of the stated aims of the EAGLE Network's collections.

16.4. How to meet diverse needs with modern editorial means

"Underlying the debate has been the basic issue of readership: should [...] a long-term definitive republication be directed Corpus-style above all in usum scholarum, or should it reflect today's realities by being much more accessible and use-friendly? And if the latter, what changes need to be made?"[DAVIES 2009, p. 270]

Here, Davies hints at the exact problem that underlies the dilemma that editors face today. There is a longstanding tradition said to be useful to scholars, and publishers are wary of altering it because they fear being viewed as populist and supporters of senseless *res novae*, while of course their actual motivation is the sober observation that audiences have changed and that the traditional publications serve purposes no longer existent. One reason for this is that many scholars who publish inscriptions come from a philological background; in philology the editor's task can often end with the production of a text

that is as accurate as possible according to set standards. Arguably, as a work of art, literature can sometimes be appreciated independently from its context. This is very different with texts published to be valuable as historical source material. Another complication is that while philologists used to be trained in the composition of Latin, this is seldom the case today. Latin metadata is not only a complication for users, but also for editors who find it increasingly challenging to write in Latin [ALFÖLDY 1999]. This may lead to obscure wording or grammar mistakes that hinder clarity.

In the following section, I will use some of the most troublesome areas of dealing with inscriptions to show the ways in which digital representations of epigraphic material can help contemporary audiences to make (better) use of it.

16.4.1. Finding material

There are two ways to find inscriptions. Possibility A is starting from a topic, e.g. the role of children in Hellenistic Greece. The SEG's bibliography or further monographs on the subject will help, an anthology may help too, but finding previously unconsidered material is nearly impossible. Possibility B is to start from a source and find out more about it. Traditionally, however, an inscription receives a new name when it appears in a new collection. There are some concordances, the SEG and AE, Claros, and the EDH, but they are hard to find and hard to use. In fact, Claros has slavishly copied indexes without distinguishing, for example in the SEG, between a reference to an edition of the same text and a reference to an edition of another text that only briefly mentions the text one is looking for. Deciphering abbreviations like RIB may not seem like a much different expertise from figuring out what Cic. Ad. Att. means, but at least if one googles the latter one receives Cicero, whereas if one googles the former, one receives descriptions of inflatable boats and the human skeleton. Aside from the fact that it is entirely inexplicable why inscriptions do not have unique IDs yet, at least concordances and lists of abbreviations should be better, more complete, and easier to find.

Diverse audiences have diverse needs, but the advantage of a digital edition is that it has no space limits. An inscription may be valuable evidence on the lives of women and on spelling variations at the same time. Collecting inscriptions in a corpus often means either putting

together epigraphic material following certain criteria that will always omit other texts that could also be relevant, or not listing a text in a potentially relevant category. An inscription published digitally can appear under as many categories as is useful, but it only has to be entered once. Such tags can combine the uses of a table of contents with that of an index. Combined with inscription IDs and better concordances, this will enable more people to find much more relevant material.

16.4.2. The text

Different audiences may also need different editions of the text. The new edition of the *Inscriptions of Aphrodisias*, for example, lets the user decide if he wants to see the edition or a “diplomatic” version.³ The naked text in capitals is for anyone who wants an unbiased representation of what is on the stone, while a secondary school teacher may want to see the text in a shape as close to textbook Latin as possible. This may seem unprofessional to the epigrapher, but a text with as few complications and as complete and translatable as possible will be more welcoming to younger learners who are just making contact with this sort of problematic text. To this end, the usefulness of markup cannot be doubted, because what markup does is a logical continuation of a process of standardisation as well as adapting to the increasing need for customisation. If one approves of using the Leiden conventions and of using communal terminology, one cannot be against markup because it does exactly the same thing while being more flexible and more precise. This is how users can access customised texts that are represented exactly how they need them.

16.4.3. Translations

First of all, translations are very often not provided while in editions of papyri, translations into one of English, French, German, Italian and Spanish have been included for a long time. Critics often counter this idea by suggesting that those dealing with epigraphic editions ought to be familiar with Latin and Greek anyway and that their classical language skills ought to be better than their modern languages, too. This certainly is not the case anymore, neither for example in Britain, where the ancient languages are by no means a requirement at all for a

³ For an example, see: <http://insaph.kcl.ac.uk/iaph2007/iAph010001.html>.

degree in, say, Ancient History, nor in a country like Germany, where a certificate in Latin is a common (and in many cases a compulsory) qualification to have for an Ancient History student. Even if these people read their Ciceros and Demostheneses fluently, it would not necessarily enable them to read inscriptions. The language in inscriptions is different in terms of grammar, vocabulary, spelling, foreign words, unfamiliar names and - especially - abbreviations. In addition, the language in an honorific inscription to the emperor will vary greatly from that in a verse epitaph for a dog. Reading these languages fluently comes with a very different set of skills from what is taught in Latin and Greek courses.

Finally, as was acknowledged by Turner and propagated by Louis Robert, it is the editor's task to contextualise the document. The editor has to decide and demonstrate how the inscription fits into the bigger picture, and thus attempt an interpretation. A translation is the first step not only to make sure for oneself that one truly understands the text and can make sense of one's own conjectures, but it is also the first step towards an interpretation by deciding how certain terms should be read and what they can mean when they stand together. Today it is no longer useful to simply publish a text and say nothing about it. Such a text will hardly be useful to anyone. A translation is the easiest step towards making a text accessible in terms of reading the text and having a first interpretation of it. After all, the editor must understand his text anyway if he makes any conjectures or other editorial decisions. A publisher will usually categorise an inscription in some way or other, so he will always have to be aware of the contents.

The big advantage here is that such content does not have to be published at the same time as the text, but just like additional metadata and commentaries, it can be added or improved at a later stage. Multiple translations, maybe into different languages and with different interpretations, can be presented, and subsequently be compared by the reader.

With the research into treebanks and automated translations in general, we may at one point be able to translate automatically texts of as highly formulaic a nature as inscriptions. But for now, that is really something of the future.

16.4.4. Glossaries

Glossaries are essential for three groups. Firstly, those who are not part of the scholarly community and need simpler equivalents and explanations of complicated terms; secondly, learners who are new to (digital) epigraphy; thirdly, non-native-speakers who are not yet familiar with the English terminology. Any independently useful resource ought to include a glossary to assist audiences with its use and the particular advantage of a digital edition is that a definition does not have to be further away than a single click.

16.4.5. Metadata & Commentary

The efforts of Pleiades and Trismegistos to equip any ancient place with unique identifiers and concordances result in an additional asset of digital editions. Maps are created in no time and are a very attractive way for laymen to discover inscriptions in their area or wherever they go on holiday. However, with many of these possibilities that are already well-exploited by papyrologists, there is a large discrepancy between the potential and the reality of digital publications. Here are two comments by my participants:

“My main complaint against the epigraphy mafia is that so much scholarly commentary and images are not readily available on line. [...] For most documents one is reduced to the raw text [...] Why are epigraphers so incredibly jealous of their [...] data?”

“[My] graduate students [...] cannot access epigraphic publications because they [...] have been discontinued due to rising costs and declining budgets. The more that appears online, free, the better.”

In a time when some university libraries are unable or unwilling to afford hard copies of epigraphic publications, the discipline must think about alternative ways to communicate its results.

16.5. Conclusions

Communicating the contents and contributions of sources is part of the editing process and the essential aim of a discipline that is based on the presentation of documents. I set out to survey the needs of

today's audiences of epigraphic publications because I believe that they are the best starting point for justifying what the edition of an ancient document should attempt to do and contain. In this paper I have presented my results and given examples of how users' needs can be met by digital editions of epigraphy. The diversity of needs and interests can be best accommodated in a format not limited by space and profiting from the interconnectedness of linked data. Investing more interest in epigraphy's audiences does not only promise to create a bigger lobby for the discipline. Ultimately, this more realistic focus frees progressive developments from having to stick to restraining traditions that are unnecessary and do not serve a real purpose.

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17. #svegliamuseo

A project to “wake up” Italian museums online

Francesca De Gottardo

Abstract

#svegliamuseo¹ is an experimental project founded to “wake up” Italian museums online by leveraging the power of the Internet to generate opportunities for meaningful networking.

By acting primarily on online channels, #svegliamuseo convenes experts and enthusiasts, triggers conversations, and supports exchanges on technology, media and online communication in the museum and cultural sector. It is a platform for any museum in Italy willing to invest in social media and digital tools to improve day-to-day communications.

Keywords

Social Networks, Social Web, Online Communication, Digital Tools, Best Practices.

17.1. The Project

17.1.1. Why a project about museums and online communication

#svegliamuseo is an experimental project founded to “wake up” Italian museums online, leveraging the power of the Web to trigger a networking effect.

The mission of #svegliamuseo originated from my own workexperience.

In July 2013, I was in charge of mapping the online presences of museums and cultural institutions in northern regions of Italy (Friuli Venezia Giulia, Veneto and Trentino Alto Adige)—in connection with

¹ <http://www.svegliamuseo.com/en>

the purpose of supporting the candidacy of the city of Venice as 2019 European Capital of Culture.

Over the course of that research project, I observed that many cultural institutions in the area were scarcely present on the Web.

Besides some exceptions in Trentino Alto Adige, the vast majority of the websites were outdated and very limited in terms of style and content as well as in providing basic visitor information.

In many cases, institutions rely on municipality websites that gather together local museums on the same portals.

When looking at social networks, many gaps emerged as well. Very few of the smaller museums were present on Facebook and nearly absent on Twitter. Furthermore, some of the most well-known institutions were not represented on popular social platforms.

Some, on the other hand, used these tools merely to re-broadcast information about events and activities, already promoted on their websites and institutional channels.

During this analysis, I stumbled upon some exceptions, but I ascertained that there was a generalized lack of understanding of potential offered by digital tools.

I concluded my report stating that

online communication for museums and cultural institutions in the north-eastern part of the country is going through a transition phase. We have some isolated examples of excellence, a few cases of slow adaptation to digital changes and a large portion of institutions that lack a structured online communication plan. In this sense, few museums follow the example of institutions abroad, looking to establish two-ways conversations that involve and engage the user, who become creators of content and experiences.²

Once the research was completed, I was challenged to continue it and extend it on a broader national scale as well as comparing my findings with museums abroad in order to make trends and features in the global sector visible and accessible.

² From the paper in support of the candidacy of Venice as a European Capital of Culture 2019 (unpublished).

From this second phase of benchmark and analysis, I started a website gathering findings and considerations with the help of three colleagues, Aurora Raimondi Cominesi, Alessandro D'Amore and Valeria Gasparotti. All came from different backgrounds in the field of management of the cultural heritage.

The main scope of the project was to start conversations on the topic among the communities of interest, hoping to trigger a change.

17.1.2. Goals and approaches of the project

#svegliamuseo wants to focus attention and provide a space for conversations and exchanges about digital communication and interpretation in the cultural field.

A provocative name (“svegliamuseo” literally means “wake up, museum”), was chosen to draw the attention of the communities at hand.

The tone of the entire project is professional and accurate, but at the same time avoids the “high-brow” and rather elitist spirit traditionally associated with culture, getting closer to a more direct and informal style, suitable for online communication.

Along with the main objective, #svegliamuseo seeks to aggregate resources and act as a container of ideas, encouraging a more lively dialogue among communities while convening experts on a national and international scale.

Our methodology is based on two main activities:

- On one hand, we “pair up” international museums that effectively use digital tools and digital thinking together with Italian museums that volunteer to be advised on web and digital strategies.
- On the other hand, we want to highlight those Italian institutions that represent best practices in the field by asking them to discuss successes, common obstacles, and limitations as well as possible future developments. We believe that, by sharing these experiences, they can help drive the changes needed at smaller institutions.

Through a Wordpress blog, a Facebook group, a hashtag, and a Twitter account, we started sharing articles as well as the latest news on social media, communication strategies, analytics and evaluation for digital tools, museum blogging, storytelling techniques, mobile and

interactive media, open data, wearable technologies, Internet of things and so on.

By acting on three levels - connections between Italian institutions and museums abroad, interviews with Italian practitioners, and conversations about the latest trends -, we are trying to “wake up” the Italian museum sector, providing a space for exchange and discussion in this sense.

In the meantime, the #svegliamuseo team has become more structured, aiming at a broader diversification of contents and skills.

17.2. The reaction of Italian museums and the #svegliamuseo community

Right after the creation of the project, an actual community started gathering around it.

For this reason, we decided to open a Facebook group rather than a fan page: in an effort to establish a two-ways dialogue, open to all.

Since its opening in October 2013, the Facebook group has grown to over 1700 subscribers, including professionals in the field and people who are simply passionate about museums and like to participate in lively discussions.

At the beginning, the group included people not working in museums talking about methods and the policies of Italian institutions.

Later on, more and more cultural professionals participated, responding with their points of view.

Debates between different sectors generated an interesting exchange of opinions and content. On one hand, museums ask for advice and defend their positions, showing enthusiasm for suggestions related to storytelling techniques and creative usage of social media platforms. On the other hand, people comment, sometimes using a very critical tone, about policies related, for example, to the possibility of taking pictures in museums, the use of open data, as well as some cases of underdevelopment in the Italian sector.

Discussion, although sometimes lively, is always productive and is the main characteristic of this group.

Simultaneously, we have been looking at the same development on Twitter, with unexpected results.

Over the first months, the hashtag #svegliamuseo was used by a specific audience with a very critical tone toward Italian museums.

More recently, museums and cultural professionals adopted it to underline the fact that they were “waking up”. Since October 2013, many Italian museums have opened a Twitter account and have started to experiment with it.

Over the course of “Museum Week”, #svegliamuseo played a key role in exchanging and connecting with different institutions. Museum Week was a Twitter event that allowed museums all over Europe to come together on by collectively sharing pictures and comments based on different themes.

Today, the hashtag #svegliamuseo has a totally positive connotation.

17.3. Italian museums online: what has changed since 2013 and future developments

Over a period of six months, #svegliamuseo has been seeing a lot of transformations in the sector.

To provide some basic metrics, Italian participation to the Twitter event “Ask a Curator” in September 2013 included 15 museums. In February 2014, 34 Italian institutions joined the “Follow a Museum” event, while at the end of March 2014, more than 120 participated in Museum Week.

What does this increase tell us?

First of all, over these months, many Italian museums, especially smaller and medium institutions, created social media accounts, showing that they want to give these tools a try and experiment with them.

Secondly, we can see that there is a broader awareness toward the potential of online communication.

And furthermore, museums acknowledge the benefits associated with participation to shared initiatives, as well as the creation of a network on an international scale.

However, it is important to highlight that digital media should be used in a strategic and integrated way. When using these tools, planning beforehand as well as analyzing at the end of a project is crucial to maximize the visitors’ experiences and align the online offering with the museum’s mission.

Additionally, online strategies should be designed to respond to specific institutional needs and targets, as well as the cultural, political, and economic environments in which museums operate.

#svegliamuseo wants to move forward in this direction, acting as a platform to listen and reflect on possible strategies and the different, creative dimensions that digital media can take.

#svegliamuseo will continue to do so by leveraging the Web and its unlimited potential for connections and exchange.

<http://bit.ly/facebook-svegliamuseo>

#svegliamuseo Facebook Group

<https://twitter.com/svegliamuseo>

#svegliamuseo Twitter account

Websites

- Museum Analytics website: <http://www.museum-analytics.org/>
- La Magnetica website (for Museum Week data): <http://www.lamagnetica.com/>
- Mar Dixon website (for Ask a Curator Day data): <http://www.mardixon.com/wordpress/2013/09/summary-askacurator-day-2013/>
- Follow a Museum 2014 website: <http://followamuseum.de/>
- Jasper Visser's The Museum of the Future: <http://themuseumofthefuture.com/>
- Colleen Dileen's Know Your Own Bone: <http://colleendilen.com/>
- Nina Simon's Museum 2.0: <http://museumtwo.blogspot.it/>
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18. #DigitalInvasions

A bottom-up crowd example of cultural value
co-creation

Elisa Bonacini, Marianna Marcucci, Fabrizio Todisco

Abstract

The purpose of this paper is to present #DigitalInvasions' (#invasionidigitali), a project which has just finished its second edition, held on 24 April to 4 May 2014. Digital Invasions' is an Italian bottom-up project of collective participation in creation and sharing of cultural contents in order to enhance and promote Italian cultural heritage, through the use of web and social media. This project is an example of new forms of a democratic, participatory and inclusive digital culture.

Keywords

Digital culture, co-creation of cultural value, social media, user generated contents, participatory culture, participatory museum, dissemination of cultural heritage.

18.1. Prosumers and new ways of cultural heritage dissemination through UGC

Democratization of data and information, in the web 2.0 and social media era has allowed creation of a participatory knowledge that, mainly by using interconnection, social sharing and co-creation of content and cultural value, made it possible to exploit network's potential.

This change of perspective was already heavily supported also by the European Union since its Dynamic Action Plan guidelines for the EU co-ordination of digitisation of cultural and scientific content (DAP 2005) on issues concerning users and content:

“Users need to benefit more from the networking of cultural knowledge, as the implementation of technologies

enables the development of a European Cultural information space. They need to be facilitated to find easily and use cultural content and to contribute their own knowledge and experience, becoming active citizens in information societies”.

also focusing on specific Key issues such as:

- Engaging audiences in re-use and content production;
- Mobilising cultural institutions to make best use of existing technologies to enable digital access by all citizens.

During the Web 1.0 phase, web was presented as an one-way, passive, static and anonymous medium, in which, according to scholars, “the online experience was more like the reading of a book than the sharing of a conversation” [KOZINETTS 2010a].

With the Web 2.0 phase, web has transformed in a participatory platform, shared, fluid and personalized. With a wide opening to the users’ contributions, even information and cognitive system has been literally transfigured, from a top-down, one-to-many and content-centered system to a bottom-up, many-to-many and user-centered one.

In this system, user self-generates digital contents - different from those produced by traditional media - defined user-generated contents (UGC), exponentially contributing to decentralization and democratization, according to information openness model. According to this model, in fact, to create and manage the content and the information are no longer, or not just, the centralized authorities (experts, etc.), but various and disseminated stakeholders: users, contributors, prosumers etc. [CIAPPEI et al. 2010; BONACINI 2011; BONACINI 2012], able to interact easily with new mass digital technologies. In this 2.0 phase, user consuming culture has turned into a prosumer or a consumer who participates in a new kind of production defined presumption [BRUNS 2008].

The real Web 2.0 revolution lies on the role of user who has acquired knowledge, technical expertise and ability to interact with this platform. Nowadays, social and economic development of our modern society depends on this new awareness and capacity. Exponential evolution of digital content creation has led to a real cultural revolution, where

ICTs have become increasingly dominant. Evolving from a mass consumption society, our society has been transformed definitively in a mass cultural production society - also defined software society, whose cultural output is what Lee Manovich calls software culture [MANOVICH 2011; MANOVICH 2013] - where UGC have become so abundant to talk about a "cornucopia of online consumer data" [KOZINETS 2010b] and cultural production takes on aspects of mass collaboration (an emblematic model is Wikipedia). So, we live in a digital culture, where bottom-up and top-down processes are simultaneous and users contribute in a variety of ways and in the meanwhile they are consuming information [UZELAC 2008]. Our culture economic model, based on a broad diversity and plurality of information and perspectives, is defined networked information economy [BENKLER 2006]. In our mass production society and in its networked information economy, acting as prosumers of cultural contents, users act as providers of knowledge, exploiting simultaneously the social and participatory modes of internet communication, as a kind of socialcasting [BENNATO 2011], whose distribution process refers to a community of people who decide autonomously to increase the contents' circulation thanks to sharing opportunities offered by new technology and participative web platforms, with a strong cultural and symbolic matrix, since that flow of content occurs with the cooperation of people who enjoy the same content.

In our software culture, there are specific cultural processes (creating, distributing, receiving and sharing both information and knowledge), which are mediated by specific digital tools, software or applications, enabling prosumers to create, share and disseminate their cultural contents. According to Matarasso [2010], this process changes the way of thinking about culture and participation:

"The coining of the term 'prosumer' marks a growing recognition, not just that people can be both cultural producers and consumers (something that has always been the case) but also that conventional ideas about professionals and amateurs are increasingly meaningless. As museums and other cultural institutions open up curatorial and programming process to forms of co-creation, the knowledge of professionals is being modified by the experience and insights of their audiences".

Communication in a digital context is more fragile than appears. Process requires sender and receiver using compatible technologies

which evolve quickly, differently and continuously. Moreover, it requires them to boast a similar mindset or the ability, the wisdom, the will to deeply understand each other. Which may prove difficult when we come to Cultural Heritage that is, by nature, highly intangible and thus leaves room for extremely personal 'interpretations'.

If, on one side, those interpretations may appear distant and of no real value for defining the specific cultural object they refer to, on the other side they represent an invaluable asset to better define that very cultural object and deeply understand the way it is perceived by the audience.

Engaging the audience in a closer relationship with the Cultural Heritage they are surrounded by may prove effective to co-create additional cultural value. Initiatives aimed at that can enable:

- a better understanding of the communication issues affecting Cultural Heritage;
- an increased awareness of the needs and difficulties related to the protection and valorization of Cultural Heritage;
- a sense of 'participation', so to actively maintain and enhance the value of any cultural experience.

Digital media constitutes a challenge not only for museums communicating art, history, cultural heritage, but for all the staff of cultural institutions, organizations and businesses. The challenge, for museums, is to change their museums praxis re-inventing themselves "in order to embrace a prosumer culture" [SCHICK 2010].

Today, production of cultural content is really easy thanks to social and geo-social networking platforms and their use in mobility. In addition, the real-time sharing of a place, an object or a live moment, has a huge evocative and communicative potential, because authenticity, emotion, excitement and satisfaction are expressed in a non-filtered way and give this communication an unparalleled effectiveness [MILANO 2011], fostering forms of digital sociality. The amazing spread of social media (participatory by nature) and digital tools like smartphones and tablets makes this challenge increasingly inviting and lead us all to inevitably rethink communication altogether. The open-endedness of those media explain the possibilities for a two-ways communication processes and for the creation of a kind of content that is not merely 'user-centered' or 'user-driven' but, rather, fully 'user-generated' also at a Cultural Heritage level.

18.2. #DigitalInvasions: best practice of crowd cultural value co-creation

#DigitalInvasions project (#invasionidigitali) is a strong and wide example of user involvement both in cultural value co-creation and content sharing of suitable to Cultural Heritage enhancement [MARIANNA MARCUCCI et al. 2014; BONACINI 2014]. This bottom-up initiative is unique in its kind, both for the consistency and virality of this phenomenon, and for its novelty and its direct and indirect effects on Italian cultural communication. At the base of #DigitalInvasions' great success are, of course, the profound change which has occurred in users' role and the desire to share and participate cultural value, fostered by social platforms spread.

#DigitalInvasions are 'social media mobs' of people who support Italy's museums and cultural heritage by 'invading' them and then documenting their cultural experience on blogs and social media. In this way, people can raise awareness, interest, curiosity around cultural sites and generate positive response from a wider audience and, potentially, investors.

This project is all about co-creating and nurture cultural value through proactive participation of visitors into the museums' communication life-cycle. It is characterized by a fully bottom-up approach, where people organize independently single events all around the country during a given time frame. Each 'invasion' is meant to create new forms of conversation about arts and culture, and to transform Italy's heritage into something that is open, welcoming and innovative. Social and digital communication are key to the invasions: 'invaders' are bloggers, archeology amateurs, artists, photographers, Instagrammers, historians, communication experts, but also common people with the most varied backgrounds, united by a shared desire to promote their cultural heritage with social media. All of them boast a real passion for their country and its unique heritage, and own well established social media accounts. Inspired by a contingency, #DigitalInvasions aims now to become a sort of 'national territorial lab' for new social and digital communication products and models, and a tool to enhance both visitor's experience and museum/cultural site performance.

#DigitalInvasions were immediately recognized as a best practice in transmedium approach applied to national heritage and its integrated ways of promotion, a kind of urban gaming useful to provide a different

and collectively built vision of cultural places and objects, giving them a new life [SYMBOLA 2013].



Fig. 18.1. #DigitalInvasions poster with Goethe in der Campagna, J.H.W. Tischbein, 1787

18.2.1. Manifesto

In every country, the very own artistic and cultural heritage represents a great resource. To allow this heritage to express its potential, it is needed to embrace innovation and grasp the profound changes taking place in modern society. While a conservative trend still pervades the management of culture, in many international contexts a process of change has been started, which goes hand in hand with the evolution of society and its technological progress.

The acceleration of the digital revolution can contribute to renovate the cultural institutions and promote a concept of 'open and widespread' cultural heritage. A radical change is happening, especially thanks to those new forms of socialization and interaction with the new digital and social platforms on the web. Through them, knowledge and participation of the users are encouraged at all levels, increasing and customizing the appeal of the cultural offer and, most of all, activating new interaction mechanisms of fruition and comparison of the cultural offer. For these reasons:

1. We believe that the application of the new forms of communication and shared multimedia to the cultural heritage is a fundamental opportunity to boost the transformation of the cultural institutions into open platforms for the circulation, exchange and production of value, capable of ensuring an active communication with the public, and the fruition of cultural heritage free

of geographic boundaries wherein the sharing and the model of open access will be the best formulas.

2. We believe in the new forms of conversation and circulation of the artistic heritage, no more authoritarian and conservative but open, free, friendly and innovative.
3. We believe in a new relationship between museums and visitors based on participation, creation and promotion of culture.
4. We believe that the platforms connecting visitors, experts, scholars and enthusiasts, allow users to cooperate by offering museums their UGC personal content (User Generated Content) that may encourage co-creative cultural values.
5. We believe in new experiences of visiting cultural sites, no longer passive but active, where knowledge is not only transmitted but also built, where the visitor is involved and able to produce himself forms of art.
6. We believe that internet and social media are a great opportunity for cultural communication, a way to involve new players, shoot down all kinds of barriers and further facilitate the creation, sharing, dissemination and use of our artistic heritage.
7. We believe that internet is able to trigger new ways of management, conservation, protection, communication and exploitation of our resources.

18.2.2. #DigitalInvasions2013: born of a massive digital phenomenon and its Manifesto

Designed by Fabrizio Todisco, the very first edition of #DigitalInvasions was held on April 20 - 28, 2013 as a sort of bottom up-Culture Week in a crowded mode (Culture Week 2013 edition was, in fact, abolished by Italian Ministry of Culture for financial reasons) and based on use of smartphones, tablets, tags and social networks. #DigitalInvasions has been able to grow across the country thanks to a network of people and partners, including #igersitalia (Italian Instagramers), Digital Natives, #iofaccirete (travel bloggers), Officina Turistica and National Association of Small Museums.

By actively working together, it was decided to create the website www.invasionidigitali.it, to write and promote its Manifesto, reproduced in full in the next page, that might help to further understand motivations that lie behind this format.

www.invasionidigitali.it website, with its brand on high-impact posters, its slogan with main hashtags #invasionidigitali, #liberiamo lacultura (#letsfreeculture) and #laculturasiamanoi (#weareculture), its profiles on Facebook, Twitter, Pinterest, Instagram, Foursquare, Google+ and Flickr, was officially launched on 2 April 2013. At the very beginning, museums and institutions allowing a digital invasions inside were only 5.

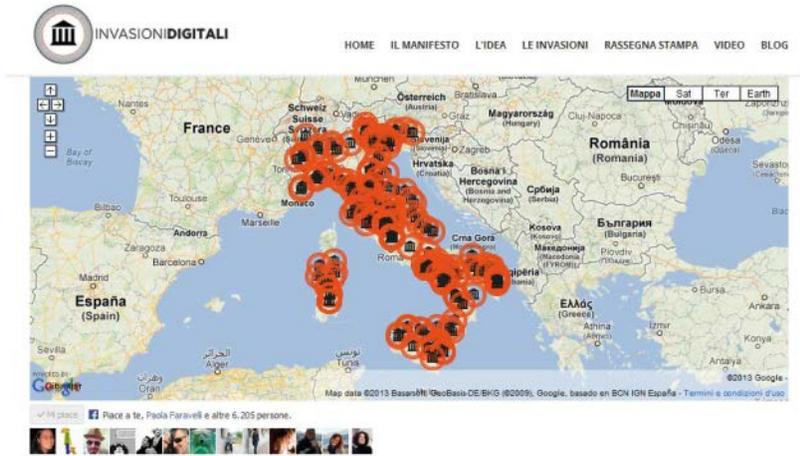


Fig. 18.2. #DigitalInvasions poster with Mr. Spock from Star Trek, 1966-1969

From April 2 to 18, accessions have grown at a phenomenal rate and multiplications of these local initiatives was viewable on website's Google map, on which every single digital invasion was updated and geolocated by the staff, reaching in a very short time a total of over 300 invasions organized in all Italian regions. In this way, a mass participatory and shared platform has been created, unique in the world, in which everyone - from the common art lover to cultural institutions - thanks to social media activities, helped to undermine the hierarchic and still plastered Italian word of culture and its communication.

As a blogger wrote when invasions increased progressively on Google map, Italy looked like a sick, sprinkled with red blisters, infected by a virtual virus, that is spreading fast, and all those blisters looked like Garibaldi's scarlet shirts, ready to march on Italy, but they were coming in peace.

Each #plannedinvasion (#invasioneprogrammata) was a mini-digital-social event in itself: every coordinator created invasion's event on



#INVASIONIDIGITALI (20-28 APRILE 2013)
CO-CREATION OF CULTURAL VALUE

Fig. 18.3. Geolocated map of #DigitalInvasions2013



Fig. 18.4. Poster of planned invasion at Royal Palace Gardens of Venaria Reale (Turin)

Facebook or Eventbrite with its own poster (according to specific editorial guidelines), indicated to participants (invaders) the official event hashtag and any procedures for sharing photos and video on different social platforms. Website automatically aggregated any post and digital content with official tags. Invaders were also invited to take a photo of their digital invasion concluded and to create short videos to upload on Youtube. From all videos collected (sixteen in total), the staff made a unique video on #digitalinvasions2013, as a bottom-up promotional video on cultural and touristic beauties of Italy, made by Italian people.

18.2.3. Data from #DigitalInvasions2013

At the very end, every coordinator was invited to fill in a short report to collect final data on #digitalinvasions. Those data were highlighted through an infographic (Fig. 18.5, 18.6), we are going to analyze.

Final reports collected were 225 (91 historical centers, 21 archaeological sites, 86 museums and 27 naturalistic parks); weekend April 27-28 was the most liked for organizing #digitalinvasions. 225 invasions were carried out by 9.434 invaders, for a total of 10.798 artworks, objects and sites photographed and shared on the web. Analytics provided data were measurable only for those social networks in which it was possible to quantify hashtag #invasionidigitali (use of hashtags on Facebook came on June 12, 2013).

With 3.200 people active on Twitter, in the week 20-28 of April, were produced 22.900 tweets with and reached over 1.500.000 people.

On Instagram, 795 people have taken 7.345 photos, which were viewed by 43.230 followers, getting 665.725 likes and 4.299 comments.

The page on Pinterest, with 313 board, had 638 followers who have pinned 5.595 images, repinned 1.410 times, with 2.030 likes, 3.604 interactions and 2.202 impressions.

List of venues on Foursquare (166) had 115 followers and 982 check-in.

Facebook fan page, from March 25 to April 30, has got 36.004 views, 5.874 fans (with a total of 2.437.037 friends, 322.609 of which achieved only during 22 April), 6.219 likes on published posts.

www.invasionidigitali.it website in the same period got 44.757 visits.

Indirect results achieved by the Facebook Fan Page and Twitter profile demonstrate the viral potential of such an operation, which can rightly be considered a form of crowded-digital-marketing for culture, whose idea of virtual network has been beautifully rendered by a multimedia painting specially designed by the artist Fabrice de Nola to celebrate the achievements of the project.

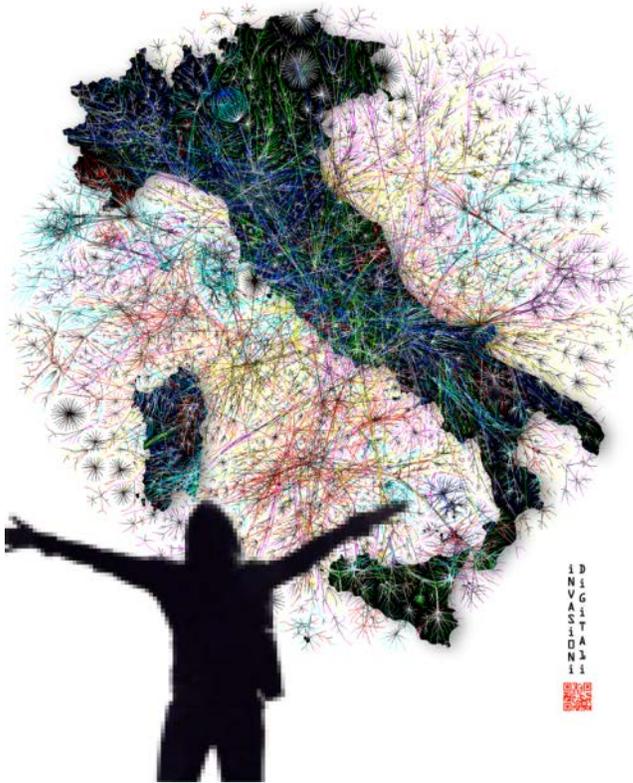


Fig. 18.7. #DigitalInvasions2013 (Fabrice de Nola, 2013)

18.3. #DigitalInvasions2014: a massive digital phenomenon from Italy to the world

After first edition's success, in the following months, #DigitalInvasions' staff has joined a number of institutional initiatives related to promotion of cultural heritage through social media ('White Digital Night' for Museums' Night on July 13 and again on December 13; Researchers' Night on September 27; European Heritage Day on September 28-29).

The project was also presented at the Digital Heritage Conference in Marseilles in October, at the National Conference of Small Museums in Assisi, at Mediterranean Borsa of Archaeological Tourism in Paestum, at the Imaginary Festival in Perugia in November and at the BTO Buy

Tourism Online Conference in Florence in December. In April 2014, the project has been just presented - through a workshop and a planned invasion in the Museum of Baltimora - at the Museum and the Web Conference 2014 in Baltimore.

New website www.invasionidigitali.it has been launched on March 14, 2014, also available in English.

#DigitalInvasionsInvasions digital, over 400, were held from April 24 to May 4.

Baltimore's digital invasion has pioneered this project beyond national borders. On the "old European continent" invasions were recorded in Germany (the Platform, along the Isar River and Valentin Karlstadt Musäum of Monaco; the Landesmuseum Natur und Mensch in Oldenburg; the Filarmonik Orkestra and the Museum für Naturkunde in Berlin), Denmark (Kulturcentret Assistens in Copenhagen), in Bosnia and Herzegovina (History Museum of Bosnia and Herzegovina in Sarajevo).

Overseas, two invasions were carried out in Australia (Museum of Contemporary Art and The Lucy Osburn/Nightingale Foundation Museum in Sydney) and Brazil (Museu do Arte do Rio in Rio de Janeiro).

A digital 'virtual' invasion has just been promoted by the organizers of International Museum Day which take their guests on a virtual tour through three of the biggest online image archives from the field of art, culture and history, such as Europeana, Prometheus and Artigo, and invite them posting and sharing images and selected artworks and telling stories and informations about them. Followers could participate on Twitter and on Facebook asking questions, or just interacting following the hashtags online.

The second edition has just ended and the staff is collecting final reports so we aren't be able to give more 'numbers' about it, but it apperas reasonable to consider that probably more than 15,000 people have been involved.

18.4. Cultural policies and socio-digital impacts of #DigitalInvasions projects

In times of economic turndown, when budget cuts heavily affect cultural management policies and strategies, the use of digital data, information and value co-created by (and with) the audience may generate an environment in which it contributes in



Fig. 18.8. #DigitalInvasions2014 in Italy



Fig. 18.9. #DigitalInvasions2014 in Europe



Fig. 18.10. #DigitalInvasions2014 in the world

- mitigating losses of socially valuable asset;
- optimizing (and minimizing, too, in a longer term) costs of communication;
- generating new added-value content by re-use and re-interpretation of pre-existing content.

#DigitalInvasions' phenomenon couldn't pass unnoticed on the national press and, in some cases, even on the international one, because of the huge 'movement' on a wide variety of social platforms. Each digital invasion organized in a museum, a library, an historic center, an

archeological site or in a park, had extensive coverage on the local press, but the whole phenomenon of #DigitalInvasions gives an acceleration to crowd-social ways of cultural communication in Italy.

Impact of this project can be measured especially for indirect and deep implications in our society and especially in our cultural institutions that have suddenly had to deal with the numerous requests for clearances and access to video and photographic documentation.

Since the first edition #DigitalInvasions had the patronage from many municipal governments and from the Regional Department for Cultural Heritage and for Sicilian Identity (the only Regional Department to ensure its patronage of both editions).

To overcome legal issues and authorizations, video and photographs and their publishing and sharing on the web have been assimilated to a personal and non-commercial use (such as falling within the exemption provided by D.Lgs. no. 42/2004, art. 108, paragraph 3).

#DigitalInvasions are perceived, both by the institutions and citizens who have promoted and supported them, as an opportunity to highlight not only great museum collections or the most famous national historical centers, but especially those monumental, artistic and archaeological emergencies that make Italy a great heritage widespread and are worthy of a better conservation, enhancement and fruition.

Digital revolution, radically changing cultural consumption's behaviors, requires our institutions to rethink not only forms of relationship with their audiences but, more important, models of distribution, enhancement, enjoyment and use of their cultural contents, in line with Europe for a more and more widespread and democratic dissemination of high-definition digital cultural contents, also requiring a broad rethinking of stringent copyright rules.

Italian Ministry of Culture, because of many national monuments, parks and museums joined the project, could not remain indifferent and gave a virtual 'placet' through the official profiles on Twitter and Facebook page; since the first edition it soon started sharing and retweeting posts and tweets of #DigitalInvasions.

Such a phenomenon opened the door, first, to a more conscious collaboration with #DigitalInvasions' staff, expressed by the organization of the Museum's Night on May 18, 2013 in collaboration with IgersItalia and by the Ministry patronage for the first edition of the the White Digital Night on July 10, 2013.

Furthermore, #DigitalInvasions lead, without any doubt, to the full adoption of the participatory museum model and the full opening towards UGC to facilitate processes of co-creation and co-production of cultural value which can lead to new and innovative ways of cultural and creative consumption.

This happy and peaceful project showed that Italians don't want anymore culture conceived by institutions as 'property' and 'possession: #DigitalInvasions2013 has marked a point of no return in relationship with our cultural heritage. The proof is the recent request by the Superintendence of Tuscany to authorize 'selfies' in front of Michelangelo's David at the Accademia Gallery. The Twitter profile of Italian Minister of Culture and Tourism Dario Franceschini twitted remembering the last days of invasions during the second edition.

Are the invaders succeeding in liberalizing photos in Italian museums? We hope so.

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19. Archeowiki: enhancing archaeological heritage in Lombardy (Italy) with open-source strategies

Anna Antonini, Dante Bartoli, Sara Chiesa, Cristian Consonni, Rossella Di Marco, Sara Franco

Abstract

Open Source initiatives in cultural environment are emerging tools among educational and cultural institutions. This practice, indeed, is largely used by museums, libraries, archives, in order to promote knowledge also implemented by a sharing process.

Involving people in this participative process means also increase the number of real visitors in museums. That idea stimulated the project “Archeowiki”.

Keywords

archeowiki, crowdsourcing initiatives, archaeological heritage, digital archive, open source, creative commons, museum, wikipedia

19.1. Introduction

The aim of this paper is to illustrate the project “Archeowiki” that involves six museums in Lombardy, Wikimedia Italia, the Italian chapter of the Wikimedia Foundation, and some social and cultural associations (working with disabled people, elderly people, and students).

An initial lack of archaeological contents on the Wikipedia pages - due to absence of digital-archaeological-experts able to contribute to the archaeological sections and difficulties in finding relevant and reliable information on these topics – stimulated the realization of this project.

The project favoured the digitalization of circa 1,000 images and documents belonging to the museums involved in the Archeowiki Project (*Raccolte Extraeuropee del Castello Sforzesco di Milano, Civico Museo Archeologico di Varese, Fondazione Passaré di Milano, Civico Museo “Goffredo Bellini” di Asola, Museo Archeologico G. Rambotti di Desenzano, Civico Museo Archeologico di Castelleone*).

Archeowiki, inspired by other similar projects, with both a local and an international vision (GLAM-Wiki¹, Wiki Loves Monuments, Share Your Knowledge), is an experimental action in Lombardy, where the most innovative effect has been the positive reply and support of the Archaeological Superintendency of Lombardy, that demonstrated the awareness of a change in the cultural sector. Technological tools play a growing role in spreading culture and educating people, opening new scenarios and new ways of co-working as virtuous collaborations between private and public institutions.

Moreover, Archeowiki offers to associations, museums and online users, the opportunity to obtain an enhancement of the cultural heritage, offering visibility, fruition, education and know how, by working together.

Wikipedia determines a higher and free visibility for public institutions, sometimes small and/or not well-known, that can increase the number of interested people in their archaeological collections [PEKEL 2014].

19.2. Digital archives for museums

The widespread use of new digital technologies transformed and changed the idea of cultural heritage access. Museums followed this trend and started digitalizing their heritage, transforming private archives in open and freely downloadable databases. In this sense we could consider the global museum “without walls”, as it has been conceived by André Malraux, as the first example *ante litteram* of virtual museum. Indeed the Malraux’ idea of “museum of museums” is the closest concept of the actual model of hypertext [IRACE 2013].

The examples of digital archives grown in the last few years are various, born within the institution or risen from external organization. Just to mention the most well-known, we could refer to Google Art Project, an online platform launched on February 1st, 2011 by Google Inc., in cooperation with international museums such as the Tate Gallery in London, the Metropolitan Museum of Art in New York and the *Uffizi* in Florence. The Google Art Project represents one of the pioneering experiments to collect digital images [BERTACCHI et al. 2011].

¹ GLAM is the acronym for “Galleries, Libraries, Archives, and Museums”

Open-source initiatives in the cultural environment are emerging tools among educational and cultural institutions. This practice, indeed, is largely used by museums, libraries, archives, in order to promote knowledge which is also implemented by a common sharing process. In this context it is extremely important the idea of co-design, participatory approach and public implementation of contents of the digital archives. *Europeana 1914 - 1918*, another of the activities of the Europeana Project like EAGLE - inaugurated in 2011 - is an interesting example of collaboration and bottom-up implementation. Different people are asked to upload contents about the First World War, showing the historical and tragic events from a common people point of view. Objects and documents are digitalized and uploaded on the website; contents are reviewed by museums experts and internet users. Despite of some controversial positions [LOVINK 2002; METTIERI 2009; LANIER 2010], asserting the advantages of free-access will lead to a detachment from the artwork, in 2008 the American Alliance of Museums identified this process as "Creative Renaissance"² sparked by technological instruments and helpful tools for online promotion of cultural contents, redrawing also the human centrality within narrative and learning processes.

The main values enhanced by open licensing models refer (...) to the increased visibility of museum collections and to the new knowledge and information generated on art images by commons based peer production systems. [BERTACCHI et al. 2011, p. 9].

Today, reaching a large target of visitors means spreading contents through largely utilized channels. Wikipedia is one of the most popular among the wide public, reflecting also free circulation of cultural contents and free information.

Involving people in this participative process means also to increase the number of real visitors in museums. That idea stimulated the project "*Archeowiki: nuovi «archeologi» in Lombardia, percorsi virtuali e reali*" (Archeowiki: new «archaeologist» in Lombardy, real and virtual paths).

² <http://download.aaslh.org/AASLH-Website-Resources/Museums+and+Society+2034.pdf>

Eschenfelder and Caswell [2010] define this open approach to digital cultural collections “cultural remix” because it allows users to access all the available information without any limits. Users generate and re-contextualize cultural heritage attributing new fruition contexts and establishing new values for the cultural contents: free to use, re-use and redistribute as the Open Knowledge Foundation defined in 2010, without any legal, technological or social restriction.

19.3. Open Source initiatives in the cultural environment: ideas and examples

Open source originally indicated a licensing model for software allowing anyone interested to download and have free access to the program source code;³ [LAKHANI et al. 2003], meaning that the implementation of the algorithm describing a computer software, i.e. the source code, is available and can be freely used, changed, and shared (in modified or unmodified form) by anyone. Open source⁴ itself stems from the “free software” movement launched by Richard Stallman in 1983 with the creation of the GNU project,⁵ the publication of the GNU Manifesto in 1985⁶ and the founding of the Free Software Foundation,⁷ which established four fundamental freedoms for software:⁸

- The freedom to run the program, for any purpose (freedom 0).
- The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help your neighbor (freedom 2).
- The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

³ http://www.ee.oulu.fi/~vassilis/courses/socialweb10F/reading_material/2/lakhani00-HowOpenSourceSoftwareWorks.pdf

⁴ <https://opensource.org>

⁵ <https://www.gnu.org/gnu/thegnuproject.en.html>

⁶ <https://www.gnu.org/gnu/manifesto.en.html>

⁷ <https://fsf.org>

⁸ <https://www.gnu.org/philosophy/free-sw.en.html>

These ideas were born in protest against the progressive transformation of software from an environment where programs and code were freely shared towards a situation where software was provided as binary executables whose source was not made available. This is recalled by R. Stallman himself with an episode related to the source code of the driver for a printer⁹ while he was at MIT's Artificial Intelligence Lab in the 1970's.

Free/Libre licenses can impose two admissible conditions that can be requested upon the sharing and reuse of a free software. In this context the word "libre" is sometimes used to avoid the confusion, in English, about "free" as "gratis, at no cost" and "free" as a matter of freedom, this is also conveyed with the motto "*Free as in freedom not as in free beer*" or "*Free as in free speech*". These conditions are:

- Attribution: in case of redistribution of the work the original author as to be accredited for his work in such a way that it should result clear that the author does not endorse any subsequent modification;
- Virality (or copyleft or "Share Alike"): requiring that derivative works have also a free license, in particular, share-alike licenses require the same license of the original work to be used for the derivative work;

As of today open source software is usually developed in a collaborative way by several participants, and the term is specifically applied to works that are distributed under licenses that comply with the Open Source Definition.¹⁰

Free software and Open Source are distinct from absence of copyright or Public Domain.¹¹ These ideas regarding freedom expanded later on to other uses, first with the Creative Commons licenses,¹³ supported by Creative Commons - a nonprofit organization founded in 2001¹⁴ by Lawrence Lessig, Hal Abelson, and Eric Eldred with the

⁹ <https://www.gnu.org/events/rms-nyu-2001-transcript.txt>

¹⁰ <http://opensource.org/osd>

¹¹ Richard Stallman argues in his essay "What is Copyleft"¹² argues that Public Domain «allows uncooperative people to convert the program into proprietary software», therefore Public Domain falls short in protecting software freedom.

¹³ <https://creativecommons.org/licenses>

¹⁴ <https://creativecommons.org/about/history>

objective of enabling the sharing and use of creativity and knowledge through the homonymous licenses¹⁵. Creative Commons licenses provide a modular framework of 6 licenses where the author can choose which rights retain for himself and which ones to make available to the public (CC-BY, CC-BY-SA, CC-BY-NC-SA, CC-BY-ND, CC-BY-NC, CC-BY-NC-ND). Following the experience gathered with free cultural projects like Wikipedia, the definition of "*Free Cultural Works*" was published on 2006, initiated by Erik Möller as a means to resolve ambiguity about the phrase "*free content*"¹⁶ in the context of the Wikimedia project family. Also the Free Cultural Works definition allows attribution and share-alike clauses as permissible restrictions.¹⁷ Regarding the topic of this project, Wikipedia has undergone a license change from the GNU Free Documentation License (GFDL),¹⁸ a license from the Free Software Foundation initially designed to be applied to software documentation and manuals, to the Creative Commons Attribution-Share Alike license (CC-BY-SA) in June 2009.¹⁹ One remarkable example of the impact of Creative Commons licenses highlighting the fact that they have provided a framework which could be used also by museums and cultural institutions to increase the dissemination and reach of their collection, is described by the case Powerhouse Museum in Sidney²⁰ starting from April 2007, when some photos of the collections of the museum were made downloadable with a Creative Commons license, particularly with a Creative Commons Attribution-NonCommercial-ShareAlike 2.5 license (CC-BY-NC-SA 2.5).

Starting April 2008 the museum has also made available its photographs on Flickr with a Creative Commons Attribution-NonCommercial-NoDerivatives license (CC-BY-NC-ND 2.5). Some of the works with more liberal licensing (e.g. in the Public Domain) were also transferred to Wikimedia Commons²¹ and the museum is listed

¹⁵ For a specific review of the Creative Commons licenses in relation with the Italian Law system, which is relevant to the context of this paper, see DE ANGELIS 2009.

¹⁶ <http://freedomdefined.org/History>

¹⁷ http://freedomdefined.org/Permissible_restrictions

¹⁸ <https://www.gnu.org/copyleft/fdl.html>

¹⁹ <https://blog.wikimedia.org/2009/05/21/wikimedia-community-approves-license-migration>

²⁰ http://wiki.creativecommons.org/Case_Studies/Powerhouse_Museum,_Sydney

²¹ https://commons.wikimedia.org/wiki/Category:Images_from_the_Powerhouse_Museum

in the partnership page²² on Wikimedia Commons, the repository of free digital multimedia used by the Wikimedia projects.

19.4. Wikipedia and Crowdsourcing initiatives in the cultural environment

The term crowdsourcing²³ was first used in the economics field in 2005 by Jeff Howe and Mark Robinson, editors at Wired Magazine, after a conversation about how businesses were using the Internet to outsource work to individuals. As described in [RIDGE 2014]:

Crowdsourcing in cultural heritage is more than a framework for creating content: as a form of mutually beneficial engagement with the collections and research of museums, libraries, archives and academia, it benefits both audiences and institutions. However, successful crowdsourcing projects reflect a commitment to developing effective interface and technical designs.

Following the guideline on partnership²⁴ on Wikimedia Commons, a crowdsourcing project can have several benefits to a cultural institution and to the disseminations of the works it protects:

- public attention: the adoption of free licenses will increase the circulation of the digital images of the museum's contents;
- context: the images will be used on all the Wikimedia projects and also grouped in categories with similar materials;
- contents and metadata, especially with the translation of the caption in several languages;
- community support.

²² <https://commons.wikimedia.org/w/index.php?title=Commons:Partnerships&oldid=123152257>

²³ <http://en.wikipedia.org/wiki/Crowdsourcing>

²⁴ https://commons.wikimedia.org/w/index.php?title=Commons:Guide_to_content_partnerships&oldid=107674598

The reference initiative for Archeowiki is the “Wikipedian in Residence”²⁵ (WiR) project, started in June 2010 by Liam Watt,²⁶ an Australian Wikipedian, which did a 5 weeks residency at the British Museum in London (UK). These experience has been thoroughly documented both on Wikipedia in dedicated project pages²⁷ and on Watt’s personal blog.²⁸ The Wikipedian in Residence model was first piloted by the GLAM initiative - which is described more in depth in the next session, but has since been adopted by other types of organizations. Wikipedians in Residence are Wikipedians or contributors to other Wikimedia projects who dedicate time to working in-house at an organization; these collaborations may be financially compensated or be voluntary. Wikipedians in Residence are not in-house editors of Wikipedia, instead, they enable the hosting organization and its members to create and continue a productive relationship with the encyclopedia and its community, lasting also after the residency is finished.

A project like the Wikipedians in Residence is classifiable as crowdsourcing because its main purpose is to enable users from the public, through the use of Wikipedia, to spread and disseminate information about objects preserved by the institution involved.

Another initiative relevant to the Archeowiki project in the context of crowdsourcing is content donation by cultural institutions. We see these initiatives as an example of crowdsourcing because of the possibility of the cultural institutions to engage directly with a large pool of Wikipedians around a particular topic. We take as an example on this field the experience of the Bundesarchiv, the German Federal Archive,²⁹ which, starting from 2007, has donated to Wikimedia Commons more than 100,000 files as of May 2014. As of May 2014 a total of 101,207 images in the category and up to three levels of subcategories could be measured.³⁰

Content donation usually consist of several phases:

²⁵ http://outreach.wikimedia.org/wiki/Wikipedian_in_Residence

²⁶ <http://wittylama.com/2010/03/13/the-british-museum-and-me>

²⁷ https://en.wikipedia.org/wiki/Wikipedia:GLAM/British_Museum

²⁸ <http://wittylama.com/category/museums/british-museum>

²⁹ https://outreach.wikimedia.org/wiki/GLAM/Case_studies/German_Federal_Archives

³⁰ This data has been obtained using the Glamorous tool (<http://tools.wmflabs.org/glamtools/glamorous.php>) and this query: <http://bit.ly/BundesarchivGlamorous>.

- Contact with the community through interested local Wikipedians or, as in Archeowiki's case, with the help of a local Wikimedia chapter;
- Definition of the donation and legal clearance: the museum has to define which set of images to donate and to check that all the legal requirements for releasing the images with a free/libre license;
- Digitalization: many museums have their images already available in digital format. The Bundesarchiv has a collection of 10 million photos which is already digitized in part. Some metadata like: author, date and description (at least in English) should be prepared and made available for upload;
- Upload on Wikimedia Commons: the upload is done, depending on the number of files, either manually, semi-automatically or automatically.
- Feedback and follow-up: the Bundesarchiv could benefit from the operation of two distinctive feedbacks: error reports³¹ regarding the image descriptions and licensing problems reports³² on images with unclear licensing status.

As of May 2014, 22,566 distinct images were used across all the Wikimedia projects. Images from the Bundesarchiv are used on the Wikimedia projects offering a greater visibility to the institution: this case study also demonstrates the benefit of crowdfunding for cultural institutions.

Raccolte Extraeuropee had already participated to a crowdsourcing project on Wikipedia in 2011. The project, called "Share Your Knowledge"³³ was an international collaboration between the Italian Fondazione lettera27³⁴ and the Africa Centre in South Africa. The project was also part of the wider GLAM-Wiki initiative and Wikimedia Italia was collaborating as a partner.

³¹ https://commons.wikimedia.org/wiki/Commons:Bundesarchiv/Error_reports

³² https://commons.wikimedia.org/wiki/Commons:Bundesarchiv/Questionable_licensing

³³ https://it.wikipedia.org/wiki/Progetto:WikiAfrica/Share_Your_Knowledge

³⁴ <http://www.lettera27.org>

The goals of Share your knowledge was to share African cultural heritage on the web through WikiAfrica, a subproject designed to africanize Wikipedia by generating and expanding 30,000 articles in two years. The project promoted a new method of acquiring and sharing knowledge that is fully-inclusive, mainstream, intercultural and relevant to contemporary and historic Africa. The initial two years were focused on encouraging external Africa-based, cultural organizations, museums and archives, as well as bloggers and journalists, to contribute their knowledge to Wikipedia.

Raccolte Extraeuropee, as one of the cultural organizations involved, shared a large part of its African collection.

This relationship has facilitated the sharing of resources between GLAMs and Wikipedia as part of a long-term ongoing collaboration.

19.5. Archeowiki project

Archeowiki is a project that would like to facilitate the growth of visitors in museums, and at the same time to enhance the archaeological heritage located in Lombardy.

The project has received the support of different public institutions, in particular of Regione Lombardia and was made possible by a grant from Fondazione Cariplo.

When the project started a partnership between different associations was signed. This partnership puts together know-how in technical and digital skills and knowledge of the cultural heritage and the Italian cultural enhancement system.

Wikimedia Italia is the leading partner. Since 2005 Wikimedia has been the official Italian correspondent of Wikimedia Foundation.

Wikimedia pursues objectives of social solidarity in the field of cultural promotion. The main aim is to contribute actively to spread and improve the advancement of knowledge and culture through the production, collection and spread of free contents.

Gruppo Archeologico Ambrosiano and Mimondo are two non-profit associations. Their purpose is protection, enhancement and preservation of historical, archaeological and cultural heritage; they promote the awareness of the world cultures through the development, conservation, protection and enjoyment of tangible and intangible evidence preserved in museums and other institutions. They collaborate with public institution, museums, universities and local organizations.

Fondazione Passaré is a foundation based in Milan, created in 2007, which purpose is to promote research and cultural activities related to contemporary and extra-European arts, especially from the African continent.

Raccolte Extraeuropee, a branch of the Milano municipality owns an important extra-European collection. The 8,000 objects stored by the Museum come from Africa, Asia, South America and Oceania. Their exhibition is planned for the October 2014 at the Museo delle Culture Ansaldo, in Milan.

Archeowiki is the result of a new collaboration that starts from the awareness of a lack of contents in archaeological topics on Wikipedia. In addition to this the idea behind the project was to promote small archaeological museums, that own important but unknown collections.

The aims of this project are several:

1. to involve new targets of public, in particular young people, retired people and disabled people. This audience is not really involved in museum activities as should be taken in consideration in designing paths and educational projects.
2. to teach and diffuse the Wikipedia language to enlarge the number of experts Wikipedians
3. to enrich Wikipedia with archaeological contents and improve the existent ones
4. to increase the number of visitors of the museums involved
5. to promote open data sources technologies in public museums as a preferential path to diffuse its knowledge

In addition to Fondazione Passaré and Raccolte Extraeuropee, the Archeowiki team chose four other museums that own archaeological artifacts to participate in the project, then it was asked to the museums' curators to select a part of their collections with particular attention to the Lombard artistic heritage.

In the following we shortly describe the collections involved in the project:

- *"Museo Civico Archeologico di Varese"* preserves prehistoric materials ranging from the Neolithic to the Bronze Age. The museum has the exceptional Tomb Warrior of Sesto Calende (early sixth century BC.) with the remains of the wagon and harness for two horses.
- *"Museo Civico Archeologico di Castelleone"* hosts various archaeological collections from the Mesolithic Age to the Iron Age. The project specifically concerns the collection of artifacts from a private donation to the City.
- *"Museo Archeologico G. Rambotti di Desenzano del Garda"* is located in an area rich of pile-dwellers settlements from Bronze Age. The museum hosts a great collection coming from wet areas of archaeological interest, mainly due to the characteristics of the anthropic deposits submerged at a short distance from the Garda Lake: the anaerobic conditions allowed the preservation of the artifacts in organic material. The plow from Lavagnone is the most important example.
- *"Civico Museo «Goffredo Bellini» di Asola"* has a collection composed of materials found both on the antiques market and in the area around Mantova, especially it is pre- and proto-historic material
- *"Fondazione Passaré"* decided to put online on Wikimedia its photographic archive related to African cave paintings. The archive was created by Alessandro Passaré a Milanese doctor passionate by African art that contributed to develop the 20th century Milanese avant-gardes during the 50's and the 60's.
- *"Raccolte Extraeuropee"* chose a selection from Pre-Hispanic Collections: ceramics and textiles from Perù that are representative of all indigenous cultures from the 10th century. B.C. to the Spanish conquest brought to Italy by a Milanese collector.

The project aims to involve a target of visitors that usually do not go to museums for economic and social reasons. To overcome the obstacles that limit the participation of these categories of public, the project's partners contacted the institutions that coordinate group of retired people (Auser), and groups of blind people (the "Istituto dei

Ciechi di Milano”). The collaboration with these two institutions made possible to organize specific tours for these categories of people.

Specifically, for retired people some conferences/lessons within the University of the third age were organized, and for blind people some hands-on paths with the reproduction of some objects of the collections involved.

The first action of the project was finding the volunteers in both archaeological and Wikipedia fields. An open call was advertised to look for volunteers able to conduct the guide tour in the museums and to teach how to add new contents on Wikipedia. We called these two actions, tour and uploading, Wikitrip.

The volunteers were trained before starting the wikiptrips with the public.

The training consisted in a curriculum covering the following topics:

- some university professors gave to the volunteers some basic archaeology information that allowed the volunteers to have a basic knowledge of the context in which they were going to do the wikiptrips;
- Museums’ curators gave them specific informations about the collections and the museum with some objects studied more in detail;
- Wikipedia editors instructed the volunteers on how to add, improve and correct contents on Wikipedia;
- an educator, expert in education in museums, provided some pedagogical information in order to help volunteers to interact with students;
- volunteers had a specific training to work with disabled people. This part of the training was conducted directly within the “Istituto dei Ciechi di Milano”. Educators explained to the volunteers how the guides should interact with blind people and what kind of material should be used to produce copies of the artifacts that could be manipulated.

Wikitrrips are divided in 3 phases:

- A first lesson at school where archaeological volunteers and wikipedians explain to the students the project's aim. The students are instructed to recognize the objects they will see during the trip to the museum and at the same time they have a first contact with Wikipedia that become for them a way to improve their knowledge and in particular to upload the photos of the collections.
- After a first training at school, the students visit the museum collection, directly in museum or in the storage as for Raccolte Extraeuropee. During these visits students can observe the artworks closely and from the volunteer's hand. Students can take pictures of the objects.
- After going back to school, the last step consists of reading again the page of the museum and the related data sheets and add new information, pictures and link with other pages, or also translate in other language.

An example of a digital photograph of an artifact from Raccolte Extraeuropee is shown in Fig. 19.1.³⁵ The following Figg. 19.2³⁶ and 19.3³⁷ show the related metadata and the disclaimer attached to the photograph.

Wikitrrips then started also for retired people for which the volunteer prepares a conference with the opportunity to see the artworks closely.

19.6. Creative Commons licenses for cultural heritage protected by MIBACT: a viable solution

The particularity of the project Archeowiki is also the experimental collaboration started with the Soprintendenza Archeologica della Lombardia. This public institution, as a regional branch of the Italian Ministry of Culture , has the responsibility to preserve and protect

³⁵ https://commons.wikimedia.org/wiki/File:Raccolte_Extraeuropee_-_PAM01238_-_Per%C3%B9_-_Cultura_Huari.jpg?uselang=it

³⁶ https://commons.wikimedia.org/wiki/File:Raccolte_Extraeuropee_-_PAM01238_-_Per%C3%B9_-_Cultura_Huari.jpg?uselang=it

³⁷ https://commons.wikimedia.org/wiki/File:Raccolte_Extraeuropee_-_PAM01238_-_Per%C3%B9_-_Cultura_Huari.jpg?uselang=it

File:Raccolte Extraeuropee - PAM01238 - Perù - Cultura Huari.jpg

View Wikimedia Commons, the free media repository

From Wikimedia Commons, the free media repository



Download all sizes

- Use this file on the web
- Use this file on a wiki
- Email a link to this file
- Information about reusing

Size of this preview: 597 × 600 pixels.
Original file (600 × 603 pixels, file size: 37 KB, MIME type: image/jpeg)

Fig. 19.1. Screenshot of the description page on Wikimedia Commons of one of the photograph uploaded as part of the Archeowiki project. Title, metadata and other informations are organized following the same structure for all the pictures uploaded.

Author	Cultura Hiarí, Perù, Dipartimento di Ica o Arequipa o Moquegua (?)
Object type	Stanza
Description	Vaso antropomorfo. Il vaso raffigura un guerriero con pitture facciali, un copricapo semisferico e una veste elaborata. Porta nella mano sinistra uno scudo decorato con una figura con le braccia alzate. L'oggetto possiede un gamello; spesso gli oggetti rituali nel mondo andino erano fibbricati in coperce.
Date	6 th century / 10 th century
Medium	terracotta
Dimension	Height: 24 cm (9.4 in).
Current location	Raccolte Extraeuropee del Castello Sforzesco 
Accession number	PAM01238
Object history	Collezione Balzarotti
Notes	Carolina Orsini
References	Bibliografia specifica: <ul style="list-style-type: none"> ▪ A. Aitri, <i>Le culture del Perù da Chavin agli Inca. La collezione Federico Balzarotti al Castello Sforzesco</i>, Silvana Editoriale Milano 2004, p. 84
Source/Photographer	Raccolte Extraeuropee/Foto Saporetto (Milano)
Permission (Reusing this file)	<div style="border: 1px solid black; padding: 5px;"> <p>This file is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported (https://creativecommons.org/licenses/by-sa/3.0/deed.en) license.</p> <p style="text-align: center;">Attribution: Raccolte Extraeuropee del Castello Sforzesco (http://www.comune.milano.it/deserver/webcity/documenti.nsf/webal/A3751CF2FE8DCCF2C125703100429822)</p> <p>You are free:</p> <ul style="list-style-type: none"> ▪ to share – to copy, distribute and transmit the work ▪ to remix – to adapt the work <p>Under the following conditions:</p> <ul style="list-style-type: none"> ▪ attribution – You must attribute the work in the manner specified by the author or licensor (but not in any way that suggests that they endorse you or your use of the work). ▪ share alike – If you alter, transform, or build upon this work, you may distribute the resulting work only under the same or similar license to this one. </div>

Fig. 19.2. Screenshot of the description page on Wikimedia Commons showing the metadata associated to the photograph shown in Fig. 19.1. The image shows the license under which the photograph is released (CC-BY-SA).

OTRS The permission to use this work has been archived in the Wikimedia OTRS system. It is available only as ticket #2013060310006668 for users with an OTRS account. If you wish to reuse this work elsewhere, please read the instructions at COM.REUSE. If you are a Commons user and wish to confirm the permission, please leave a note at the OTRS noticeboard.

Ticket link: <https://ticket.wikimedia.org/otrs/index.php?Action=AgentTicketZoom&TicketNumber=2013060310006668>

This file by Raccolte Extraeuropee del Castello Sforzesco (<http://www.comune.milano.it/deserver/webcity/documenti.nsf/webal/A3751CF2FE8DCCF2C125703100429822>) was uploaded as part of *Archeowiki*, a project by Wikimedia Italia (http://wiki.wikimedia.it/wiki/Main_page), in cooperation with Associazione MIMondo (<http://www.mimondo.it/>), Gruppo Archeologico Ambrosiano (<http://www.archeoambrosiano.org/>), Raccolte Extraeuropee del Castello Sforzesco (<http://www.comune.milano.it/deserver/webcity/documenti.nsf/webal/A3751CF2FE8DCCF2C125703100429822>) and Fondazione Passaré (<http://www.fondazionepassare.com/>). The project is financed by Fondazione Cariplo (<http://www.fondazionecariplo.it/en/index.html>).

Further authorizations required by the Italian "Code of Cultural Heritage and Landscape" (Codice Urbani), under Legislative Decree No. 42, dated January 22, 2004, and its subsequent amendments, regarding the reuse of the picture.

 This image reproduces a property belonging to the Italian cultural heritage as entrusted to the Italian government. Such images are regulated by Articles 106 et seq. of the Italian Code of Cultural Heritage and Landscape under Legislative Decree No. 42, dated January 22, 2004, and its subsequent amendments. These regulations, unrelated to copyright regulations, establish a system for the protection Italy's historic and artistic heritage and its standards of dignity. Among other things, these regulations provide for the payment of a concession fee by those who intend to benefit economically from reproductions of property belonging to the Italian cultural heritage. Reproduction of this image is permitted for personal use or study. A further authorization by the Italian Ministry of Heritage and Culture is required for reproduction for any other purpose, and particularly for commercial use. Such commercial use includes, but is not limited to, use in (a) any form of advertising, and (b) any company name, logo, trademark, image, activity, or product.

 The making of this document was supported by **Wikimedia Italia**.

Fig. 19.3. Screenshot of the description page on Wikimedia Commons showing the disclaimer associated to the photograph shown in Fig. 19.1. This disclaimer indicates the restrictions descending from the "Codice Urbani".

the archaeological heritage in Lombardy. These operations are ruled by the "Codice dei beni culturali e del paesaggio" (Decreto legislativo del 22 gennaio 2004, n. 42), which provides that the reproduction of cultural goods (including photographs) is subject to strict rules and reproduction fees depending on the use that is made of the replicas (art. 108 of the aforementioned decreto legislativo 22 gennaio 2004, n. 42).

The theme of how to comply with Creative Commons (CC) licences, so that cultural institutions can be able to operate independently, has yet to be addressed by Italian laws [DE ANGELIS 2009]. Therefore, a specific solution was designed for this project which could provide a valuable precedent for the evolution of the legislation on the promotion of cultural heritage.

At first, permission was asked in order to publish photographs and descriptions of archaeological materials selected from museums beneficiaries of the project on Wikimedia Commons and the Soprintendenza expressed his favorable opinion for the project. However, this opinion is subject to particular conditions, which are the reference in the description to the place where the object is stored, the authorization from the Ministry of Culture, and the publication of the images in low resolution. Moreover, Wikimedia and the other partners of the project have attached a particular disclaimer already accepted by the Italian Fine Arts Bureau for the project "Wiki loves Monuments"³⁸ started in 2012. It specifies that the reproduction of the image is only authorized for personal use or for study; instead for different purposes, in particular for commercial use, is required a further authorization from the Ministry. These specifications are based on Italian Fine Arts Bureau's decree of April 20th, 2005. It addresses the criteria and methods for cultural production, following the art. 107 of the Legislative Decree of January 22nd, 2004 (n.42), which aims to regulate the indirect fruition of cultural heritage, and that combined with the CC-BY-SA license allows to comply with the hierarchical structure of authorization of the Institution and the need of horizontal use by Internet users [MORANDO 2011].

The collaboration established between the Soprintendenza and the project Archeowiki is a real experiment in Lombardy, because there are no other examples of cooperation of the public authority with

³⁸ http://it.wikipedia.org/wiki/Progetto:Wiki_Loves_Monuments_2012

a crowdsourcing platform like Wikipedia. It is really hard to find online archaeological contents, specific and controlled by experts in this field, due both to the partial lack of archaeological contents on Wikipedia pages and to the regard of the "Codice dei beni culturali e del paesaggio".

The Archeowiki project has shown a change in the cultural sector: the cultural heritage can be enhanced also through Open Sources initiatives, which manage to reach a wider audience. The images will be used by many users, skilled and unskilled, for study and research, in a completely new way of approaching and sharing the cultural heritage.

19.7. Chain reaction

The project has been able to train 16 volunteers, to involve 24 classes, 24 teachers for which there will be involved 600 students through the wikitrips. Moreover we intend to organize 24 wikitrips with blind people and retired people, that will allow to involve 250 new visitors.

At the moment we have already uploaded 570 new images on Wikipedia. We imagine to increase this number through the pictures that the students will add.

The aim is to stimulate a chain reaction in archaeological knowledge through Wikipedia. We are confident that pictures and data sheets will be used by Wikipedian users to explain others pages on Wikipedia, dif-fusing archaeological science and spreading the museum's collections knowledge, as in a virtuous cycle.

The project is still ongoing and a final evaluation has still to be written, but Archeowiki seems to be a virtuous example of how new technologies could help public and private institutions in enhancing their artistic and archaeological heritage, while respecting copyright laws. The use of Wikipedia and mobile digital devices has been a good way to involve young students in a topic that usually does not interest them. The physical contact with objects and their reproduction and the idea of producing culture on Wikipedia improved the involvement of retired and blind people. This means that the project has contributed to bring new public not only to all the museums involved, but also to the broader field of archaeological studies.

One of the results achieved by the Archeowiki Project is its easy replicability. It was indeed essential to be able to add new data to the collections of the partners involved, deeply interested in keeping the

results updated, and to keep providing easy access to these archaeological items to the largest public.

Among the museums involved, the Archaeological Museums of Villa Mirabello (Varese), and Asola, host two sections not yet available through Archeowiki: their Lapidariums preserve inscriptions and lithic artifacts from the surrounding areas, mostly dating to the Roman era.

The Museum of Villa Mirabello [CANTARELLI 1996] has on exhibit famous inscriptions from the territory of the province of Varese, ranging in time mostly between the second and third centuries A.D. The most common types include stelae, arae, gravestones, sarcophagi, and tombstones. Their provenance is not always known, which makes it difficult to reconstruct the context of provenience or of belonging; reading difficulties also are very high due to the poor preservation of the stone.

The remains of ancient epigraphs, visible in the the third room of the museum "Goffredo Bellini"³⁹ in Asola, are for the most part funerary inscriptions on stelae and inscriptions with extremely essential texts, limited to basic information regarding the life of the deceased, or more commemorative inscriptions made to honor those who worked for the good of the local community. The monumental stelae are two [TAMASSA 1971]: the first one dedicated to the *gens Atilia* (first century B.C.), family name which was widespread in the Brescia area, and the second one dedicated to *Valentius Baebeianus Junior*, in memory of his support to the construction of a thermal complex built in the fourth century A.D., testifying to the existence of wealthy elites in the city center.

Epigraphic inscriptions are artifacts difficult to read and understand, and quite often the museum's section where they are on exhibition is bypassed by visitors of a museum that hosts them. The interest of epigraphs reaches its peak to study their provenience contexts, particularly because in open spaces the use of stone is preferred in order to make the text both visible to the public, and durable.

The possibility offered by Archeowiki to read and better understand archaeological artifacts, is perfect to study ancient epigraphs, allowing for an easier accessibility, and therefore making it possible to offer new interpretations and a better understanding of their historical and artistic value.

³⁹ <http://www.turismo.mantova.it/index.php/approfondimenti/scheda/id/32>

A card type, to be taken as a reading example, could follow the guidelines presented:

Artifact	<i>Artifact's description</i>
Location	<i>Artifact's location</i>
Date	<i>Chronology of the artifact</i>
Provenience	<i>Finding place or provenience context</i>
Typology	<i>Typological description</i>
Material	<i>Artifact's material</i>
State of Preservation	<i>State of preservation or degradation</i>
Dimensions	<i>Measurements</i>
Description	<i>Iconographic description</i>
Transcription	<i>Transcription of the epigraphic text</i>
Translation	<i>Translation of the epigraphic text</i>
Interpretation	<i>Interpretation of the epigraphic text</i>
Specific Bibliography, Reference to CIL	<i>Literature mentioning the artifact, CIL reference (if available)</i>
Bibliography	<i>Literature helping to understand the artifact, parallels</i>

Tab. 19.1. Metadata and information that could be collected and made publicly available through the epigraphic card

There is no doubt that the added value of the Archeowiki project could be the comparison and continuous updating of the epigraphs' cards, finding parallels between artifacts which are kept in separate collections.

In this way, the visitor who should see an inscription, likely will be more stimulated to find out the meaning of these anonymous stone slabs holding so much value to better understand the history of our territory, and at the same time he or she will be able to interact with the Archeowiki system, taking a picture of the artifact and uploading it on the project's website.

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20. Intellectual Property Right Issues

The British School a Rome: a case study

Alessandra Giovenco

Abstract

This paper originates from the need to clarify some fundamental issues about Intellectual Property Rights in order to provide the British School at Rome (BSR) with a framework for its content contribution to the EAGLE project. Given that the BSR will contribute images and translations from two of its collections, some copyright issues must be clarified before publishing this material on the Web. For this reason, the process used by the BSR to provide these images and their relevant metadata with a transparent and clear copyright statement will be described. The research for this paper was carried out using entirely web-based resources.

Keywords

Copyright, methodology, Inscriptions of Roman Tripolitania, Copyleft, Italian law

20.1. An overview of Intellectual Property, copyright and copyleft

Intellectual Property (IP) refers to creative works, whether they are inventions, literary or artistic works – such as photographs, paintings, etc. - designs, symbols, names. Consequently, Intellectual Property rights (IPRs) are the rights given to individuals for their creations. These rights are protected by IP laws in each country, although international conventions have been put in place to protect authors or rights owners across the world. IPRs include different types of rights, such as patents, trademarks and copyrights.¹

¹ For a glossary of different IPR terms please see: <http://www.copyrightservice.co.uk/copyright/glossary>.

In this paper, the type of rights protection we will examine is copyright, as this is a pivotal concept underpinning any digital project which aims to publish on the Internet different types of content (images, translations and metadata). The need to clarify copyright issues is a priority for any dissemination activities, especially in the context of the EAGLE project, which has to be fully compliant with the guidelines released on this topic by Europeana and by all the past/current EU-financed projects contributing to Europeana.²

So, what is copyright?

Copyright is a legal term used to describe the rights that creators have over their literary and artistic works. Copyright arises as soon as a work is created and, according to the Berne Convention,³ copyright protection is obtained automatically without the need for registration or other formalities. Works covered by copyright range from:

- Literary works such as novels, poems, plays, reference works, newspapers and computer programs, databases
- films, musical compositions, and choreography
- artistic works such as paintings, drawings, photographs and sculpture
- architecture
- advertisements, maps and technical drawings

Copyright does not continue indefinitely. The law provides for a period of time during which the rights of the copyright owner exist. The period or duration of copyright begins from the moment when the work has been created, or, under some national laws, when it has been expressed in a tangible form. It continues, in general, until some time after the death of the author.

In many countries, the duration of copyright provided for by national law is as a general rule the life of the author plus not less than 50 years after his/her death. Nevertheless, the European Union, the

² Each EU-financed project delivering content to Europeana is faced with solving IPR issues, trying to harmonize 27 different national copyright laws in Europe, see <http://ssrn.com/abstract=2145862>.

³ http://en.wikipedia.org/wiki/Berne_Convention

United States of America and several others have extended the term of copyright to 70 years after the death of the author. A work falls into the public domain once copyright is expired.

Making a work publicly available on the Internet does not imply that this is in the public domain. For this reason, it is very important to define a copyright licence for each type of content (images, transcriptions, translations and other type of metadata) at the beginning of any project that will use the web as its primary source of communication and distribution.

A rights owner may also abandon the exercise of his/her rights, wholly or partially. The owner may, for example, publish copyright protected material on the Internet and leave it free for anybody to use, or may restrict the abandonment to non commercial use.

A new approach to copyright issues is the concept of Copyleft,⁴ which has no meaning apart from a play on words: “Copyleft describes a copyright licencing scheme where the author surrenders some of his rights. Typically a Copyleft licence will allow a work to be freely copied, distributed or adapted, provided that all copies or modified versions are also freely available under the same licence. Copyleft is not the opposite of copyright, merely a way of describing a more ‘liberal’ copyright licencing policy. The most well known example is the General Public Licence (GPL).”

20.2. Are all works protected by copyright? Some thoughts on the Italian IP law

In some countries, not all works are considered ‘creative’ and are therefore not protected by copyright. This is a conceptual approach to the definition of ‘artistic creation’ that varies from country to country. For example, according to the Italian IP law (Legge sul Diritto d’autore del 22 aprile 1941 n.633),⁵ to include a photograph under the definition of ‘artistic creation’, it is essential to look not at its content but at the purpose for which the photograph is taken. If the purpose of the photographer is only to document or reproduce an object, the photographs get less protection in terms of copyright (fotografia semplice) or can also be considered as not protected at all if they fit into the category

⁴ http://www.copyrightservice.co.uk/copyright/p20_copyleft

⁵ http://www.interlex.it/testi/l41_633.htm#87

of a mere 'descriptive work' (riproduzione fotografica).⁶ The Italian law states that there is a difference between artistic creation and simple photographic reproduction. It is critical to define if a group of images is fully, less or not protected by copyright; this may help sort out two fundamental questions, which should be asked in order to label each item properly with its correct copyright statement:

1. *Is the material we intend to publish protected by copyright or not?*

This question is important for the purpose of determining a suitable copyright process for different types of resources (images, translations, other metadata):

2. *If the material is copyright protected, who is the author/creator or the rights owner of the image?*

Once these questions have been answered and it has been determined that the material is protected, then it is necessary to ask the author or rights owner permission to use it for your specific purposes.

20.3. The BSR process for solving IPR questions

From the observations above, it is clear that copyright issues on content are quite complex and specific investigations have to be carried out in each country in order to be compliant with national laws. Most of the time, it is necessary to analyse these issues on a case by case basis, especially when it comes to international projects with partners from different countries. Moreover, if the research is not conclusive because

⁶ Le riproduzioni fotografiche, previste dall'articolo 87 della legge sul diritto d'autore, sono fotografie "di scritti, documenti, carte di affari, oggetti materiali, disegni tecnici e prodotti simili", ovvero opere meramente descrittive della realtà che difettano del requisito della creatività e pertanto sono sprovviste di qualsiasi tutela giuridica. Per poter inserire una fotografia nella categoria delle riproduzioni fotografiche deve guardarsi non tanto al contenuto raffigurato (fotografie di scritti, documenti, carte di affari, oggetti materiali, disegni tecnici e prodotti simili), bensì allo scopo in vista del quale la fotografia è stata realizzata. Solo qualora essa fosse stata realizzata con finalità esclusivamente riproduttive o documentali essa non sarebbe ammessa a godere di alcuna tutela. Si tratta di foto aventi mera finalità riproduttiva dell'oggetto materiale, e quindi non destinate a funzioni ulteriori quali la commercializzazione o promozione di un prodotto. <http://brunosaetta.it/diritto-autore/tutela-delle-fotografie-in-rete.html>

of the complexity of the situation it is essential to seek professional advice from experts or specialist lawyers.

For example, for each database of inscriptions copyright issues may be more or less difficult to address depending on the provenance of the objects as well as on the author of the media (photograph, drawing) depicting them. For the inscriptions located in Italy, UNIROMA has negotiated an agreement between the Italian Ministry of Cultural Heritage and Activities (Ministero per i Beni e le Attività Culturali - MiBACT) and the EAGLE Consortium for the use of photographs, specifying the licence which must be used. In addition, the Pontificia Commissione di Archeologia Sacra (PCAS Roma), that has recently become a member of the EAGLE BPN, has granted rights to images of inscriptions under its jurisdiction and from its Archive which are similar to those granted by MiBACT.

In order to respond to the urgent need of clarifying a copyright statement for the content being delivered to the EAGLE project, the BSR did detailed research on their photographs from the South Etruria collection - inscriptions located in Italy - and the Libya collection - inscriptions located in Libya - as well as their translations. The pattern set to define a copyright statement for the BSR images can be represented as follows:

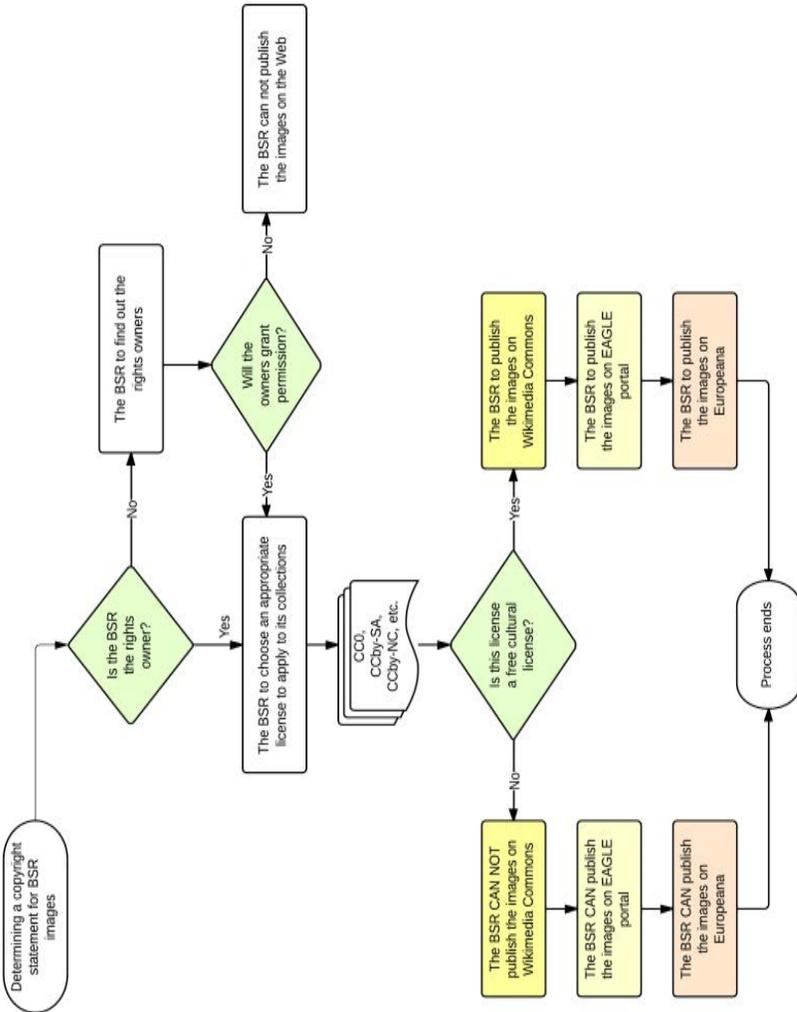


Fig. 20.1. The pattern set to define a copyright statement for the BSR images

20.4. Images from the South Etruria collection (inscriptions located in Italy)

Copyright issues are more complex when it comes to inscriptions located in Italy as there is also the overlapping question of the Codice dei Beni Culturali (Decreto legislativo 22 gennaio 2004 n. 42).⁷ Once the rights of the owner of the image have been determined, there are still other rights to be considered. In fact, the work/object depicted in the image, i.e. the inscription, is under the protection of MiBACT and therefore permission is required for its reproduction.⁸

As the owner of the objects, the Ministry manages the photographic reproductions of objects that fall under its protection and requires permission from anyone wishing to use them for any purposes (personal use, study, commercial use, etc.), no matter who is the author/creator of the photograph/image. For this reason, an agreement between the EAGLE consortium and the MiBACT was signed in 2005,⁹ to obtain a licence for the images of inscriptions on the EAGLE DB, only for study purposes and not commercial use. We can therefore conclude that the licence granted to EAGLE is very similar to Rights Reserved – Free Access¹⁰ licence and is not considered a free cultural licence, which is required by Wikimedia Commons¹¹ when contributing to their portal.

⁷ <http://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2004-01-22;42!vig=>

⁸ I beni culturali, anche se entrati nel pubblico dominio, comunque non sono riproducibili liberamente. Il diritto di riproduzione è attribuito, infatti, all'ente titolare delle tutela del bene culturale, così come stabilito dal codice dei beni culturali (Decreto legislativo 22 gennaio 2004 n. 42). In ogni caso non possono essere considerati beni culturali le opere create da autore vivente o la cui esecuzione non risalga a oltre 50 anni. Gli enti che hanno in consegna i beni culturali possono consentirne la riproduzione nonché l'uso strumentale, a titolo oneroso. Nessun canone è invece dovuto per le riproduzioni richieste da privati per uso personale o per motivi di studio. <http://brunosaetta.it/diritto-autore/diritto-dautore.html>. Fotografie di beni culturali. Le fotografie di beni culturali pubblici sono pienamente legittime per uso personale. Si tratta di riproduzioni non destinate al commercio, e quindi non costituiscono utilizzo concorrenziale che danneggia il titolare dei diritti/opera protetta, cioè il Ministero dei Beni Culturali. Nel caso di opere d'arte private l'uso delle foto, cioè la riproducibilità, dipende dall'autorizzazione del titolare dei diritti. Se la pubblicazione online delle foto è tale da non arrecare danno al titolare dei diritti (perché in bassa risoluzione, e di piccole dimensioni), e non è finalizzata al guadagno economico (perché diffusa con finalità didattiche o critiche) può ritenersi lecita. <http://brunosaetta.it/diritto-autore/tutela-delle-fotografie-in-rete.html>.

⁹ http://www.beniculturali.it/mibac/export/MiBAC/sito-MiBAC/Contenuti/MibacUnif/Comunicati/visualizza_asset.html_1524219572.html

¹⁰ <http://www.europeana.eu/portal/rights/rr-f.html>

¹¹ <http://commons.wikimedia.org/wiki/Commons:Licensing>

I would also like to add that former Italian Minister, Massimo Bray, has raised the social media issue and pointed out that the reproduction and distribution on the web of images relating to Italian cultural heritage is currently made difficult by the Codice dei Beni Culturali. In his opinion, social media will have to be seen as an opportunity and not as an obstacle, and he has suggested the law should be changed in some of its provisions.¹² A significant step forward was recently made in this area with the Decreto Legge, 31 maggio 2014, n. 83, in effect from 1 June 2014. According to article 12, reproduction and distribution by any means of images relating to Italian cultural heritage are allowed provided that these activities are carried out for study and not commercial purposes.¹³

20.5. Images from the Libya collection (inscriptions located in Libya)

The issues concerning the images of inscriptions located in Libya seem to be easier to sort out, provided there is not a Libyan law that protects the reproduction and distribution of images of Libyan monuments and archaeological sites. So, once the rights owner has been identified – this applies to the majority of the photographs in the BSR – the process of getting permission from the author or owner (whether a person or institution) and choosing an appropriate licence will be more straightforward.

The BSR has a collection of nearly 1,000 photographs of Inscriptions from Tripolitania,¹⁴ which has already been published on the web by King's College, London in 2009. A free cultural licence has been applied to the whole publication, including transcriptions and translations in English, but should not, in theory, be extended to the images, which should have a different copyright statement. In effect, not all the images in the collection are owned by the BSR as there are several photographs taken by the Department of Antiquities in Tripoli and which are consequently owned by the Libyan Ministry of Culture.

Given the very critical political situation in Libya, the BSR thinks it would not be appropriate to address this issue now, although new

¹² http://documenti.camera.it/leg17/resoconti/commissioni/stenografici/html/07c07/audiz2/audizione/2013/05/23/indice_stenografico.0001.html

¹³ <http://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legge:2014-05-31;83>

¹⁴ <http://inslib.kcl.ac.uk/irt2009/index.html>

contacts recently established by the BSR with the Department of Antiquities could gradually help smooth the situation. For this reason, the BSR has decided to apply two types of licences to the Libyan images in its collection. One is the free cultural licence (CCBY - SA), which will be released to the images owned by the BSR, the other is the Rights Reserved – Free Access licence, which will be used for the images owned by the Libyan Department of Antiquities. This means that not all of these images will be sent to Wikimedia Commons, but all of them will enrich the EAGLE and EUROPEANA portals.

20.6. Translations from Libyan inscriptions

Translations of Libyan inscriptions will be mainly based on those from the online publication of King's College London.

As the licence on this publication is a CCby-SA, the same licence will have to be applied to any derivative work – including the Italian translations, some of which have already been added to the EAGLE Mediawiki. EAGLE Mediawiki uses the Wikibase software to manage its records and allows the coexistence of several translations, each of them with its own copyright statement and, where possible, linked to the relevant image published on Wikimedia Commons.

Other translations will be based on the work published by the University of Cassino in 2010 and permission is therefore needed for their publication on the Web.

20.7. Conclusions

Cultural institutions who wish to publish their content on the Web but are concerned about re-use of their collections should consider that there are different formats available to make this content accessible to users.

The BSR has established some technical requirements for images to be published on the Web, especially on Wikimedia Commons; the file format should be JPEG, the image resolution 72 ppi, and the image size between 800 and 1000 pixels on the long side. This type of file is certainly not suitable for professional printing but allows web users to discover images that interest them, granting access to collections that would otherwise remain unknown. This accessibility therefore attracts a broader audience and exposes small institutions such as the BSR in the wider Web.

The opportunity for the rights owner to waive all or part of their rights to a particular object or metadata set makes it possible to publish digital content on sites such as Europeana or Wikimedia Common that promote Open data access. A well-run Open content programme and the use of Linked Open Data can achieve different goals at the same time: increasing traffic to your own website, generating income opportunities for those items that require a specific licence, extending the reach of the institution beyond the academic world.¹⁵

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¹⁵ See the Linked Open Data at the British Library: <http://www.bl.uk/aboutus/annrep/2010to2011/mainachieve/incdigaccess/index.html> and the Open Content program at The Getty: <http://www.getty.edu/about/opencontent.html>

PART IV

DIGITAL APPROACHES TO CROSS-DISCIPLINARY STUDIES
OF INSCRIPTIONS

21. Digital Marmor Parium

For a digital edition of a Greek chronicle

Monica Berti, Simona Stoyanova

Abstract

The Digital Marmor Parium is a project of the Humboldt Chair of Digital Humanities at the University of Leipzig to produce a digital edition of the so called Marmor Parium, which is a Hellenistic chronicle on stone written in the Greek island of Paros and preserved in two fragments.

Keywords

Chronology, EpiDoc, Epigraphy, Fragmentary texts, Greek, XML, Named entities

21.1. The Digital Marmor Parium Project

The goal of this paper is to present the Digital Marmor Parium, which is a project of the Humboldt Chair of Digital Humanities at the University of Leipzig.¹ The aim of this work is to produce a new digital edition of the so called Marmor Parium (Parian Marble), which is a Hellenistic chronicle on a marble slab coming from the Greek island of Paros. The importance of the document is due to the fact that it preserves a Greek chronology [1581/80-299/98 BC] with a list of kings and archons accompanied by short references to historical events mainly based on the Athenian history. The project team is producing a new XML edition of the text according to the EpiDoc Guidelines, is encoding all the named entities mentioned in the inscription, and is producing a timeline visualization of the chronological information preserved on the stone.

¹ <http://www.dh.uni-leipzig.de>

21.1.1. The Marmor Parium Inscription

The Marmor Parium [IG 12, 5, 444] is constituted by two fragments. The upper part of the first fragment (A) is lost and known only from the transcription produced by J. Selden in the 17th century [ll. 1-45]. The surviving portion of A [ll. 46-93] is now in the Ashmolean Museum in Oxford. The second fragment (B) is preserved in the Archaeological Museum of Paros [ll. 101-133]. The compiler of the text is unknown, but the date of the composition can be fixed at 264/63 BC thanks to the name of the Athenian archon Diognetus [l. 3]. The stone includes a list of events from the reign of Cecrops [1581/80 BC] to the archonship of Euctemon [299/98 BC] with a main focus on the Athenian history. The events are arranged in paragraphs which present a very similar format including a short description of the event, the name of the Athenian king or archon, and the number of years elapsing from 264/63 BC that are expressed with acrophonic numerals [CADOUX 1948; MADDOLI 1975; TOD 1948].

21.1.2. The Parian Chronicle

The Marmor Parium is the earliest example of this kind of document and it is a very valuable piece of evidence under many respects. It is not only a chronological record of Greek history, but it is also the result of a selection of events made by its compiler, whose name is unfortunately lost [ll. 1-3]. The importance of the text from a historiographical point of view is shown by the fact that the document is part of the *Fragmenta Historicorum Graecorum* by Karl Müller [FHG 1, 533-590] and of *Die Fragmente der Griechischen Historiker* by Felix Jacoby [FGrHist 239; JACOBY 1904]. In this sense, this evidence is a perfect example of a fragmentary author whose work is not preserved through quotations in later texts, but in a fragmented original form. Accordingly, the Digital Marmor Parium is part of the Digital Fragmenta Historicorum Graecorum (DFHG) project developed by the Humboldt Chair of Digital Humanities at the University of Leipzig.²

21.2. The Digital Marmor Parium

As mentioned above, the first goal of the project is to produce an XML edition of the text of the Marmor Parium according to the latest

² <http://www.dh.uni-leipzig.de/wo/open-philology-project/digital-fragmenta-historicorum-graecorum-dfhg-project/>

EpiDoc Guidelines.³ A dynamic electronic publication will provide not only wider audience and unlimited space, but also various pathways through the material, allowing users to navigate the edition according to their needs and interests. The use of the EpiDoc standard will also insure compatibility with already existing electronic databases of inscriptions, literary texts, and the EAGLE-Europeana network.

An important part of the project is identifying the named entities mentioned in the inscription. The Pleiades⁴ gazetteer will be referenced to for the place names and the geography of the Marmor Parium has been annotated through Pelagios.⁵ The personal names and identification of individuals will make use of and feed into the Standards for Networking Ancient Prosopographies project (SNAP).⁶ The encoded text of the stone and the images of the fragments will be part of Perseids, a collaborative editing platform developed by the Perseus Project,⁷ so that it will be possible to select regions of interest on the images and annotate them [ALMAS et al. 2013].

The team is also producing a visualization of the chronology preserved by the Marmor Parium with the open source tool TimelineJS,⁸ which allows comparison between the epigraphical text not only with other ancient chronologies but also with different chronological interpretations of the content of the inscription made by modern scholars.

³ <http://sourceforge.net/p/epidoc/wiki/Home/>

⁴ <http://pleiades.stoa.org/>

⁵ <http://pelagios.org/recogito/map?doc=116>

⁶ <http://snapdrgn.net/>

⁷ <http://perseids.org/>

⁸ <http://timeline.knightlab.com>

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22. The Inscription between text and object

The deconstruction of a multifaceted notion with a view of a flexible digital representation

Emmanuelle Morlock, Eleonora Santin

Abstract

In scholarly use, the term ‘inscription’ is not always unambiguous. The same concept can designate either the signifiers on a support, regardless of their meaning and textual function, or can be used to distinguish different texts. In a digital representation, a distinct markup is utilised to encode the material and textual dimensions. In order to combine them in an adequate representation, we submit a definition of some epigraphic notions which supports the theoretical model of an encoding schema compliant with the EpiDoc guidelines, designed as a part of the *IGLouvre* project.

Keywords

Inscription (notion of), archaeological dimension of text-bearing objects, epigraphic edition, text representation, TEI, EpiDoc, digital edition.

22.1. Introduction and purposes

For a long time epigraphic editions have approached inscriptions mostly as texts, almost ignoring their physical nature. For example, reference corpora like the *Inscriptiones Graecae* were not illustrated with photographs. This period is fortunately over, although it left some consequences in editorial practices.

The 14th international symposium of Greek and Latin epigraphy, whose main theme was *Publicum, Monumentum, Textus*, has proved, once again, that any modern survey must regard an inscription as exposed writing, inseparable from its physical support (monument, object, vase, mosaic) and its context, whether certain or hypothetical. Incorporated into its support, the inscription regains its primary value as a semantic system to describe, read and interpret by incorporating at

least a threefold approach: archaeological, textual and historical.¹ An edition which strives for completeness must take all these aspects into account.

The following questions lie at the core of this approach to epigraphic objects and define a series of challenges in the editing of inscriptions and their contexts. How can earlier editorial practices be taken further in order to reduce the misinterpretations that arose in past, and might arise in the future, from a fragmented presentation or a partial analysis of a text-bearing artifact? How can epigraphic edition be properly re-structured in order to show a three-dimensional object which requires a multidisciplinary investigation? Can digital representation, digital encoding and digital edition help achieve such a difficult endeavor?

In the last decade, the digital edition of Greek and Latin inscriptions marked-up using the EpiDoc schema has gone through at least three important changes and gave rise to three types of publications:

1. Electronic republications: enhanced and expanded versions of printed books with a new presentation, improved particularly from the point of view of data availability and data query, quantity and quality of illustrations (e.g. *Vindolanda Tablets on line*² [TERRAS 2006] and the addition *Vindolanda tablets online 2³ - Aphrodisias in Late Antiquity 2004*,⁴ expanded version of the 1989 printed book by Charlotte Roueché).
2. New editions of corpora (e.g. *Inscriptions of Aphrodisias 2007*)⁵ that took advantage of the digital environment but are still close to the paper editions model [BODARD 2008]. In these first essays the apparatus criticus and textual commentary have been reduced, or sometimes omitted, in order to mind the encoding aspects.
3. Critical editions of new epigraphic corpora whose editors were able to give a more extensive and accurate representation of the

¹ For a similar approach see M. Lamé and P. Kossmann, From paper browser to digital edition of inscriptions: a new conceptual model for a global historical approach, poster presented at the TEI Conference (Rome, October 2014), <http://eer.hypotheses.org/posters>

² <http://vindolanda.csad.ox.ac.uk/>

³ <http://vto2.classics.ox.ac.uk/>

⁴ <http://insaph.kcl.ac.uk/ala2004>

⁵ <http://insaph.kcl.ac.uk/iaph2007>

text its restitution and commentary taking advantage of previous experiences (e.g. *Monumenta Asiae Minoris Antiquae XI*⁶).

Currently, in enhancing the archeological dimension of the inscriptions, great results can be observed in some ongoing, and quite advanced, epigraphic projects in Sanskrit/Cam-language, *The Corpus of the Inscriptions of Campā*) and in Celtic language, *Ogham in 3D*.⁷ The latter has revealed the great potential of the TEI-XML encoding associated with the 3D scanning process [DEVLIN et al. 2014a; DEVLIN et al. 2014b]. Now, progress remains to be made in order to create an encoding model that could combine the textual as well as the material dimension of an archeological object bearing text, and help us to determine:

1. The arrangement of an inscription on the support;
2. The textual cuts made by epigraphers on the base of different criteria.

In this endeavor, we have to bear in mind three basic values: structural eariness, flexibility and reversibility.

The diplomatic transcription of an inscription is the result of an act of interpretation, even if it is, to some extent, meant to be a neutral act. And, reading and recognizing different texts and subtexts is *a fortiori* an interpretative process. Their order and their presentation in a printed or digital edition is an editorial choice depending on the aim of the paper as well as from the scholarly habits of its author. Hence, one can understand the importance of creating a model that provides a clear 'map' of all the texts (coeval or not) readable on an object and the benefit of linking them to one or several high quality images. At the same time, such a model should be able to represent, and graphically display, the editor's choices. This would allow readers to follow the editor's interpretative path backwards and allow for the easy introduction of modifications, if they want to reuse the file.

The major challenge is finding an encoding structure that takes into account not just one, but several common epigraphic scenarios: a composite text on a single support, a simple or composite text on a composite support and the rather common case of the support's re-use.

⁶ <http://mama.csad.ox.ac.uk/index.html>

⁷ <http://ogham.celt.dias.ie/menu.php?lang=en>

The solution found within the project *IGLouvre*⁸ should be considered as a suggestion and a starting point for a wider discussion.

Starting from four possible configurations of interaction between text and object, we first suggest a clarification of the notions embedded in our model and then we propose a method to encode, and thus better represent, the main relationships between the inscription, in its material dimension, and the text.

22.2. Interaction between text and object: four possible configurations

22.2.1. One simple text written on a single object

Let us start from the one-to-one relationship, the most linear and, fortunately, the most common. The prevalence of this configuration is perhaps the reason why some epigraphic projects do not need a way to encode more complex configuration.

A round funerary altar bearing epitaphs for three members of the same family is a good example to start with, for two kinds of reasons: the arrangement of the writing on the round surface and the internal chronology of the inscription.

22.2.1.1. Epitaph of Damophon, Epaphroditos and Theudoris

Monument description: Funerary altar decorated with bucrania.

Present location: Paris, Louvre Museum (MA 2327)

Original location: Kos.

Last recorded locations: Athens, then Toulon arsenal.

Date: 2nd half of the second century BC.

Bibliography

Monument: HAMIAUX et al. 1998, 205, n. 221; BERGES 1996, 115-116, n. 26 (the text of the inscription is not the right one), pl. 12, 3.

Editions: DAIN 1933, 17-18, n. 9 (reviewed by L. Robert, *Revue Archéologique* 2, 1933, 123, n. 9).

⁸ French project lead by Michèle Brunet, Professor of Greek Epigraphy, University Lumière-Lyon 2, selected for funding by the ANR (French National Research Agency, ref. number: ANR-12-BSH3-0012). It aims to publish a digital edition of the Louvre collection of Greek Inscriptions.

Δαμοφῶντος
 τοῦ
 Ἐπαφροδίτου

Ἐπαφροδίτου
 τοῦ
 Ἐπαφροδίτου
 πρεσβυτέρου
 Θευδωρίδος <τᾶς>
 τᾶς
 [Ἐπαφ]ροδίτου ζῶν[των]

I. 10. Dain: [Εὐμ]όλπου ζῶν[τος].

Firstly, in order to give a precise idea of the text layout and lettering, a 3D image would be far more effective than a two-dimensional photo.⁹ Secondly, the decision to present the inscription as just one text without any further divisions or, alternately, as one text divided in three textual components, is a scientific statement coming from the assumption that the three names have either been carved at the same time or not. A. Dain assumes that there are three inscriptions carved in three different stages.¹⁰ Revising the stone and the context of its fabrication, the modern editors will be able to confirm Dain's opinion and in this case they might want to divide the text in three sections (for this configuration see the next paragraph). Instead, they might assume that the monument was commissioned by all the people mentioned on the stone during their lifetime, and that the inscriptions have been carved all at the same time. This last hypothesis seems to be supported by some epigraphic

⁹ See the photo in HAMIAUX et al. 1998, 205, n 221. A program of 3D scanning and imaging of all these kind of monuments (altars with bucrania) is underway within the *IGLouvre* project.

¹⁰ In the description of the stone Dain writes: "au-dessous de la guirlande reliant deux têtes de béliers, première inscription de trois lignes; au-dessous de la même guirlande, deux autres inscriptions". In the critical notes he adds: "L'inscription a été gravée à trois reprises différentes". Maybe he hesitates between singular and plural, *inscriptions/inscription*, because the singular represents the neutral point of view of a contemporary reader (what we can see today avoiding any assumption) and the plural his interpretation.

parallels found in the round altars from Kos.¹¹

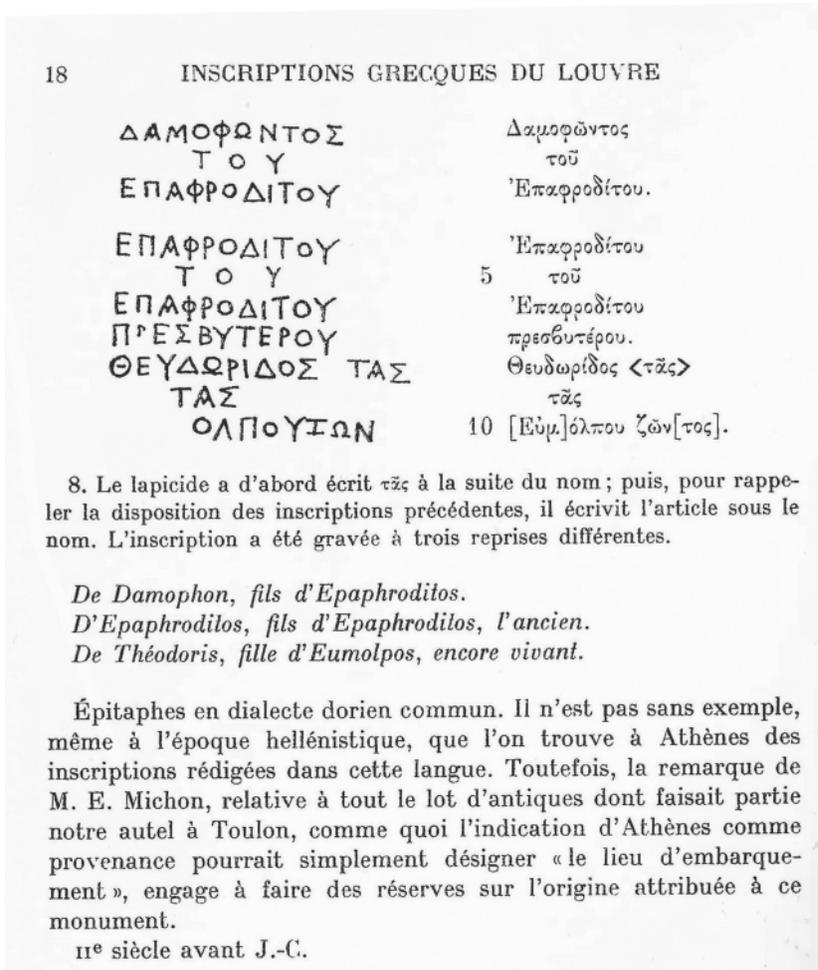


Fig. 22.1. Dain, Inscriptions grecques du Musée du Louvre, n. 9

¹¹ See BERGES 1996, Katalog ns. 1-111 (Rundaltäre aus Kos), in particular the monument n. 32 where the word ζώντων after two personal names at the genitive case is well legible.

22.2.2. One structured text consisting of multiple textual components, written on a single object or on one object-part

The textual components can be homogeneous with respect to their text type or function (several epitaphs, see 22.2) or heterogeneous (e. g. a dedication and a signature; an epitaph and a defixio, a dedication and a decree). An ancient reader, or a modern observer, could see them as parts of a composite text.

Within thematically classified epigraphic editions, the observance of strict classification rules leads editors to sometimes split into two different entries what has been conceived and realised as a cohesive ensemble. Such a practice could result in misinterpretations, especially when the necessary cross-references are omitted. An editorial presentation that compromises the overall view of an inscription, even in a thematic corpus, is fortunately less and less common. But one of the most valuable advantages of a digital edition is the possibility to markup different text forms (i.e. different taxonomies), without compromising the overall view. Giving that fact, it would be better to publish these composite texts as a whole while at the same time showing that they consist of heterogeneous components. In that way, it would be possible to link every component to the previous epigraphic editions in which it has been treated as an independent text included into different thematic groups (e.g. dedications vs decrees).

This case is exemplified by the editorial history of a marble slab from Delos (after 166 BC) bearing a dedication and a decree of the dionysiac artists honouring the aulos-player Craton, son of Zotichos from Calcedonia, now in the collection of the Louvre Museum.¹² The inscription, published by W. Froehner [1865, n 67, DÜRRBACH 1921, n 75] starting from the stone's autopsy, was then edited as an unitary text by all the principal editors except P. Roussel¹³ who, following thematic criteria, splits it into two different texts and puts them into distinct sections of the IG volume (*decreta collegiorum*: IG XI 4 1061 and *dedicationes artificum dionysiacum*: IG XI 4 1136).

¹² See the full bibliography in LE GUEN 2001, 231-239, n 45 and ANEZIRI 2003, D10.

¹³ Like G. Daux reminds in his edition of 1935 "dans les IG la dédicace et le décret proprement dit sont placés dans deux sections différentes (nos 1136 et 1061) et que leurs lignes ont reçu une numérotation indépendante".

Once again, the collection of the Louvre Museum provides us with an interesting example: three funerary epigrams written on two slabs that were parts of the same funerary monument, perhaps a sarcophagus.

22.2.3.1. Funerary epigrams for Antiphon and Eurymenides sons of Sophocles

A. Monument description: A rectangular white marble slab cut again in the modern age, at the top there is a plate frame slightly prominent.

Dimensions: H. 55 x W. 100 x D. 11 cm.

Text layout: 8 lines, one l. per verse, flush left, second line indented.

Present location: Paris Louvre Museum (MA 905-1).

Findspot: Thasos, loc. Μούγγινα.

B. Monument description: A rectangular white marble slab cut again in the modern age, largely damaged at the upper left corner and broken into two parts stuck back together.

Dimensions: H. 61 x W. 94 x D. 8 cm.

Text layout: 18 lines, one l. per verse. Two lines groups, the first consisting of 8 lines (flush left, second line indented) and the second consisting of 10 lines (flush left, no indentation).

Present location: Paris, Louvre Museum (MA 905-2).

Findspot: Thasos, loc. Μούγγινα.

Original location: Thasos.

Date: about 100 BC.

Bibliography

Editions: CONZE 1860, pp. 18-21, [textual order: a, c, b] (Kaibel, *Epigr. Gr.* 208, add. p. 519; Demitsas, n. 1161-1162); IG XII 8 441, [textual order: a, c, b]; from a squeeze PEEK 1955, GV 2038 [textual order: a, c, b] (Peek, *Griechische Grabgedichte*, 1960, n. 47); DUNANT et al. 1958, 160, pl. 40.

Studies: MENDEL 1900, p. 281; LANE 1988.

A. Marble slab (MA 905-1)**a. Epigram for Antiphon****Meter:** elegiac couplet**Narrative form:** 1st person

ἄρτι με νυμφιδίων ἀπὸ δύσμορον ἄρπασε παστῶν
 δαίμων ἐς τριτάταν νισόμενον δεκάδα,
 ἄρτι βίου περὸν κατ' εὐκλέα θέσμια δόξας
 στυγνὸς ἄπαιδα δόμοις ἀμφεκάλυψ' Αἶδας
 Ἀντιφῶντα, γοναῖσι Σοφοκλέος ὄν τέκε μάτηρ
 Ἥρω, τᾷ λιπόμαν οὐ τέκος ἀλλὰ τάφον.
 αἰαῖ, τίπτε, Τύχα, με τὸν εὐκλέα πατρῖδι κόσμον,
 τλάμονα, δυσπενθής, ὠρφάνισας βιότου;

B. Marble slab (MA 905-2)**b. Epigram for Eurymenides****Meter:** elegiac couplet**Narrative form:** 1st person

οὐ γάμον, οὐχ ὑμέναιον ἐμοὶ [c. 6 - 7]
 Ἥρω, ἀποφθίμενον δ' ἐστενάχησε γό[οις]
 εἰκοστὸν τανύσανθ' ἐτέων δρόμον· ἄ μμε δ' ὄμ[αίμους]
 τλάμονας ἐν δισσοῖς μηνσὶν ὄδ' ἔσχε τάφος·
 πατρὸς δ' εὐόλβοιο Σοφοκλέος ἄρσενα γέν[ν]αν
 ὠκύμορον φθιμέναν ἐστενάχησε Θάσος·
 μάτηρ δ' ἄ μεγάλαυχος ἐφ' υἰάσιν, ἄ πάρ[ο]ς εὐπαις,
 οὐχὶ τέκη, κω[φ]ο[ρ]ὺς δ' ἄντι δέδορκε τάφους.
 (vac. 2 lines)

c. Epigram for Eurymenides**Meter:** iambic trimeter**Narrative form:** 3rd person

ὁ τύμβος ἐσθλὸν υἷα τὸν Σοφοκλέος
 Εὐρυμενίδην κέκευθεν, ὧι βίου μόνα

ἐτῶν διεξάμειπτο διπλόα δεκάς·
 κατεῖδε δ' οὔτι νυμφικῶν ἐφίμερον
 παστὸν γάμων πάρεδρον, ἀλλ' ἀπ' ὀλβίων
 σφαλεῖς μελάθρων στυγνὸν ἦλθ' ὑπ' Αἶδαν,
 δυσπενθὲς Ἡροῖ ματρὶ καὶ συναίμοσι
 λιπῶν φίλαισιν ἄλγος· ἅ δ' ἀλιστεφῆς
 δόξας ἕκατι τῶιδε πατρία Θάσος
 τὰ σεμνὰ τιμᾶς δῶρ' ἔνειμεν εὐκλέος.

How many text structures, how many sequences are acceptable for a composite text like this? As many as the perspectives which an editor might hold as possible and worthy of notice:

- The chronological sequence of recorded events (is the text chronologically structured?);
- The poet's perspective (is the text based on a poetic project and a consequent poetic arrangement?);
- The 'engraving perspective' (what was the order of engraving? Is there a connection between this order and the inner chronology?).

If the display context and the mutual position of the marble slabs can be reconstructed, one might also add the ancient reader's point of view.

22.2.4. Multiple distinct texts, consisting of one or several textual components, written on a single object (no links with one another apart from the support)

It is the case of the support's re-use. In order to show various scholarly approaches in publishing this particular occurrence, we will compare two editions in which editors decided to present the inscription from two different perspectives. In IG IX 2, 1040 a-d (Fig. 22.3), O. Kern had an object-perspective, since he published under the same text-entry all that is readable on the stone and performed text divisions both in the diplomatic and in the critical transcription by means of a sequence of lower case letters (elsewhere in the same volume he used roman numbers). In the inscriptions of Gonnoi (*Gonnoi* nos. 114, 115, 122, 123, 127, 198,¹⁴ see Fig. 22.4, 22.5 and 22.6), B. Helly adopted thematic and

¹⁴ In the epigraphic archive of HiSoMA at Lyon, the number of the object is GHW 4348, see photos; the inventory number in Larissa Museum is 318.

IG IX 2, n.	Gonnoi, n.	Type of text	Date	Position
1040 a	198	votive dedication	2 nd c. BC	front face
1040b, ll. 1-5	114	manumission	end 1 st c. BC	front face
1040b, ll. 6-15	115	manumission	about 25 BC	front face
1040b, ll. 16-19	122	manumission	1 st half of the first c. AD	front face
1040c	123	manumission	Tiberius reign?	left side
1040d	127	manumission	45-46 AD	right side

Tab. 22.1. Bibliographical concordance

chronologic collecting criteria and so decided to split the ‘inscription’ into six different text-entries.

On the one hand, it is reasonable to separate texts that have no relation with one another, on the other hand it would be important to show the history of the different uses and reuses of an object, and make readers able to verify: the fact that there are really no links between the texts apart from the fact that they are on the same support; all the material aspects of the writing: changes of hands and writing style, text layout, etc.

22.3. Defining concepts: key entities for the material and textual dimensions

Our first attempts to represent these configurations involving a one-to-many text/object relationship by means of an EpiDoc markup stumbled upon the ambiguity of the notion of ‘inscription’. If the notion mainly describes a ‘text’, is it correct practice to use the EpiDoc ‘textpart’ subdivision of the ‘text’ element to encode material parts of an object? Since the term is often used as a substitute for a unique ‘object’ or ‘document’¹⁵ bearing a unique text, what should we do with texts that

¹⁵ See CAYLESS et al. 2009. The authors restate the historical and theoretical background of the creation of EpiDoc. The dual use of the term ‘inscription’ throughout the article to designate the source alternatively as an object and as a text, must be related to the fact that “the collaborators were seeking a digital encoding method that preserved the time-tested combination of flexibility and rigor in editorial expression to which classical epigraphers were accustomed in print, while bringing to both the creator and the reader of epigraphic editions the power and reusability of XML”.



Fig. 22.5. Larissa Museum inv. n. 318 - IG IX 2 1040 c



Fig. 22.6. Larissa Museum inv. n. 318 - IG IX 2 1040 d

run across several objects or fragments? The recommended practice taught in the EpiDoc training sessions¹⁶ is very flexible, permitting the use of the textpart subdivision both for purely textual units or text areas

¹⁶ See Bodard's slides Structure of the Epigraphic Text from the Digital Classicist wiki page: http://wiki.digitalclassicist.org/EpiDoc_Summer_School

visible on specific parts of the object.¹⁷ But as D. Buzzetti demonstrates it, the process of text encoding, in a scholarly context, is at the same time the building of a *representation* and of *the representation of a representation* [BUZZETTI 2002]. It requires the clarification of the underlying text model necessarily used (knowingly or not).

In order to properly represent these configurations, we tried to model the distinctions we needed to clarify the relationships between the abstract and material dimensions, leaving aside for the moment the ambiguous notions.¹⁸

These distinctions help us clarify certain structural issues that appeared in our first attempts to provide an EpiDoc transcription for these configurations presented in section 22.2. The way an entity can be identified, described and represented by means of markup is never a direct consequence of its intrinsic nature, but depends on the perspective adopted. For example, if a standing statue is entirely preserved in a museum in one piece, its base would be described as what we call ‘a typological object part’, but not as a ‘physical object part’. In contrast, if a similar statue is broken into two different parts (e.g. one being the base and the other the body), and is then located in different museums, both the base and body parts will then be described as ‘physical object parts’ according to this typology. From the textual perspective, parallel examples can be explored. A composite text consisting of heterogeneous components [22.2.2] may not be considered as an abstract textual unit fitting into existing literary genres. As an existing unit of the source yet implicit, its identification is subject to interpretation. Its inclusion in the representation as a logical textual unit depends on the decision of the editor. If it is represented, it must then be seen as an *editorial unit* which materializes an entity that is implicitly present in the source. The nature of this editorial decision is structural. As it operates at the highest level of the hierarchy (the text that encompasses the others), it impacts the way the entities are defined. All of these key entities have found a corresponding element in the EpiDoc schema. Does this allow us to build a coherent encoding strategy?

¹⁷ No more than the TEI, EpiDoc is meant to be a prescriptive standard with respect to the use of the elements.

¹⁸ For a comprehensive exploration of the definition of what an inscription is from an ontological perspective, see PANCIERA 2012.

Entity name	Definition
Text-bearing object	A material object (artifact) that bears one or several inscribed texts. The material object can consist of one single piece or several distinct physical elements.
Physical object part	A detachable physical part of a material object that can be physically isolated: such as a slab, a bloc or a fragment. Several objects parts originating from the same object (whether single or composite) may be kept in different institutions.
Typological object part (or 'physical feature')	A non detachable part of an object identified with reference to a given epigraphic or archeological typology (e.g. base, front-face, side, etc.)
Inscribed entity	The set of marks that were inscribed on a material support.
Abstract text	An abstract entity corresponding to the 'object of thought' that is the denotata of the inscribed entity or its intellectual content. It can be classified into a textual genre, such as a decree, a dedication, a manumission, etc. It may be structured as a unified or composite text.
Textual component of a composite text	A distinct text that pertains to a defined genre and that structurally functions as a component of an overall composite text.
Edited text	A representation of the inscribed text intended for publication. As the result of a scholarly process involving interpretation and editorial choices, it is supposed to respect some shared standards or conventions for both the structure and the distinctions represented.

Tab. 22.2. Key entities and their definitions

22.4. The encoding strategy of the *IGLouvre* project

This encoding strategy is being defined within the framework of the *IGLouvre* project. Our first objective is to offer a system, compliant with the EpiDoc schema, which should be able to coherently represent with markup all the configurations we have identified in our corpus. A second and derived objective is to enable the highest possible flexibility in the exploitation and representation of these relationships in the web interface. The contours of the final web application that will give an interface to the digital publication are not specified yet. But since the aim is to exploit thoroughly the material and textual dimensions of the various items present in the Louvre collection, we need to be able to define a precise connection between these entities. As is highlighted in table 22.3, the mapping between the EpiDoc schema and the entities of our model has been established rather easily. However, we need to say that the decision to use the 'msPart' element to represent the entity 'physical object part' is currently under discussion¹⁹ within the EpiDoc and TEI communities.

¹⁹ In her feature request ticket (<http://sourceforge.net/p/tei/feature-requests/505/>) posted on 2014, April 29th, C. Schroeder asks for a re-definition of the element in the guidelines for exactly the same kind of use for the element.

Entity name	Function of the element	Path (position in tree)	Possible elements
A text-bearing object	Identification	TEI/teiHeader/sourceDesc/ msDesc	<msIdentifier/> <altIdentifier/>
A physical object part	Description	TEI/teiHeader/sourceDesc/msDesc/physDesc/objectDesc/ supportDesc	<support/>
A physical object part	Identification	TEI/teiHeader/sourceDesc/msDesc/ msPart	<msIdentifier/> <altIdentifier/>
A physical object part	Description (object)	TEI/teiHeader/sourceDesc/msDesc/msPart/physDesc/objectDesc/ supportDesc	<support/>
A physical object part	Description (history)	TEI/teiHeader/sourceDesc/msDesc/msPart/ history	<origin/> <provenance/>
A typological object part	Identification	TEI/text/body/div[@type='edition']/ div [@type='textpart']	[@xml:id]
A typological object part	Categorization	TEI/text/body/div[@type='edition']/ div [@type='textpart'][@subtype]	Controlled vocabulary
A typological object part	Description (layout)	TEI/teiHeader/sourceDesc/msDesc/msPart/physDesc/objectDesc/ layoutDesc	<layout/>
A typological object part	Content (transcription)	TEI/text/body/div[@type='edition']/ div [@type='textpart']/ ab	mixed content
The abstract text	Identification	TEI/teiHeader/sourceDesc/msDesc/ msContents	<msItem[@xml:id]/>

Category	TEI/teiHeader/sourceDesc/msDesc/msContents	<msItem[@class]/>
Name	TEI/teiHeader/sourceDesc/msDesc/msContents/ msItem	<title />
A textual component of a composite text	TEI/text/body/div[@type='edition']/ div[@type='textpart']	[@xml:id]
Category	TEI/text/body/div[@type='edition']/ div[@type='textpart'] [@subtype]	Controlled vocabulary
The edited text		A collection of web pages designed from the transformation of the EpiDoc XML representation.

Tab. 22.3. A mapping between our typology and the key entities within the EpiDoc schema

In order to achieve our second aim, we intend to use the linking mechanisms provided by the TEI framework. Once the entities are identified with an `@xml:id` attribute, the markup can establish with precision the relations between one another, using attributes like `@target` or `@corresp`. To give a detailed example, the case illustrated in paragraph 22.2.3 is developed in table 22.4: the encoding distinguishes two `msParts` elements in the `teiHeader`, and four textual units, one for each epigram and one for the group they constitute.²⁰

Identified elements can be pointed to using the `@xml:id` attribute. More precise linking between the abstract texts listed in the `msContent` element (`teiHeader`) can be provided using as many `<locus/>` elements as needed, with a `@target` attribute. The same pattern may also be used to record distinct stonecutters (in `handNote` elements) or different dates (in `origDate` elements) and associate them with the relevant parts in the transcribed text.²¹ For cases such as those we treated in the examples commented in 22.2.1, 22.2.2 and 22.2.4, where the inscription is carved on a single object, we decided to use a ‘default `msPart`’ to draw a symmetry with the case where several `msParts` are used.

In cases where the textual structure overlaps the physical agency of inscribed texts areas, the use of an empty element milestone, assorted with the relevant `@unit` attribute (e.g. ‘`section`’)²² resolves the problem caused by the need to represent two overlapping structures in a single XML tree. It should however not be denied that this approach impacts the workload of the task of encoding. But in our point of view, it proves to be worthwhile, as soon as you consider the range of possibilities offered in the digital web interface. In some cases like the re-use of the same support for the engraving of successive texts, this strategy is also entirely necessary in order to link them to the same object.

²⁰ The ODD file which formalises the schema and its documentation is supposed to include the typology used for the `@subtype` attribute. The EpiDoc documentation states that `@subtype` is not constrained, but common values might include “`fragment`”, “`column`”, “`section`”, etc. We consider that any categorisation can be used.

²¹ It is also possible to record data related to illustrations of the objects or inscribed portions of the objects (e.g. drawings, photographs, etc.) in a `facsimile` element, to provide links to an image, or a region of an image, via the `@facs` attribute, but it is a quite a widespread practice which doesn’t require special comments for our purpose.

²² The term ‘`section`’ denotes the abstract nature of the entity considered. It can be opposed to another kind of milestone unit like ‘`block`’, which can be used when a physical structure overlaps a textual one.

Entities	Type	Encoding
Slabs	physical object part	<pre><- - in the teiHeader - -> <msPart xml:id="mspart01" n="A" corresp="#milst01"/> <msPart xml:id="mspart02" n="B" corresp="#milst02"/></pre>
Epigrams	Abstract texts	<pre><- - in the teiHeader - -> <msItem xml:id="msi01"> <title>Epigram for Antiphon</title> <locus target="#lg01"/> </msItem> <msItem xml:id="msi02"> <title>Epigram for Eurymenides</title> <locus target="#lg02"/> <msItem xml:id="msi03"> <title>Epigram for Eurymenides</title> <locus target="#lg03"/> </msItem></pre>
A group of epigrams for the sons of Sophocles	The edited overall text	<pre><! - - in the TEI/text element- -> <div type="edition"> <div type="textpart" subtype="group-of-epigrams25"> (...) </div> </div></pre>
Each epigram	Textual components of a composite text	<pre><! - - in the TEI/text/div@type='edition' element- -> <milestone xml:id="milst01" unit="block" corresp="#mspart01"/> (...) <milestone xml:id="milst02" unit="block" corresp="#mspart02"/> (...)</pre>
The verses of each epigram	Text inscribed in each textual component	<pre><lg xml:id="lg01" > <l><lb/>ὄν γάμων (...)</l> <l><lb/>(...)</l> </lg></pre>

Tab. 22.4. EpiDoc markup of the example presented in 22.2.3

22.5. Conclusions and perspectives

This encoding strategy permits us to meet the following requirements:

- the material and abstract dimensions of the items in the Louvre collection are taken into account in a compliant EpiDoc markup, exploiting its capacity to provide fine grained identifiers and linking mechanisms that are required to build on an interface showing inscriptions not just as decontextualized texts;
- the scientific editors keep full control on the editorial choices they made beyond the structure of the printed or digital publication;
- the deconstruction of the notion of ‘inscription’ will also provide help for designing and implementing several extractions and data exports that will have to be developed in the near future to ensure the interop-erability of the digital collection and its re-use for other projects.

Further work needs to be done to make explicit this encoding strategy in the form of an ODD schema and documentation file. One of the important next steps of the *IGLouvre* project will be the specification of the web interface of the digital edition. But before this further stage, it would be interesting to reformulate our model of what an inscription is using the CIDOC-CRM metamodel.²³ This work may provide critique and opportunity for enhancements. It also may help see to what extent our work can be useful for other projects. In conclusion, even though the material and the textual dimensions cannot be separated in the editorial representation, they need to be precisely distinguished in the abstract model of the source that must be clarified before structuring this representation. Finally, is the ambiguity of the notion of ‘inscription’ a hurdle impossible to avoid? What is an inscription? It is an inscribed text, an inscribed object in a given state of preservation or an edited text? We think that in order to escape ambiguity, we have only two ways: stepping back to the ancient meaning of the Greek *epigramma* (ἐπίγραμμα), and state that an inscription is nothing else but letters on a support, or accept that in the epigraphic field, an inscription

²³ Other authors have already explored this perspective [ORE et al. 2009]. In the last meeting of the TEI consortium, the same authors suggested the introduction of new elements for the entities `physicalObject` and `conceptualObject`: <http://www.tei-c.org/SIG/Ontologies/meetings/m20131003.html>

is above all an editorial unit which results from individual scientific choices and disciplinary criteria. The need for a clear understanding of this underlying model may be considered as one of the most fruitful contributions of the digital edition.

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23. The IGCyr Project

Encoding Codes, Translating Rules,

Communicating Stones in Ptolemaic Cyrene and in
Contemporary Bologna

Alice Bencienni, Simone Agrimonti

Abstract

The paper draws a parallel between the work of a *bononiensis* epigraphist involved in the IGCyr project and the historical patterns of (epigraphic) communication between central and local power in Ptolemaic Cyrene. In the first part, the analogy of functions is used to introduce the project's specifics; afterwards a brief survey of codes and rules adopted to shape stones for communication gives some suggestions concerning digital text transcription as a desired outcome. The second part presents HELLAS UniBo, a markup laboratory set up in Bologna in June 2013 and based on user engagement.

Keywords

IGCyr, languages, chronological hierarchy of texts, 'inner' layout, HELLAS UniBo, user engagement, markup.

23.1. The IGCyr project

The title of this paper draws a parallel between the work of a *bononiensis* epigraphist and digital encoder involved in the international IGCyr project (the digital corpus of the *Inscriptions of Greek Cyrenaica*) and the historical patterns of communication with specific reference to epigraphic communication between central and local power in Ptolemaic Cyrene. The title intentionally consists of three verbal phrases that can simultaneously be interpreted in two ways, according to the grammar function – noun or adjective – given to the -ing form (or present participle). In the first case, the parallel points to an analogy of functions that will be used to introduce the IGCyr project's specifics. In the second case, the parallel refers to the meta-linguistic level. A brief survey of the codes and rules adopted to shape stones for communication can

provide some suggestions regarding digital text transcription (and possibly its visualization) as a desired outcome. The analogy of functions will be the first object of analysis.

23.1.1. Encoding codes, translating rules, communicating stones in Bologna and in Cyrene

Despite the differences in the tools used, the media and the targeted general public, similar technical procedures concerning the handling of written documents can be observed, both in contemporary Bologna and in ancient Cyrene.

Since 2011, the team working on the IGCyr project has been digitising inscriptions from Cyrenaica (sixth to first century B.C.) and processing 771 texts so far (except for about 60 metrical texts that will constitute the *Greek Verse Inscriptions of Cyrenaica*, GVCyr). Catherine Dobias-Lalou is the main epigraphy researcher overseeing the digital edition of these texts, which involves the Universities of Bologna, Macerata, Paris IV Sorbonne and King's College London as part of the wider project InsLib (*Inscriptions of Libya*).¹ The latter includes the *Inscriptions of Roman Tripolitania* (IRT), the *Inscriptions of Roman Cyrenaica* (IRCyr) and the Ostraka from Bu Ngem (already available on the website papyri.info). As suggested in the title of this paper, within the IGCyr project, the task for the University of Bologna is to achieve the following three main results:

encoding codes: encoding in EpiDoc heterogeneous documents² coming from the most prominent cities of Cyrenaica and also from other parts of the country;³ among these documents are some very important historical inscriptions inscribed in Cyrene; the present paper will specifically deal with the constitutional code enacted by Ptolemy son of Lagos [SEG 9.1] and a Ptolemaic ordinance attached to a royal letter [SEG 9.5];

¹ The collaborative undertaking was agreed upon between Charlotte Roueché, Catherine Dobias-Lalou and Lucia Criscuolo in May 2011.

² The most relevant groups of inscriptions and typologies attested are as follows: graffiti on vases; historical inscriptions (oath of the founders; list of grain donations; syla inscription; *diagramma* of Ptolemy; will of Ptolemy VIII; *prostagma* of Ptolemy IX); accounts of the *damiourgoi*; sacred laws; honorary inscriptions for functionaries and for members of the Lagid royal family; lists of soldiers and of public subscriptions' contributors; dedications; catalogues of priests and *epheboi*; epitaphs; funerary and honorary epigrams.

³ The most up to date archaeological and sites guide of Cyrenaica is now KENRICK 2013.

translating rules: translating the documents from Doric and *koiné* Greek into Italian; this is a great challenge in particular for what concerns metrical texts, historical inscriptions and documents coming from the Ptolemaic chancery, written in a diplomatic and prescriptive language;

communicating stones: first of all this implies preparing an open access tool to gain knowledge of the epigraphic sources from ancient Greek Cyrenaica;⁴ the IGCyr project is gathering inscriptions already published in many different and sometimes outdated corpora [*CIG* III, 5129-5362b; *SGDI* III.2, 4833-4870; *SEG* 9; *SECir*], in the entries of *SEG* relating to Cyrenaica, and in outstanding monographs and articles,⁵ some of which very recently appeared;⁶ secondly, it means converting the IGCyr project also into a user engagement project as well as into a permanent training laboratory for epigraphists and digital epigraphists [23.2].

In ancient Cyrene, people started inscribing on stones and town walls since the time of its foundation, at the end of the seventh century B.C. Many of these inscriptions have arrived intact up to now. By focusing on the power relationship between Cyrene and the Ptolemaic dynasty, i.e. in the Hellenistic age, when Cyrene was depending on the Lagid realm founded by Ptolemy, the general of Alexander the Great, it is possible to see that the University of Bologna's aforementioned objectives can find a parallel in the communication strategies adopted by ancient Cyrene:

encoding codes: adopting the rules enacted by the Ptolemies for their subject city; deciding to publish royal codes, ordinances and letters; recording them on stone and selecting specific places for their publication;

⁴ As it is widely known, a corpus of the Greek inscriptions from Cyrenaica never existed. The PHI 4 CD-Rom and online edition (Searchable Greek Inscriptions) collects only a selection of documents from *SEG*.

⁵ Most relevant being ROBINSON 1913; OLIVERIO 1932–1933; OLIVERIO 1933–1936; PUGLIESE CARRATELLI et al. 1961; GASPERINI 2008; GASPERINI 1967; BOARDMAN et al. 1966; BOARDMAN et al. 1973; LARONDE 1987; CHAMOIX 1988; PACI 1989; DOBIAS-LALOU 1993; MARENGO et al. 1998.

⁶ E.g. DOBIAS-LALOU 2000b; DOBIAS-LALOU 2002; DOBIAS-LALOU 2013; MARENGO 2010a; MARENGO 2010b; MARENGO 2011; REYNOLDS 2010; REYNOLDS et al. 2012; LAJTAR 2010; ROSAMILIA 2010; INGLESE 2011; PACI 2011; NOWAKOWSKI 2013. An extensive bibliography has been compiled in Bologna by Ljuba Merlina Bortolani.

translating rules: moving the normative voice of the king from the virtual level of the word written on perishable material to the effective level of the document registered both in the city's archive and in the text displayed on stone; the latter integrated the words of the king into a local frame of Doric *formulae* or dossier of civic documents;

communicating stones: using epigraphic publication and its exhibition on stone to publicize the novelties introduced by the king regarding internal constitution, legislation and procedure.

23.1.2. Bologna's and Cyrene's encoding codes, translating rules, communicating stones

At meta-linguistic level if the sequence is inverted, by considering first the (two) inscribed texts from Cyrene, it is possible to notice how, when encoding codes, translating rules and communicating stones, the epigraphic habit of Cyrenean stonecutters follows some interesting – though not specific – diplomatic, linguistic and layout patterns. The encoding codes and translating rules described below will be compared with EpiDoc text transcription guidelines.

The famous constitutional text by Ptolemy, a *diagramma* enacted between 321 and 320 B.C. for Cyrene by the general of Alexander, on duty as an agent of the king of Macedonia, describes the composition and functioning of the board of citizens and of the institutions of the polis [SEG 9.1; Fig. 23.1].⁷

The layout is standard: the text is organized in paragraphs highlighted by blank spaces (*vacat*) and small thin lines below each new entry. These encoding codes are completed by some remarkable features that show the translating rules usually adopted by Cyrenean citizens when dealing with Ptolemaic authority and normative texts. The original and more ancient text coming from the chancery of Ptolemy, which is *koiné* (ll. 2-72), is placed between a later supplied opening *formula* (an auspicious one or an explicative header: l. 1) and a long list of Cyrenean magistrates (ll. 72-87). Both parts are worth noticing for their linguistic Doric flavour; these were added by the Cyrenean authorities to the

⁷ Later editions: FRASER 1958, pp. 120-127; SB VIII.2, 10075; LARONDE 1987, pp. 95-98; historical interpretation and chronology: CRISCUOLO 2001; for the immense bibliography BENCIVENNI 2003, pp. 105-108.



Fig. 23.1. *Diagramma* of Ptolemy, SEG 9.1. Cyrene Museum, inv. no. 11. Photograph by and courtesy of Catherine Dobias-Lalou

original text. When accepted as a source of law, the ruler's words were combined with very local, and proud, framing procedures. The result, which is a very meaningful and communicating stone, offers a clear example of the interaction between unequal but mutually dependent powers.

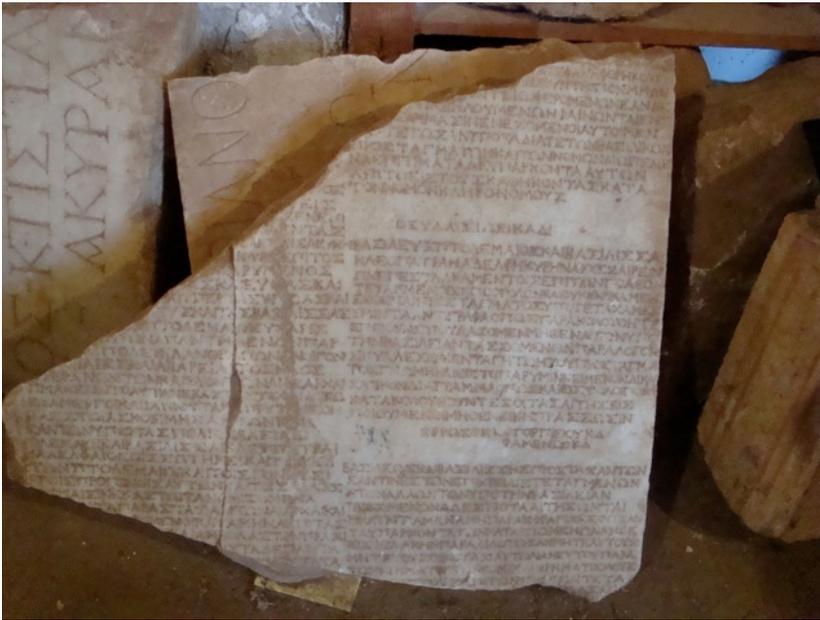


Fig. 23.2. SEG 9.5. Cyrene Museum, inv. no. 137. Photograph by and courtesy of Catherine Dobias-Lalou

Equally noteworthy is a deeply damaged wall marble slab bearing a dossier of documents dating to the end of the second century B.C. The artefact bears four relevant texts, arranged in two columns (A-B), coming from two different sources of law. The first is a fragmentary honorary decree issued by Cyrene, the second a fragmentary royal document of unknown typology, the third a royal letter of Ptolemy IX Soter II and Kleopatra the sister (Selene), dating back to the year 108 B.C., to which is attached a fragmentary royal ordinance (*prostagma*) enacted by the royal couple [SEG 9.5; Fig. 23.2].⁸

⁸ Later editions: PRÉAUX 1942; LINGER 1980, pp. 107–111 nos. 45-6 (only royal letter and ordinance); bibliography in LINGER 1980; add LARONDE 1987, pp. 423-424; MARQUAILLE 2003 (with C. Dobias-Lalou, BE 2005, 620).

The language employed is essential for the comprehension of the texts' subdivision and structure. Due to the many gaps that surround the preserved lettering on the left, above and below, it is only through the linguistic analysis of the texts that the editor can distinguish a Doric text issued by the Cyrenean institutional bodies in the first column (A1) from the one in *koiné* (B1) written above the royal texts (B2, B3) in the second column.⁹ Again, the use of language helps distinguishing the two different sections within the royal letter B2: first the Cyrenean header with the local date B2a and then the royal text itself (B2b). The Cyrenean header was initially written on the perishable document when it entered the civic archive, and later it was reproduced on stone. As observed above with the text parts assembled in the *diagramma*, in this case too the documents, as it often happens with dossiers, are arranged in an altered chronological order. First comes the more recent document, the decree (A1), with which Cyrene honours the royal couple and their child for the benefits granted to the city, and after the three royal texts that had been previously enacted (B1, B2, B3). Among these, it is possible to further distinguish dates and set the following very particular chronological order: B1, B3, B2b, B2a. Indeed, as can be easily appreciated by e-mail writers, B3, which is attached to B2, was necessarily written first. As seen above, in this case also it is possible to notice the complex structure of stone display that the Cyreneans used to build up when dealing with their rulers' documents.

What about EpiDoc encoding codes and translating rules for these cases? In the guidelines there are plenty of appropriate tags for the many surface and layout phenomena illustrated above (spaces, milestone *paragraphoi*, *div* *textpart* columns, *div* *textpart* sections). Nevertheless, some tags can still be improved, especially the ones encoding Greek language variations (and of course scripts variations within the same language) and chronological hierarchy of composite texts or dossier documents.

⁹ Editors neglected the *koiné* language of B1 and considered it as a Cyrenean document, the final part of decree A1 (FRASER 1958, pp. 103-104, 127-8; LARONDE 1987, pp. 423-4), a civic law (LENGER 1980, p. 107) or a civic *dikastikon diagramma* (ARANGIO RUIZ 1937; ROUSSEL 1939), deceived by OLIVERIO 1933-1936 *editio princeps*, which attributes the date B2a (expressed following Cyrenean calendar) to B1 instead of B2b. Only MUSTI 1957, p. 284 n.3, recognized the correct position of the date on the stone and attributed it, as a Cyrenean archive label, to the royal letter below (but he interpreted B1 as a decree). Only OLIVERIO 1933-1936 interpreted B1 as a royal rescript.

As for what concerns language (and script) variations, it would seem that special subtags relating to dialectal varieties of Greek and *koiné* have not yet been thoroughly developed. The IGCyr project might consequently decide to improve these consistently with the specifications outlined in RFC 5646 (IANA Language Subtag Registry), as suggested by the guidelines.¹⁰ However, it may also be that someone has already started devising said more specific subtags, but the news has not yet reached the community. Whatever the case, once the subtags relating to dialectal varieties of Greek and *koiné* Greek have been established, or, if already in use, when they become available to the wide EpiDoc community, it would be necessary to consistently apply them to all the projects dealing with Greek inscriptions. Consequently, subtags would allow signalling the different languages (and scripts if necessary) used in the original text and, above all they could be used to mark the transitions in language (and script) within the same text and inscription.¹¹

Another point which creates some encoding problems is the chronological hierarchy of texts. It would be really useful to find out whether it could be possible to tag relative chronologies and, if necessary creating links to absolute chronology whenever relevant.

The two examples from Cyrene clearly show that, if it were possible to tag the different types of attested Greek (Cyrenean Doric and *koiné* language in the above cases)¹² and the internal chronology of the texts, researchers would be able to index linguistic patterns, to assign texts to coherent language groups (possibly combined with their origin), and to define a more subtle chronological distribution of the texts (if not absolute, at least relative).

Different linguistic rules do not allow translation into the modern languages to express the dialectal differences existing between Doric and *koiné* (except for the convention that imposes the transliteration of personal names, which creates a Doric sound that may be appreciated only by an educated reader). A possible solution could be a multiple visualization of Greek texts – traditional versus specifically oriented. The visualization resulting from the tagging of the text's transcription as seen in the examples above could show the linguistically and

¹⁰ <http://www.stoa.org/epidoc/gl/latest/supp-language.html>

¹¹ Using the `xml:lang` attribute inside the tag `div`, e.g.: `<div type="textpart" subtype="section" n="1" xml:lang="grc">`.

¹² As described by DOBIAS-LALOU 1987; DOBIAS-LALOU 2000a; DOBIAS-LALOU 2001; DOBIAS-LALOU 2004; LONATI 1990; MARENGO 1991.

diplomatically composite character of texts combined on stone.¹³ In particular, when dealing with royal correspondence and with dossiers of documents, the very simple pattern of quoting levels employed in contemporary e-mail applications may be an interesting layout of comparison.

In conclusion, the combination of the IGCyr project with the nature of the documents that are being processed and the aforementioned specific interest in the ancient patterns of communication helps focusing on some contemporary communication challenges. If nowadays communicating stones can be made effective, these should be able to also display the fascinating features concerning their 'inner' layout of ancient communication strategies.

AB

23.2. A laboratory for encoding IGCyr: challenges and problems of a user engagement based markup

In this section I am going to specifically focus on the experience of the HELLAS (Historical EpiDoc and Leiden+ Laboratory for Ancient Sources) UniBo, a markup laboratory based on user engagement and collaborative work set up in June 2013 at Bologna University. During this year of activity the laboratory, in collaboration with the IGCyr project, has digitised many texts. This type of experience presents many interesting points which make it worth examining. What I consider most important is that the laboratory, thanks to some peculiar organisational and task management characteristics, worked very well in both training new users and carrying out the encoding of epigraphic texts. I therefore present you an overview of the history and functioning of the HELLAS, with the aim of also thinking about different methodologies to teach markup while working on an encoding project.

In order to let you more clearly understand, I will firstly describe the creation, organisation and practical functioning of the laboratory. After that necessary introductory part, I will consider and analyse the effects of our working methods.

¹³ The possibility of multiple visualizations may also be of interest for metrical texts, whose rendering on stone may differ from the verse articulation usually adopted in modern studies on ancient prosody.

23.2.1. From a summerschool to a laboratory: the HELLAS UniBo

The starting point was the EpiDoc training workshop, held in May 2013 at Bologna University and organised by the Department of History and Cultures. At that time, the Department had also already started the IGCyr project, in collaboration with other European universities.

This event¹⁴ consisted in an intensive workshop on digital epigraphy, with a particular focus on text markup in XML. Through this intensive workshop, participants were introduced to the world of markup and could gain competence in the process of texts encoding. However, unlike previous editions, it was decided to try to carry on the activity after the end of the workshop. Since many of the participants were Bologna University students, we had the possibility to come to the university and work there: the project thus started with the participation of five students.

We met once a week for a couple of hours and practiced on the tagging of epigraphic texts. The original aim of the laboratory was only educational, with no intended relation with the IGCyr project. The idea was continuing to work with XML, in order to gain more familiarity and avoid the risk of forgetting all the notions acquired during the workshop. During this first period, which lasted for about a month we had the possibility to be informally tutored by one of the organisers of the workshop (Ljuba Merlina Bortolani); this was a significant help, because we were not ready to work without any support. During the last meetings of this phase, we started using digital editions of epigraphic materials from Greek Cyrenaica for our exercises: the participation of Bologna History and Cultures Department in the IGCyr project gave us easy access to this material. Since the participants' reaction to the work was positive, it was decided to set up a permanent laboratory (HELLAS Unibo).¹⁵ In starting this new phase we saw the possibility to develop our digital capabilities, acquiring a significant know-how in the field of markup and text tagging, which could in the end lead us to be able to autonomously carry out the digitisation of texts or *corpora*.

¹⁴ The organisers in charge of the digital part of the workshop were Pietro Liuzzo and Ljuba Merlina Bortolani, while the direction was entrusted to Lucia Criscuolo and Alice Bencivenni.

¹⁵ Organized in collaboration with Rodopis (Associazione culturale <http://rodopis.org/>).

All the members of the group had gained sufficient familiarity with XML and we thus abandoned pre-prepared practice texts and started a systematic markup work on texts of the IGCyr project. This meant working on new texts, which needed to be completely tagged or had to be checked and corrected. Although it might seem irrelevant to you, this changing was quite important, since it gave us the possibility to do some useful work, concretely contributing to a project with our efforts.

In this period the laboratory acquired its characteristic organisation. The participants, who had been working on text tagging since the workshop, now started to be able to carry out some autonomous work. The work thus started to be collectively organised, based on collaboration. First there was a phase of individual work, which was done both at home and during laboratory sessions at the university. The usual activity for everyone was to completely encode one or more short texts, starting from an already existing file or from the bare traditional edition of the inscription. After that, during the laboratory, all the XML files were collectively observed, in order to find possible errors and gaps.

Doing this checking-work all together enabled us to make up for the absence of a digital supervisor. In fact, even though during the individual tagging work one happened to have many doubts about some passages, they could be usually dispelled with a group confrontation. We also observed that the most recurring errors were usually oversights, not serious mistakes due to a misunderstanding of tagging rules; because of that, the complete check of the text made by the group was usually sufficient to solve greatest part of the problems.

Since most of the work (and all the final checking) was done by people who were physically in the same room, we had no need for particular online platform for the collaborative work. The absence of such a tool was never a problem, because we had based the whole laboratory on a very close collaboration between all participants, which could hardly be achieved through online tools. Usually, every user worked on his own computer and only at the end of the markup the files were grouped and sent to the project managers.

In case of big problems relating to text structure, formal tagging concerns, or doubts we were sometimes forced to rely on the help of Pietro Liuzzo and Ljuba Merlina Bortolani. They, despite not being in Italy, were our digital expert reference. This assistance took place through Skype conversations or chatting, usually at the end of the

working session or immediately after it. Through this long-distance partial collaboration, we were able to solve almost all the difficulties that came out.

Since that time (June 2013), HELLAS continued working on epigraphic texts from Greek Cyrenaica. Work ranged from the complete digitisation of new texts and their inclusion in the catalogue, to the revision and updating of the tagging of already existing files. This type of varied work gave us the possibility to deal with different texts, from short vase fragments to endless official documents (Ptolemaic *prostagmata*, Cyrene civic decrees), and consequently to use a good range of epigraphic tags. In the meanwhile, the laboratory was joined by other two students, who had taken part in the workshop edition of 2011, or had received an informal XML training. This took the total number of participants to seven. The laboratory can surely be defined as a user engagement activity. First of all because we were in fact possible users: as students, researchers, and PhD candidates we were part of the scientific community that could benefit from the digital edition of such a huge number of inscriptions. Our being external to the project, was not only a formal matter. In fact we were not part of the supervision board, neither had we been assigned to some specific work. We had of course a fair degree of independence regarding markup decisions, even though our work had to be approved and we should conform it to the conventions of the project. We may thus say that it was possible for people with relatively little knowledge of markup systems to carry out some work. What can really question considering our laboratory a user engagement activity is the fact that the IGCyr project had not been thought in order to include external contributions; we could start doing that only because, in Bologna History and Cultures Department, we were at close contact with people who had a significant role in the supervision of it.

Given this relevant point for acquired, one should however state that a small changing in the structure of the project (which just saw the entrustment of some work to an independent group) was in the end done, in order to create the conditions for our work. On the basis of what I have said so far, I think we can conclude that the Bologna laboratory has many of the features which distinguish a user engagement based work and it can be treated as an example of this type of activity.

23.2.2. Effects of collaborative work in person on the IGCyr project

I will now talk about the effects of this type of user engagement based markup work. I am in fact convinced that the peculiar structure of the laboratory has affected the way we worked and the training process. In relation to this point, the experience of the long-lasting activity in the permanent laboratory is definitively positive. Although more intensive events, such as a EpiDoc workshop, are necessary to rapidly fill in the gaps of completely new digital users, in the long term period periodically repeating working sessions proved to be very useful. In fact, in the time between the sessions, one has the possibility to assimilate new notions, in case also through home exercises on new and old material.

A crucial aspect of our laboratory, perhaps the most peculiar and the one I should talk most diffusely, is the group way of working. We started working in this way because of a contingent factor: since in the laboratory there was no real expert in digital humanities, collective checking of individual work was the only viable solution: it proved to be an optimal solution. I have already said that the nature itself of most errors in individual working is such as to maximize the utility of another person's check. This is quite obvious in case of oversights and similar small mistakes. However, another frequent problem, especially in a still-not-experienced digital epigraphist involved in markup work, is to find something that you do not actually know how to tag. In this case, as I have been able to experience in person, the real problem is not to correct wrong data, but to find out what type of information you want to insert and how to transmit it through the tagging system.

I shall now consider the HELLAS activity in relation to the feedback our work could give to the organisers of the IGCyr project and the one we received from them. The main type of feedback we could give was in relation to tagging choices. In fact, as most of you probably now, there are many cases (more than one could think) in which a particular piece of information from an epigraphic text can be transmitted through different tags, which are similar but not exactly identical. The choice of the tag to be used will lead to a slightly different interpretation of that particular data.

This is far more relevant in case of encoding of a huge corpus of inscriptions. In this case it is in fact crucial to maintain a high rate of homogeneity and consistency in digital editorial interventions, not only

because in the end you hope to have a perfectly consistent corpus, with every single piece of information expressed in just one way.

Homogeneous tagging is also crucial during the preparatory phase, since it enormously helps correcting and modifying wrong data or points that needed to be changed. In relation to this aspect, the work of the laboratory could give a significant “technical” feedback to the project. The fact of being a group also enabled us to discuss on which solution we thought was preferable, in order to propose it to the project supervision board. In this way, the IGCyr project was provided a quite constant control and given a feedback on its tagging guidelines. Particularly relevant was the checking of inconsistent data. Contradicting contents could sometimes be detected, usually when adding the Italian translation of the text or during the examination of the commentary. We also focused on inconsistent tagging solutions, both relating to specific project choices and to more general ones. The importance of this work of control and revision was stressed by Catherine Dobias-Lalou, the main editor, who appreciated the accuracy of HELLAS.

Since it was set up as a prosecution of a short workshop, HELLAS UniBo has carried on the digitisation of inscriptions from Greek Cyrenaica. This laboratory, despite the scarce external human resources needed, has worked very well in training a small group of students, who have acquired significant experience and knowledge on markup techniques. These very students took part as teaching assistants in the new EAGLE - EpiDoc Workshop, held in Bologna in late May 2014. We were quite confident that this workshop would be the occasion for recruiting new users: four of the participants have in fact already joined the laboratory.

I am thus convinced that the positive experience of the HELLAS UniBo can for many aspects be considered an example of how to create a centre which blends training of new digital users with participation in encoding initiatives.

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24. Latin Epigraphic Poetry Database Project (*Hispania & Galliae*)

Concepción Fernández Martínez, María Limón Belén

Abstract

The main goal of our lecture is to present a new webpage that contains all Latin Verse Inscriptions coming from *Hispania*, between the 1st century B.C. and the 8th century A.D., as the first step of a forthcoming general Database Project about Latin Epigraphic Poetry. This website (www.clehispaniae.com) has been set up by a Spanish research group whose investigation focuses on the metrical inscriptions from *Hispania* which are to be published as the volume XVIII/2 of *CIL* (*Corpus Inscriptionum Latinarum*). Furthermore, in the context of the impending publication of a new issue of *CIL* XVIII (the XVIII/3), we are now working on the second part of this comprehensive project: a new website with Latin Verse Inscriptions originating from *Galliae* (www.clegalliae.com) and whose beginnings we will introduce at the end of this paper.

Keywords

Carmina Latina Epigraphica, metrics, database, *Hispania*, *Galliae*, *CIL* XVIII.

24.1. Introduction: The *CLE Hispaniae* Project

The founder of our project, in a broad sense, is H. Krummrey, the General Coordinator of the *Corpus Inscriptionum Latinarum*. Throughout the 1960s, he became unsatisfied with the previous editions and collections of *Carmina Latina Epigraphica* (*CLE*) arranged by various criteria and launched the proposal of a new classification of *CLE* in a separate volume of the *Corpus Inscriptionum Latinarum* (*CIL*). This volume, the 18th, will be exclusively dedicated to (the) *CLE* and will be organised according to the administrative geography of the Roman Empire (KRUMMREY 1964). Subsequently, some general studies have been published as well as various studies of certain isolated inscriptions from a strictly philological perspective [MARINER 1952, FERNÁNDEZ 1979,

HORSFALL 1985, MASSARO 1992, COURTNEY 1995, CRINITI et al. 1998, CUGUSI 1996 or CUGUSI 2003, and some other scholars].

In 1994, scholars from different Spanish universities, inspired by Krummrey's initiative, focused on this field of research and managed to become integrated and coordinated within the *CIL XVIII* a project in which both of us are currently members. Thus, these scholars endeavored to study the Latin Verse Inscriptions of *Hispania* despite the fact that editing and commenting on the epigraphic poetry of *Hispania* was an ambitious project. Besides offering first-hand critical editions derived from direct observation of the texts in their own medium, the principle objective of *CIL XVIII* was to produce an exhaustive commentary on each of these poetic texts paralleling the same philological criteria with which we might edit and comment upon any other poem of any other author.

For the first time ever, all the *CLE* of *Hispania* have been edited following regular, coordinated guidelines. A further unprecedented feat is that all the texts have been commented on and studied by a multidisciplinary team whose regular meetings have ended up producing complete records for each *CLE* which contain all the relevant data: epigraphic edition, photographs and measurements, a translation, reasoned dating, and linguistic, metrical, literary, stylistic, onomastic and historical commentary.

Since 1994, a research group initially led by J. Gómez Pallarès and since 2005, directed by C. Fernández has systematically worked on the cataloguing, in situ examination, editing and philological analysis of the material that constitutes this mentioned second issue of *CIL XVIII*. In this regard, it must be mentioned that the material has not only been located and studied, but also purged, since some pieces have been removed from the catalogue for two reasons:

- Chronological, that is, when the pieces are medieval or renaissance.
- Metrical, when we have been unable to defend, with arguments acceptable to the scientific community, that we were in fact dealing with some type of recognizable metre. There are 34 of these in all.

All this work has been done within three Research Projects of the Spanish Government.

24.2. Objectives of the project

In 2013, after so many years of hard work, our team, led by professor C. Fernández, concluded its tasks successfully and fulfilled their aims, surpassing even their initial expectations.

Firstly, the material of *Hispania* (editing and analyses of 247 inscriptions) was handed over to the *CIL* center in Berlin for publication. At this moment, a team of researchers led by Dr. Manfred Schmidt (the director of *CIL* XVIII project in the BBAW) is on the brink of carrying out the layout and correction tasks leading up to the publication of the *CIL* XVIII/2.

However, in parallel to the work for *CIL*, the researchers will facilitate the transversal exploitation of the material for its dissemination and internationalization in impact forums. Therefore, the new website, www.clehispaniae.com, has been created as a graphic and textual database which will give the scientific community access to the results in Spanish, English and Latin. The user will be able to make inquiries to the database in any of the three languages and will obtain the result in the language in which the query was formulated.

This new website offers new editions based on a variety of reliable autopsy works and provides philological analyses from a Web 2.0 perspective that is interactive and adaptable to the different needs of the researchers. The first draft of the document was finished in June 2013, however, given the nature of the website, it is periodically updated.

24.3. The *CLE Hispaniae* website: www.clehispaniae.com

This website is a general but complete outline of information about the different elements of each inscription (chronology, layout characteristics, metric form, etc.). It facilitates all kinds of searches of the textual editions and their philological analyses. Most remarkable in these works -for the very first time in the history of *CIL*- is that they are written and available in three languages: Latin, Spanish, and English.

We present three intertwined databases that can be consulted individually or collectively:

24.3.1. Iconic Search

This search is an interactive graphic database that contains a wide range of visual materials (photographs, drawings, tracings and digitized manuscripts). The information provided is schematic but absolutely comprehensive. This database allows the researcher to make

simple or combined searches of all the characteristics of each inscription (medium type, chronology, layout features, metrical form, graphic symbols, etc.).

We call this first type of search the iconic search or “Search based on the physical characteristics of the inscriptions, in their context”.

Search for an Inscription English ▾

▾ Search by physical characteristics of inscriptions, in context

Code [?]	<input type="text"/>	Reference	<input type="text"/>
Preserved	<input type="text"/>	Morphology of medium	<input type="text"/>
Type of letter	<input type="text"/>	Type of verse	<input type="text"/>
Interpunction sign	<input type="text"/>	Iconographic elements	<input type="text"/>
Verseline corresp.	<input type="text"/>	Word partition	<input type="text"/>
Prose/Verse distinction	<input type="text"/>	Chronology	<input type="text"/>
Century	<input type="text"/>		

▸ Search by Latin text

▸ Search by Latin text and commentary

CIL XVIII/2 Editing team 

Fig. 24.1. Iconic Search

The iconic search form allows you to select different enquiry criteria:

Code: the word code makes reference to the proper enumeration of the inscriptions in this website.

Preserved: indicates if the inscription is preserved or not. In the affirmative case, it also indicates in what degree of preservation the inscription is.

Type of letter: type of letter used in the inscription.

Interpunction mark: indicates if the inscription has or does not have interpunction marks and, in the affirmative case, what type of marks.

Correspondence Verse / Line: indicates, in the inscription, if each verse corresponds with a line or not.

Distinction Prose / Verse: indicates, in the inscription, if there is any distinction between prose and verse.

Century: establishes the century to which the inscription is assigned: from I B.C. to IX A.D.

Reference: allows for the search of an inscription referred to in any of the existent inscriptions (*CIL* II, *IHC*, *CLE*, etc.). It also allows the indication of the booking reference of the inscription in the aforesaid collection.

Morphology: indicates the morphology of the stone of the inscription: Plaque, Stella, Block, Altar, etc.

Type of verse: indicates the type of verse of the inscription: Dactylic, Trochaic, Iambic, etc.

Iconographic Elements: indicates if the inscription has or does not have iconographic elements, and, in the affirmative case, allows a free search of the type of iconographic element.

Partition of words: indicates if, in the inscription, there are or are not any partitions of words.

Chronology: allows for specification of the information given by “Century” by establishing if it is at the beginning, middle or the end of the century.

Once the search has been carried out, a page will show the results in chronological order. In this page, the user will be able to view the first six results of the search. In the lower part of the page, as much as in the upper part of the page, there is a control that allows the user to gain access to the rest of results.

If you click on whichever image of the consequent findings, it will take you to the iconic card of the inscription. In this card, a bigger image of the inscription will appear and, in addition, the user will also be shown the different data obtained from the physical characteristics of the inscriptions in their context. You can click on any of these bigger images in order to see them in full size.

In the above right corner of the iconic card, you will find three buttons that will allow you to view the commentary of the inscription in Spanish, English and Latin respectively.

You can begin a fresh search by clicking the next link: “New Search”, situated upper left of the card.

Inscriptions English ▾

New Search

Inscriptions: 1 - 6 de 77 1 2 3 4 5 6 7 8 9 10 >> >>>

CO1 	CO3 	J17 
J18 	CO20 	CO11 

Inscriptions: 1 - 6 de 77 1 2 3 4 5 6 7 8 9 10 >> >>>

CIL XVIII/2 Editing team 

Fig. 24.2. Result page

Image: CO1 English ▾

New Search [Edit](#)

 Comentario  Commentary  Commentarius

	<p>Reference:</p> <ul style="list-style-type: none"> • CLEB: CO12 • CIL II5: 372 • CLE: 1474 <p>Conservation: Eroionado.</p> <p>Morphology of medium: Block.</p> <p>Material: Caliza</p> <p>Type of letter: Square capitals.</p> <p>Types of verse: Dactylical (elegiac couplet). <i>De la línea 3 a la 5</i></p> <p>Type of sign: Triángulos (vert. Arriba). <i>(Final palabra)</i></p> <p>Iconographic elements: Sin elementos iconográficos</p> <p>Verse/line corresp.: No.</p> <p>Word partition: No.</p> <p>Prose/Verse distinction: Tamaño Letra: praescriptum 5,5; 3 cm / carmen 2 cm Distintos campos epigr.: No es seguro. Hendidura vertical de 11cm. por la izda. que sólo alcanza al praescriptum.</p> <p>Vacat: No.</p> <p>Chronology: Early century I b.C.</p>
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Fig. 24.3. Full Size

24.3.2. Textual Searches

The second database provides textual searches, which are also simple or complex, through our epigraphic editions of Latin texts.

Furthermore, the third database allows the user to search through the text of our schedae; not only the Latin text edition but also its full philological analysis.

In performing both types of search, it is necessary to include, at least, which text will be searched: either the text of the inscription (in the first case) or the commentary of the inscription (second case). When doing a search based on the commentary, it is also necessary to indicate in what language the search will be done.

These searches also permit you to establish an additional criterion: the conventus to which the inscription belongs.

Fig. 24.4. Refine Criteria

Once the search has been effectuated, a page with the results from the textual search will appear. In this subsequent page, the user will be able to see the first five results of the search. In the bottom part of the page, there is a control that will permit the researcher access to the rest of results.

If you click on any image of the search result, or also on the link “Image”, you shall gain access to the iconic card of the inscription. Once in the iconic card, the image of the inscription will appear enlarged with different data obtained from the physical characteristics of the inscriptions, in their context.

Imagen	Descripción
 B2	: regnas hic s(an)c(tu)s semper sedito hic abitator adesto Comentario Commentary Commentarius Ficha de Imagen Conventus Tarraconensis
 C.O.4	: Rosia hic sttll Comentario Commentary Commentarius Ficha de Imagen Conventus Cordubensis
 C.O.4	: Barnaeus hic sttll Comentario Commentary Commentarius Ficha de Imagen Conventus Cordubensis
 SF28	: Xp(ist) hic promptos animos subde bonis studiis hic timor hic doctrina datur hic corda doce(n)tur hic uiget inde bonu(m) hic ruit inde malum carne, cruore, pio linfaque et crismate sacro Comentario Commentary Commentarius Ficha de Imagen Conventus Hispalensis
 BRA.1	: Q(uintus) ego hic iaceo mecum simul Quinticus h(ic) s(fus) e(st) qui pius opsequio patri felixque in amicis Comentario Commentary Commentarius Ficha de Imagen Conventus Bracaraugustanus

(1 of 17) [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [5]

Fig. 24.5. Other results

If you click on any of the three links “Comentario | Commentary | Commentarius” that are shown in each inscription, you will gain access to the philological commentary in Spanish, English or Latin respectively.

24.3.3. Operators in textual searches

When doing a textual search, you can use operators in the text field. These operators will allow you to polish or broaden the search:

- *quod*: searches inscriptions containing the word *quod*.
- *quod AND parenti*: searches inscriptions containing *quod* and *parenti*.
- *quod OR parenti*: searches inscriptions containing the word *quod* or the word *parenti* (or both).
- *parenti AND NOT quod*: those inscriptions containing the word *parenti* but not *quod*
- *parenti^4 quod*: those inscriptions containing *parenti* or containing *quod*, but showing first the ones that contain *parenti* (degree of importance 4).
- “*quod est*”: those inscriptions containing *quod* and *est* showing up together.

24.4. 4. Impending Project: the *CLE Galliae*

The studies developed about the epigraphic poetry of *Hispania* and its dissemination and international transference have awarded us leadership on an international level in this research field. Currently, there is no other team in Spain working on this kind of research. The XVIII/2 volume, as previously mentioned, focuses on verse epigraphy from a strictly philological approach: the type of philological analyses we apply to these texts and the objective of this work which exclusively emphasizes metric epigraphs go beyond the epigraphic character of the texts and focus, most of all, on their indisputable literary dimension.

Taking this previous experience as a starting point, our team is now undertaking the study, edition, and commentary of the *CLE* from Gaul. As the *Hispania* precedent, this new project is also coordinated by the *CIL* center in Berlin, and will constitute a part of the future *CIL* XVIII/3 volume.

The new team *CIL* XVIII/3 has been upgraded with the incorporation of new researchers—some of which are French—. France is scarcely represented in international research about Latin Epigraphic Poetry, and its *CLE* have barely been systematically studied, being the Bücheler-Lommatzsch collection (1895–1926) the only reference. Since then, there have been new findings, new readings and interpretations, all of which are isolated and difficult to access for researchers. This new project will fill a necessary gap in this international research area.

The project has an important point of departure in the PhD defended by Hervé Belloc at the University of Caen, under the supervision of Dr. Philippe Moreau (both members of our current research team). The title of the PhD was *Les Carmina Latina epigraphica des Gaules: édition, traduction, étude littéraire*. The work carried out by Belloc gave us documentary and bibliographic data, accurate information on the geographical and chronological distribution of the Gaul around 300 *CLE*, and the editing and philological commentary of a good number of these inscriptions, those coming from Aquitania and the Narbonense Gaul.

In parallel to the work for the future *CIL* XVIII/3 and following the model of the results obtained for *Hispania*, a new website will be created giving the scientific community access to the results in Spanish, French and Latin (www.clegalliae.com). Similar to the case of *Hispania*, the user will be able to make inquiries to the database in any of the three

languages and will obtain the result in the language in which the query was formulated (replacing this time English with French).

Our goal is to continue using the methodologies already experimented with in the research about *Hispania*, and to benefit from the international relationships and synergies established between the research group and other European researchers that work on *CLE*.

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25. Paleographic Analysis of the Stone Monuments of Aquincum, Pannonia

Nándor Agócs; István Gergő Farkas; Ádám Szabó, Ernő Szabó

Abstract

Probably the most frequently asked question regarding Roman epigraphical sources is: when were they set up? The majority of inscriptions lacks chronological indications thus their dating is based on form, ornamental features or constitution of letters. The general idea behind paleography is, that it established alphabets specific to different eras, thus enabling a precision in dating otherwise unavaivable. The scope of the project is to analyse the entire epigraphical material of Aquincum and specify the dating of its loosely dated epigraphical material.

Keywords

Latin epigraphy, paleography, digitalization, letter constitution, Pannonia

25.1. Introduction

One of the most frequently asked questions regarding epigraphical sources is the time of their setup. The inscriptions themselves provide chronological guidelines only in a low percentage of monuments. In optimal cases the procurer dated the inscription with the names of the acting consuls, sometimes to the precision of month and day. Elements of Imperial titlature and titles of magistrates identified by prosopographical science offer an interval for the setup date. However, in most cases, elaboration of form, the style of ornaments and the general "theme" of the monument – all of which are vague and difficult to quantificate – are the basis for dating, which allows a precision of half a century at best, but in some cases, even less. Establishing a more precise chronology and thus acquiring further information has largely increased the attention of researchers of this area.

One of the most frequent practices for dating those monuments, whose inscription lacks any chronological indication, is dating by the form of letters (*tractatio*) and their elaboration (*ductus*). Insofar no summary of the types of letters used in Pannonia in different eras have been published.

Previous paleographical research set out from the presumption that the same types of letters were used, applying the same manner of elaboration in distinct intervals. E. Hübner was the first who published a paleographical analysis of latin inscriptions in 1885 [HÜBNER 1885]. He reviewed and compared monumental letters of different epochs and published his findings in tabular form. R. Cagnat utilized E. Hübner's results in his famous coursebook on epigraphy, which ran into numerous editions [CAGNAT 1964]. Throughout the course of the 20th century, several researchers of Latin epigraphy have published books employing partially or completely E. Hübner's tables.

Selected instances include Á. Buday from Kolozsvár (Cluj-Napoca) [BUDAY 1914], Sir. J. E. Sandys from Cambridge [SANDYS 1919], P. Battle Huguet from Barcelona [BATTLE HUGUET 1946] and E. Meyer from Zurich [MEYER 1973]. In 1989 J. Muess published an extensive analysis on the form and style of letters used throughout the Roman Empire [MUESS 1989]. His work was the first that made not only the outline of letters but their interior elaboration a subject of study as well, and as such, hallmarked a next great leap in the field of paleography.

Regarding the national theatre of research, the fabled archaeologist-epigraphist of Kolozsvár, Á. Buday was the first to apply the term 'paleography' in his coursebook titled 'Római felirattan' (Roman Epigraphy) published in 1914. For most part, Á. Buday relied on translating R. Cagnat's *opus*, although his work is even nowadays considered the basis for Modern lecture notes [TÓTH et al. 1999; Kovács et al. 2011] (Fig. 25.1).

The results of the work carried out by E. Hübner reverberate in the latest companions to Latin epigraphy as well as coursebooks and guides. The practice of dating based on *ductus* and form is widespread in epigraphical publications and articles, although this method is yet to be proven via objective, scientifically proved facts. Due to lack of recent paleographical research, new publications were limited to already available results, thus most of the recent works republish Hübner's essential, yet outworn conception. However the use of an Empire-wide analysis is contra-indicated by the fact that letter types vary from

<p><small>Antiké írásforma egyszerűen</small></p> <p>ABCDEFGHIJKLMNQRSTV</p> <p><small>Antiké írásforma elegáns</small></p> <p>ABCDEFGHIJKLMNQRSTVX</p>	
HÜBNER 1885, t. LXXXI.	referred source: -
<p><small>Époque de Septime Sévère.</small></p> <p>ABCDEFGHIJKLMNQRSTVX</p>	
CAGNAT 1898, t. I.	referred source: HÜBNER, E
<p>ABCDEFGHIIL MNOPQRSTV</p> <p><small>Époque de Septime Sévère</small></p> <p>ABCDEFGHIIL MNOPQRSTVX</p> <p><small>Époque de Septime Sévère</small></p>	
BUDAY 1914, 33.	referred source: HÜBNER, E
<p>ABCDEFGHIJKLMNQRSTVX</p> <p><small>Capital construido elegáns del tiempo de los Severos</small></p>	
BATLLE HUGUET 1963, 115.	referred source: HÜBNER, E
<p>ABCDEFGHIJKLMNQRSTVX</p>	
MEYER 1973, 39.	referred source: -
<p>ABCDEFGHIIL MNOPQRSTV</p> <p>ABCDEFGHIIL MNOPQRSTVX</p> <p><small>Époque de Septime Sévère</small></p>	
TÓTH – SZABÓ 1999, 155.	referred source: BUDAY, Á
<p>ABCDEFGHIIL MNOPQRSTV</p> <p><small>Époque de Septime Sévère</small></p> <p>ABCDEFGHIIL MNOPQRSTVX</p> <p><small>Époque de Septime Sévère</small></p>	
NÉMETH – KOVÁCS 2011, 55.	referred source: BUDAY, Á
<p>ABCDEFGHIILMNOPQRSTV TitAq 267</p> <p>ABCDEFGHIILMNORSTV TitAq 70</p> <p>HE ME N T E R</p>	
Tracery of two inscriptions from the epoch of Emperor Caracalla, drawn within the framework of the present project	

Fig. 25.1. Roman letter constitutions used during Emperor Caracalla’s reign in various paleographical publications

province to province or even from one workshop to the other (Fig. 25.7). Furthermore, nor E. Hübner, nor succeeding generation of academics have taken into account the ligatures, which relay the same amount of information as the single letters.

25.2. Methodology

A series of digital photographs were taken from the epigraphical monuments of Aquincum, that were revised. The most suitable photo was aligned with Adobe Photoshop CS6 (2013:04) and the occasional trapezoid distortion was eliminated. Afterwards the aligned photo was imported in CorelDraw and the outlines and interior of letters were drawn individually by hand (Fig. 25.2).

For the purpose of the present paleographical project, high resolution photographs taken by O. Harl and by the authors themselves at grazing lights were used. For specifying details and clearing doubtful sections, the epigraphical monuments serving as subject material were revisited and reexamined personally several times (Fig.25.2). However the photographical material at disposal is still insufficient for the full precision prerequisites by this project. The key element for the digitalization of letters is sufficient resolution. Our experiences indicate that considering the size of the inscription field, the minimal requirements for photos suitable for paleographic research should be of ISO 6400 sensitivity, taken from a stabilized trestle set 1.00 – 2.50 m from the vertical surface, without flash, using grazing lighting from one side. The second key aspect was providing sufficient hard disk space. Photos taken with above-mentioned settings extend to a size of approx. 30-35 MB. Although the use of photos with the highest possible resolution would enable more precise digitalization, the ca. 100 MB structural limit of the Corel X7 counter-indicates using photos with higher settings. General guidelines were established for a unified drawing of letters (Fig. 25.6).

25.3. The process of the project

This project aims to conduct a paleographical survey of the epigraphical material of Aquincum, which was not only one of the most significant settlements of Pannonia, but also the most well-examined and well-known municipalities in both national and international standards [ALFÖLDI et al. 1942, NAGY 1973, pp. 83-185, PÓCZY 2004, ZSIDI 2004b,

pp. 167-226, ZSIDI 2004a, pp. 209-230]. Epigraphical sources discovered on the territory of the city make up for a sixth of the epigraphical material of entire Pannonia. The editors of *Tituli Aquincenses*, created in preparation for the forthcoming edition of the *Corpus Inscriptionum Latinarum* have collected a total of 1.022 Latin epigraphical monuments.

A significant amount of inscriptions (877 pc. – 86 %) lacks precise dating and in most cases can be attributed to the interval of a century. A mere 14% (145 pc) of the inscriptions from Aquincum contain chronological data (Tab. 25.1). Currently 84 inscriptions have consular dating, although on 6 inscriptions the term '*co(n)s(ules)*' survived, the names did not, therefore their dating is hindered.¹ Several inscriptions have been lost during the turmoils of the 20th century. Known only from description, drawing or photographs, these inscriptions are excluded from paleographical surveys but are included in statistics.² Currently there are 71 inscriptions known from Aquincum that are dateable to the length of a single year (or in some cases, even to month or day). These inscriptions make up for 7 % of the local epigraphical material (Fig. 25.3). The next in the line of precision are inscriptions that display the names of Pannonian governors (*leg. Aug. pr. pr. later praeses*) and are dateable to the interval of several years.³ Currently 25 inscriptions of Aquincum are dated thus. The dating of inscriptions displaying Imperial titlature can vary from a single year (*trib. pot.*) to the interval of several years (*consul*) or decades (*gentilicia, cognomina, cognomen devictarum gentium* etc.) [KIENAST 2011]. In most cases however, only the Imperial gentilicum and/or cognomen is displayed, thus most of these inscriptions can only be dated to longer intervals. There are fragmented inscriptions, on which only Imperial terms survived – '*imp(erator-)*', '*caes(ar-)*', '*Aug(ust-)*' – not the name itself and thus these instances are dateable only based on other elements of the text or other aspects.

¹ Tit. Aq. 11: carved onto the frame: '[---]ter e[t] se mel c[o(n)s(ulibus)]'; Tit. Aq. 30: on the frame: '[---] V Kal[en(das)] Octob(res) posuit'; Tit. Aq. 126: 'V Kal(endas) Aug(ustas) | [[[Imp(eratore) --- et ---]]] | [--- co(n)s(ulibus)]'; Tit. Aq. 269: '[V?] Kal(endas) Iulias [--- co(n)s(ulibus)?]'; Tit. Aq. 477: '[-----] | co(n)s(ulibus)'; Tit. Aq. 479b: '[---]o col(n)s(ulibus)']'.

² Tit. Aq. 8, 9, 285, 313, 372, 464.

³ B. Lőrincz summarized the offices of Pannonian governors most recently: Kovács et al. 2003, pp. 197-199; Kovács 2006, pp. 317-318; Kovács 2007, pp. 183-186; Kovács 2008, pp. 191-192.



Fig. 25.2. Drawing method applied within the framework of the project

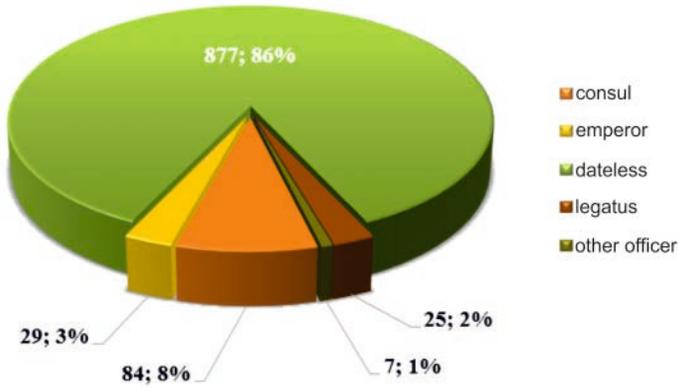


Fig. 25.3. The division of Aquincum's epigraphical material based on dating

Distribution of inscriptions based on carrier

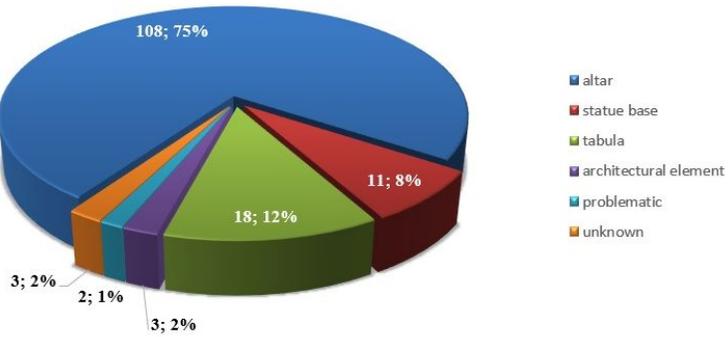


Fig. 25.4. The division of Aquincum's epigraphical material based on carrier

Apart from these cases, terms related to prosopography, onomastics, general- and military history (dislocation) all might serve as a chronological basis. The *cursi of conductores*,⁴ *pontifices*,⁵ *praesides*⁶ and *praefecti*⁷ also provide pivots for dating. However, such cases are rather rare and make up for only 1 % of the local epigraphical material.⁸ (Fig. 25.3). Examining the epigraphical material of Aquincum, one can conclude that only a fifth of the total of inscriptions (20 %) is dateable to a precision of 10 years or better. Half of these inscriptions enables dating to a single year (10 %).

The distribution of Aquincum's inscriptions based on the carrier shows the following results (Fig. 25.4). A definite 75 % of the inscriptions (108 pc.) were carved onto altars of the classical form (*ara*). The next highest ratio, 12,5 % (18 pc.) included slabs (*tabula*) for buildings and statues, i. e. constructional and honorific inscriptions. A mere 8% (11 pc.) of inscriptions were carved directly onto bases of statues. 2% (3 pc.) of inscriptions were carved onto architectural elements.⁹ Due to fragmentation, in 2 % (3 pc.) of the cases it is no longer possible to identify the carrier. It was contrary to the nature of sepulchral inscriptions to establish an absolute dating, thus for most part only a few peculiar epitaphs are included in the project.

⁴ Tit. Aq. 359: '*con|ductor ex decr(eto) ordin(is) | <c>{k}(anabarum) secund(um) conduct(ionem)*'.

⁵ Tit. Aq. 23: '*Suetrius Sabinus | [iudex ex delegat(u)] | [cognition(um) sacrar(um)] | [Caesarianar(um) cum] | suis [---] | devot[issimus] | maiesta[t]i eius | consul pontifex | augur*'.

⁶ Tit. Aq. 44: '*L(ucius) Flavius | Aper v(ir) p(erfectissimus) | praeses*'; Tit. Aq. 168: '*T(itus) Clementius | Siloivus v(ir) e(gregius) | a(gens) v(ice) p(raesidis)*'.

⁷ Tit. Aq. 289: '*col | leg(ae) Augustal(es) impen | di(i)s suis fecerunt prae | fect(o) C(aio) Iul(io) Crescente*'.

⁸ Tit. Aq. 31: '*Q(uinto) Fufici | o Cornu | to co(n)s(ule) de(signato)*'; Tit. Aq. 37: '*Silvano | Domitius | Victorinus | 7 (centurio) leg(ionis) IIII Fl(aviae)*'; Tit. Aq. 38: '*M(arcus) Caec(ilius) Rufinus | Marianus | tr(ibunus) lat(iclavius) leg(ionis) IV F(laviae)*'; Tit. Aq. 74: '*C(aius) Oppius | Ingenu(us) | trib(unus) milit(um) | leg(ionis) II adiut(ricis) p(iae) f(idelis) Sever[i](anae)*'; Tit. Aq. 203: '*M(arci) Minic[i] Martialis | [e(quo)] | p(ublico)*'; Tit. Aq. 289: '*prae | fect(o) C(aio) Iul(io) Crescente*'; Tit. Aq. 359: '*con | ductor ex decr(eto) ordin(is) | <c>{k}(anabarum) secund(um) conduct(ionem)*'; uncertain: Tit. Aq. 15: '*[---] m]p(eratori) Caesari [---]*'; Tit. Aq. 23: '*consul pontifex | augur*'

⁹ *column*: Tit. Aq. 385; *epistylum*: Tit. Aq. 441, 937.

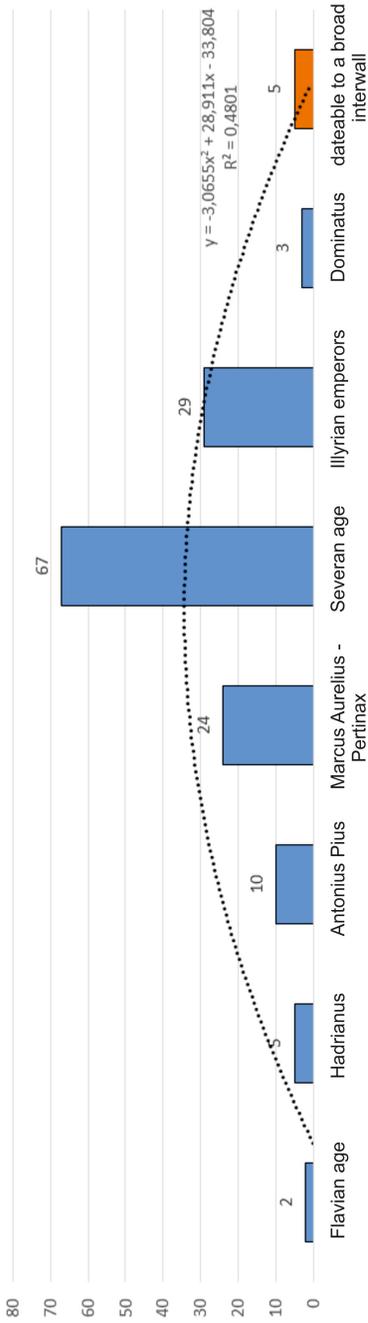


Fig. 25.5. The chronological division of Aquincum's epigraphical material

Considering the distribution based on the type of carrier, the dateable inscriptions show the same pattern as those without precise dating. The style of lettering was greatly effected by the size of the carrier as well as the length, language and function of the text. The length of the text affects the width of letters, thus the width-height ratio is not constant in inscriptions of the same era (Fig. 25.4-25.5). The temporal distribution of dateable epigraphical finds corresponds to history of Aquincum (Fig. 25.5). The earliest inscriptions were carved during the reign of the Flavian-dynasty and were all military-related. The grant of municipal rank during Emperor Hadrian's reign was followed by signs of increasing urbanization, including a distinct rise in the number of inscriptions set up. In the course of the 2nd century, throughout the reign of Emperors Antoninus Pius and Marcus Aurelius, the quantity of epigraphical materials continued to increase and reached its summit during the Severan-era (193-235). Almost half of the total of dateable inscriptions from Aquincum was set up during this forty years, as a sign of prosperity attested throughout Pannonia. Afterwards the epigraphical habit shows a decline in Pannonia as well as in the rest of Roman Empire. The quantity of inscriptions set up during the second half of the 3rd century and the first half of the 4th is the same level as that of the 1st century (Fig. 25.5).

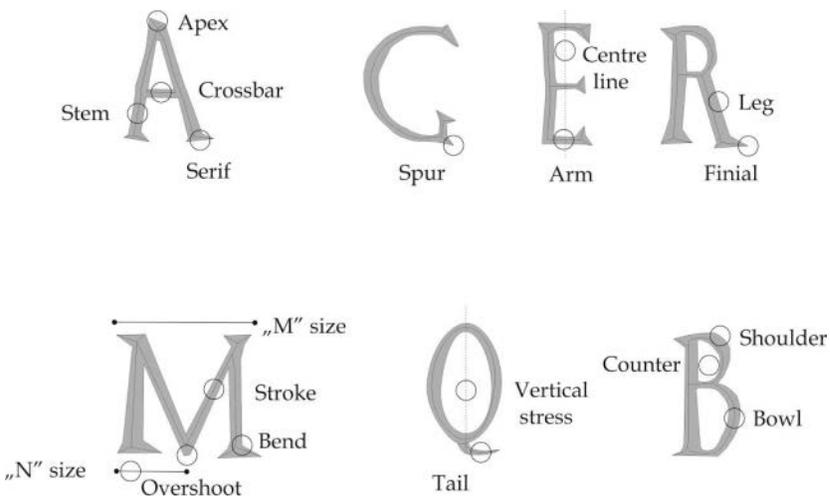


Fig. 25.6. The project's applied terminology

Previously, researchers of paleography generally accepted the hypothesis that letter forms and styles characteristic to distinct epochs are distinguished by differences in details (Fig. 25.6). For spatial reasons, this current paper cannot cover each and every epoch and phenomenon, thus the authors have concentrated on presenting a few of the results and solutions in the current state of processing. Currently two building inscriptions are known from the Flavian-era.¹⁰ Both have monumental letters of 7-8 cm height, which are below the 10 cm average, yet surpass both the size and the level of execution of the letters of altars. The letters of both inscriptions have a definite and elegant *ductus*, letters consistently have slight finials, bends are oval rather than angular. Oval letters (in the present case 'C', 'O' and 'R') are wider than others. The leg of the letter 'R' slightly curves in its lower third and always reaches out below the bowl. The width of hatches is constant.

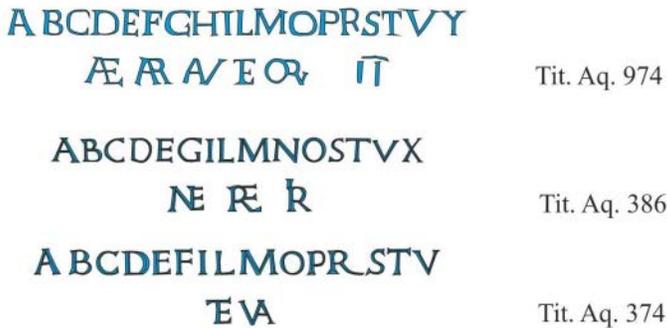


Fig. 25.7. Alphabets of inscriptions set up in Aquincum in AD 228

Four fragmented altars are dateable to the reign of Emperor Hadrian, two of which were dedicated to L. Cornelius Latinianus and thus dateable to the years AD 119/121.¹¹ These four instances are an excellent example to demonstrate the problematic nature of the paleographical hypotheses established and accepted by previous research. According

¹⁰ Tit. Aq. 1, 2.

¹¹ Tit. Aq. 148: 'I(ovi) O(ptimo) M(aximo) | ob salute(m) | Hadrianis | Augusti v(ici) X | pu(blice) po(suerunt)'; Tit. Aq. 149: 'I(ovi) O(ptimo) M(aximo) | pro salute | L(uci) Corneli | Latiniani | leg(ati) Aug(usti) | pro pr(aetore) | Imbrasus | lib(ertus) v(otum) s(olvit) l(ibens) m(erito)'; Tit. Aq. 407: '[-----] | L(ucius) Col[ne]llius Lati[nianus] | leg(atus) Aug(usti) pr(o) | pr(aetore) v(otum) s(olvit) l(ibens) m(erito)'; Tit. Aq. 944: '[-----] | [L(ucius) Attius | Macro | leg(atus) Aug(usti) | pr(o) pr(aetore) | co(n)s(ul) desig(natus)']'.

to E. Hübner's system, letters carved in the same era in the same locality should be similar if not identical, yet these four inscriptions can be divided into two groups instead of one. The honorific inscriptions commemorating *legatus* Latinianus display a similar *ductus*, despite that the spacing between the letters differs in the inscriptions. For effective use of space, on lengthier inscriptions the *lapicidae* tended not only to decrease the distance between letters, but carve letters narrower as well. The bowl of the letter 'P'-s does not connect horizontally to the stem but at a slight angle. The letter 'R'-s differ in the distance between the leg and the stem. The central arm of letter 'E'-s springs from either the exact middle of the stem, or from above. The other two altars differ from these honorific inscriptions which may be due to the fact that they were set up during the latter years of Emperor Hadrian's reign.

25.4. Conclusion

It is not unparalleled that several inscriptions are known from the same year, e. g. from AD 228 (Fig. 25.6). However, contrary to previous hypotheses, these inscriptions do not necessarily share the same letter styles and differ as much as they share common features. The preliminary results indicate that paleographical research offers tendencies on a local level rather than assumptions of universal validity. It is certain that the different execution of letters is not only the result of changes in fashion but of the different levels of professional stonecutters. The *ductus* of letters is affected both by the length of the inscription and the type of the carrier.

Despite the above-mentioned limits, the possibility of dating based on quantified and qualified paleographical observations is not to be dismissed, as there are characteristic letter styles that are typical of well-distinguishable epochs. In a similar manner, legated letters (*nexi*) are also chronological indicators: they appeared in Aquincum in the second half of Emperor Antoninus Pius' reign, spread under Emperor Marcus Aurelius' rule and ultimately their use reached its peak under the era of the Severan-dynasty.

An ongoing task of research is to discover further temporal characteristics within the epigraphical material of Aquincum, establish a chronology for different styles of alphabets used throughout its Roman period and finally, confer the results of the present project with the epigraphical material of other Roman settlements in Pannonia and the Empire.

25.5. The future of paleographical research in Pannonia

Within the framework of the present project the complete paleographical survey of Roman stone monuments from Aquincum and its territory with inscriptions in Latin is intended. The work completed up to date enabled an objective evaluation of our achievements so far and the tasks yet to be done: on one hand, the previous state of research (the lower than sufficient quality of photographs available) enabled only limited results. On the other hand, we applied an experimental methodology of digitalization applying solely graphical enhancements and replication. Our methods can – and should – be refined by applying a more grounded double system for digitalization: regarding each letter two distinct set of lines (in Corel: curves) should be provided: one documenting the current state of letters and a second set which would restore the original outlines and inner lines of each letter. A digital pen would also enable more precise digitalization. So far we had been using graphical software for digitalization, however a 3D laserscan based polygon modelling of letters may prove more efficient.

A	B	C	D
1	73	table	consul
2	89 / 92	table	Imperial
3	145 / 161	table	Imperial
4	193 / 217	table	Imperial
5	223 / 235	table	Imperial
6	201	table	consul
8	216	n/a	consul
9	228	altar	consul
11	251 (?)	n/a	consul
12	268	altar	consul
13	292	table	Imperial
15	100 / 300	table	Imperial
19	208 / 211	altar	Imperial
20	208 / 211	base	Imperial
21	208 / 211	base	legatus
22	208 / 211	base	Imperial
23	213 / 214	base	Imperial
24	238 / 244	base	Imperial
25	251	base	Imperial

– continued on next page

Table 25.1 – continued from previous page

A	B	C	D
26	268 / 270	base	Imperial
30	150 / 200	table	consul
31	146 / 147	altar	consul
37	162 / 166	altar	legio
38	162 / 166	altar	legio
40	190	altar	consul
43	157 / 161	altar	legatus
44	268 / 270	altar	praeses
48	240	altar	consul
54	193	altar	consul
56	188 / 192	altar	legatus
57	252 / 253	altar	legatus
59	188 / 192	altar	legatus
67	267	altar	consul
69	215 / 217	altar	legatus
70	216	table	consul
71b	287	altar	consul
90	197/209 or 205/208	table	consul
91	157 / 161	table	legatus
92	164 / 167	altar	legatus
94	284 / 304	altar	Imperial
97	218	altar	consul
112	193 / 217	altar	Imperial
113	241	altar	consul
115	236	altar	consul
117	211	altar	consul
126	after 194	altar	consul
129	189	altar	consul
132	235	altar	consul
141	157 / 161	altar	consul
148	117 / 138	altar	consul
149	119 / 121	altar	legatus
151	211 / 217	altar	Imperial
165	270 or 272 / 275	altar	consul
167	161 / 164	altar	legatus
168	267/268	altar	praeses

– continued on next page

Table 25.1 – continued from previous page

A	B	C	D
170	231	altar	consul
174	210	altar	consul
175	243	altar	consul
178	238	altar	consul
179	161	altar	consul
183	153 / 157	altar	legatus
189	185 / 188	altar	legatus
190	219	altar	consul
195	179/183	altar	Imperial
197	164	altar	consul
203	100 / 300	table	Imperial
206	230	altar	consul
211b	283 / 284	altar	Imperial
215	247	altar	Imperial
218	161 / 164	altar	legatus
219	212 / 217	altar	Imperial
225	188 / 192	altar	legatus
226	240	altar	consul
235	223	altar	consul
238	198	altar	consul
259	161 / 164	altar	legatus
260	208 / 212	altar	legatus
263	191	altar	consul
267	214	table	consul
268	259	table	consul
269	250/260 (?)	altar	consul
271	162	altar	consul
275	226 or 229	altar	consul
285	219	altar	consul
288	157 / 161	altar	legatus
289	138	base or altar	praefectus
313	189	altar	consul
332	237	altar	consul
341	218	altar	consul
356	218 / 222	altar	Imperial
359	200 / 250	table	conductor

– continued on next page

Table 25.1 – continued from previous page

A	B	C	D
365	200 / 250	base	Imperial
368	185 / 188	altar	legatus
369	263 / 267	altar	Imperial
372	219	altar	consul
373	237	altar	consul
374	228	altar	consul
375	305 / 307	altar	Imperial
377	156	table	consul
378	229	table	consul
379	214	altar	consul
380	230	altar	consul
382	223	altar	consul
383	226 / 229	altar	consul
384	229	altar	consul
385	220	column	consul
386	228	altar	consul
387	228	base	consul
392	234	altar	consul
394	163 / 166	altar or table	legatus
397	193 / 211	base	Imperial
399	225	altar	consul
403	229	altar	consul
404	207	altar	consul
407	119 / 121	altar	legatus
408	222 / 224	altar	consul
409	200	altar	consul
412	279	altar	consul
413	231	altar	consul
419	205 or 208	altar	consul
424	197	altar	consul
425	175	altar	consul
426	223	altar	consul
430	231	base	consul
440	235	altar	consul
441	161/180 or 196/209	epistylum	legatus
462	228	altar	consul

– continued on next page

Table 25.1 – continued from previous page

A	B	C	D
463	238	altar	consul
464	238	altar	consul
465	157 / 161	altar	legatus
477	100 / 300	altar	consul
494	220	altar	consul
899	188 / 191	altar	legatus
900	184 or 197 or 223	altar	consul
920	228	altar	consul
926	229	altar	consul
935	185	altar	consul
936	161 / 164	altar or table	legatus
937	196 / 209	epistylum	Imperial
944	130 / 133	altar	legatus
974	228	altar	consul
976	222 / 235	altar	Imperial
1000	193 / 211	altar	Imperial
1004	193 / 211	altar	Imperial
479b	100 / 300	altar	consul

Tab. 25.1. Inscriptions from Aquincum with precise dating

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26. Low-cost Structure from Motion Technology

An open approach for epigraphical digital reconstruction

Daniele Mittica, Michele Pellegrino, Anita Rocco

Abstract

In this paper we want to explain the possibility to obtain a fully 3D documentation of inscriptions with the Structure from Motion technology.

One of the best advantages of using this application, which is based on the dense stereo matching technique, is the possibility to create 3D model with low-cost hardware (digital camera and a personal computer), and web-based solutions (ARC3D or Autodesk 123D Catch or Open Source software (PPT - Python Photogrammetry Toolbox), and share them for archaeological and research purposes.

Keywords

Computer Vision, Structure from Motion, 3D models, Open Source Software, 3D documentation, digital epigraphy.

26.1. Introduction

The digital technology applied to the field of Cultural Heritage is becoming increasingly common and powerful, providing at the same time useful tools for data collection, analysis and for the simple visualization. The development of instruments and applications able to create photorealistic 3D models of objects, or architectures, archaeological sites, artworks, even entire landscapes, is now an established practice.

The use of 3D reconstruction is also useful for the complete documentation of the epigraphic finds. The traditional methods used for the relief of inscriptions (line drawing, photo, mold, frottage), even when they bring to good results, have a number of limitations related to:

- the shape of the support, which may have a curved or irregular surface;

- the state of conservation, especially for those inscriptions exposed to weathering and then corroded or covered by patinas and encrustations;
- the impossibility to adapt the exposure of the object to a proper light possibly grazing, which otherwise could help in viewing all the details;
- the subjective interpretation carried out by the performer of the relief (drawing);
- the risk to damage an object particularly impaired, leaving evident signs or spots (frottage and mold);
- long time of preparation and/or execution (drawing; squeeze).

All two-dimensional solutions applied on three-dimensional objects as most of inscriptions, do not also allow to detect the strokes which are present on an inscriptions engraved on stone. On the contrary, if we are able to obtain a three-dimensional documentation, we can gain more complex and interesting informations, about the technique or the instruments used for carving inscriptions. A clear three-dimensional representation of the carved lines also helps to discern any other stroke related to irregularities in the surface of the support.

The advantages of three-dimensional reproduction are multiple:

- the ability to virtually measure, rotate, zoom or illuminate the object, thus replicating all possible points of view;
- the convenience of data storage on a digital support, that does not need space and is not subjected to degradation;
- the ease of duplicating and sharing.

3D digital copy can be also generated using different technology, such as laser scanner, Lidar, structured light application, and photogrammetry.

Even if they demonstrate of course a great potential, it is not simple or possible to use these kind of 3D scanning devices in all archaeological circumstances, because of limited financial resources, short time for field operations, transport difficulties, lack of specific competences and the necessity of a well trained staff.

Nevertheless we can obtain a 3D model from simple pictures using compact or semi-professional digital camera thanks to the more accessible photogrammetry applications. In this sense the techniques of Structure from Motion (SfM) and Image-Based Modelling (IbM), through some algorithms of the modern Computer Vision, can be adopted for several projects, with excellent results in terms of quality and accuracy of measurements. Apart from a low-cost hardware required (just a simple consumer camera and a personal computer), all the tools to elaborate, process and manage 3D data are becoming more accessible to everyone, including non technical specialists; indeed we can use different applications such as commercial packages (Agisoft Photoscan),¹ web-based solutions (ARC3D or Autodesk 123D Catch),² or Open Source software (PPT - Python Photogrammetry Toolbox).³

For this research we tested the Structure from Motion and Image-Based methodologies for the production of high quality documentation of inscriptions, focusing in particular on their strengths such as the speed of data acquisition and processing, the convenience and handiness, the usability; we also tested their weak points such as the impact of low quality photos, ruined by shadows and shading, verifying if it could affect the final result of the reconstruction, which obviously uses the original photos for the rendering.

26.1.1. Cases of study

For this work we have chosen three inscriptions, with various level of complexity. The selection has been based on several criteria: date of inscription, in order to cover a long time (II - XIII cent. A.D.), distinguished by different technical know-how; different functions; kind of support; state of preservation; proximity to our workplace; places where these objects are actually situated and accessibility and availability for photo shooting without running into Italian restrictive copyright laws.

¹ Low-cost image-based package for creating high quality 3D model. <http://www.agisoft.ru/products/photoscan>

² Web-based SfM application. <http://www.123dapp.com/catch>

³ An open source solution for recording three-dimensional data. <https://code.google.com/p/osm-bundler/>

26.1.1.1. Milestone column on Via Traiana

Milestone column on Via Traiana made of limestone, generally well preserved, with some chipping at the edges of the frame. The inscribed surface is curved, with a few scales. The incision is accurate and has triangular shape. The milestone comes from *Canusium* and dates back to 108-109 A.D. but actually is preserved in the Public Gardens of Trani, in an easily accessible location.⁴

EAGLE ELECTRONIC ARCHIVE OF
GREEK AND LATIN EPIGRAPHY
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Schedae numerus: EDR017210
Regio antiquae: ApC
Regio nostrae aetatis: I
Urbs antiqua: Canusium
Urbs nostrae aetatis: Canosa (Barletta-Andria-Trani)
Locus inventiois: Trani (BT)
Locus adscriptionis: Trani (BT), giardini pubblici
Rerum inscripturarum distributio: cippus, miliarium
Rei materia: lapis
Scriptura: scalpro
Linguae latinae
Religio:
Versus:
Titulorum distributio: term. non sep.
Virorum distributio: imp.
Editiones: CIL 09, 6025 (1)
Epigraphi romane di Canosa I, pp. 234-235, nr. 256, con foto (M. Silvestri) (2)
Textus:
LXXXIV
Imp(erator) Caesar
divi Nervae filius)
Nerva Traianus
5 Aug(ustus) Germ(anicus) Dacic(us),
pontifex maxim(us), tribunicia pot(estate)
XIII, imp(erator) VI, co(n)sul) V,
pater patriae)
viam a Benevento
10 Brundisium pecun(ia)
sua fecit.

Apparatus: Textus secundum (2) consulti ad imaginem F. Caruso 2005
Tempus: 108 d.C. / 109 d.C.
Schedae scriptor: FABIO CARUSO Tempus schedae: 25-01-2005



Fig. 26.1. Trani (BT), Apulia, Italy - Milestone from Canusium, 108-109 A.D. [CIL IX, 6025 = EDR017210]

⁴ http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr017210

26.1.1.2. Marble slab with a funerary inscription

Marble slab with a funerary inscription from christian catacomb of Saint Hippolytus on Via Tiburtina in Rome. The slab is broken and restored with metal clamps visible in the thickness of top and bottom. The back is entirely covered with mortar, functional to a previous arrangement. The surface is smooth, with scratched line to delimitate the epigraphic space. The incision is irregularly cordon shaped, the letters are disjointed and rubricated. Dating late third - early fourth century. A.D. Now is conserved in the crypt of the Church of Holy Mary in Palo del Colle near Bari, accessible and visible on all sides only using torches.⁵

26.1.1.3. Funerary inscription walled in the Cathedral of Bari

Funerary inscription on local stone walled on the eastern facade of the transept of the Cathedral of Bari. Dates back between the eleventh and the thirteenth centuries. The surface has incrustations, some of which have also occupied the strokes, and small holes. The inscription is easily accessible, obviously only for its frontal part, but the visibility of the inscribed letters is made difficult by light reflecting on the stone.

A.R.

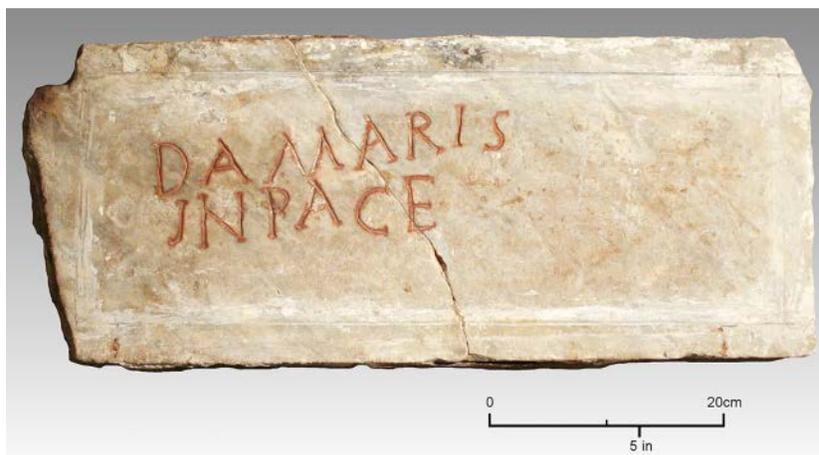
26.2. Methodology

The basic concept of building a 3D model with dense stereo reconstruction tools is to extract three-dimensional data from a series of unordered images. The Structure From Motion allows to orient a lot of images without knowing their specific camera parameters and network geometry, and everything is done by identifying similar feature points between the same images.

The process is usually performed in three main steps: image matching, camera parameters estimation, and dense matching.

The image matching analyzes picture that can be used to calculate the local feature descriptors, using the algorithm SIFT (Scale Invariant

⁵ <http://www.edb.uniba.it/epigraph/21490>



EDB21490

Pertaining to Coem. s.Hippolyti (via Tiburtina)

Titulus sepulchralis insculptus

Tabula marmorea 27 x 125.8 x 3.2. Letters 3,6-4,9

Last recorded in Palo del Colle (BA), s. Maria La Porta, cripta

Date: 290-325

Edition(s): ICVR VII, 20054

Damaris

in pace

Anita Rocco, 09/05/2005

EPICRAPHIC DATABASE BARI
Inscriptions by Christians in Rome (Ord-8th cent. CD)



Fig. 26.2. Palo del Colle (Ba), Apulia, Italy - Funerary inscription from Rome, 290-325 A.D. [ICVR VII, 20054 = EDB21490]

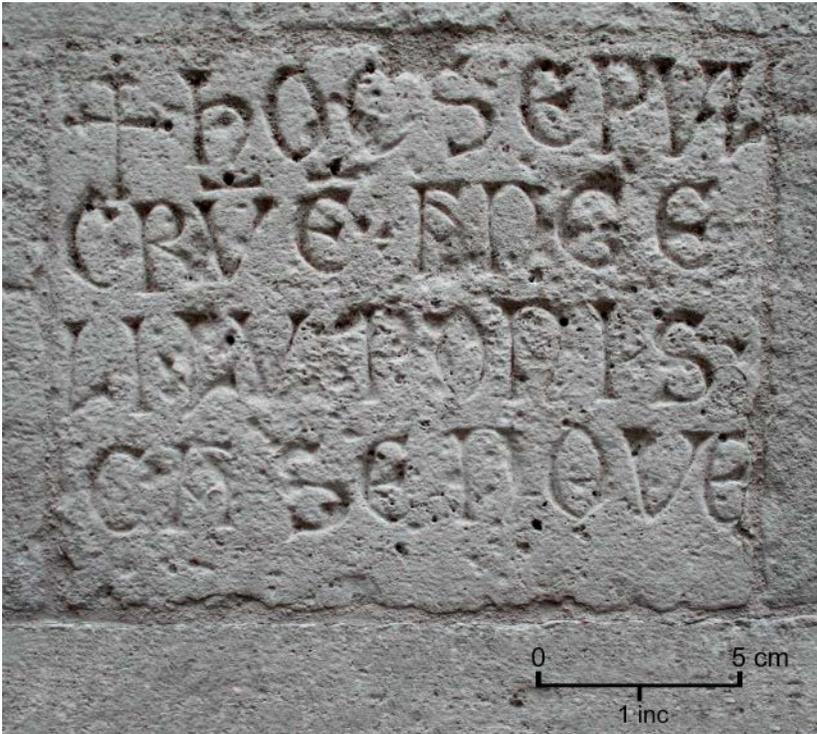


Fig. 26.3. Bari, Apulia, Italy - Funerary inscription walled in the eastern facade of the transept of the Cathedral of Bari, XI-XIII d. C., unpublished: ((cru)) hoc sepul/cru(m) e(st) Ange/li Luponis /Casenove

Feature Transform) which allows to find correspondences between images that were taken in a different space position, with different scale and lighting conditions [LOWE 2004].

Afterwards the system finds the nearest descriptor in the other image of the pairs, and from the matched features, the camera associated to the images are calibrated and oriented. Once all the images are matched, the system tries to reconstruct the epipolar geometry. The results of this phase are the camera parameters, the images orientation and a sparse point cloud, useful for the next step of dense stereo matching process in order to generate a detailed and dense point cloud.

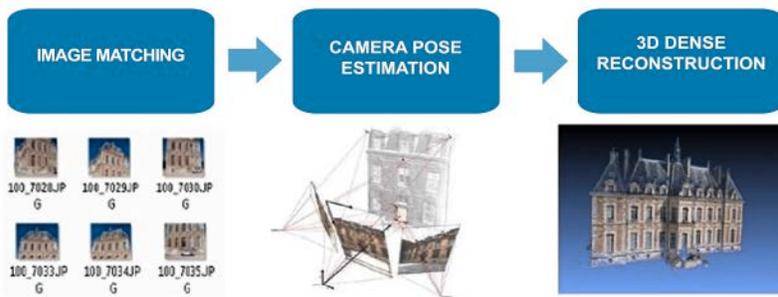


Fig. 26.4. Structure from Motion/Image-Based Modelling workflow (Moulon, Bezzi 2012 – modified)

The time needed to elaborate and generate a point cloud in general varies from hour to hour, and depending on the power of the personal computer or the broadband speed in case we use a web – based service, such as Arc3D or Autodesk 123D Catch.

Nowadays SfM technologies are available not just as web-services, but also as commercial and Open Source tools, which can be used by users with no specific 3D graphic background, of course in accordance with the same procedures of this Computer Vision (CV) technique. Indeed some years ago has been released Bundler⁶ under a General Public License (GPL), a tool which can be also considered one of the state-of-the-art implementation of SfM.

⁶ Structure from motion for unordered image collections. <http://www.cs.cornell.edu/~snavely/bundler/>

Considering the potential of this tool, Bundler has been implemented within the Python Photogrammetry Toolbox (PPT), an Open Source application developed and released under GPL v.3 license by the Arc-Team s.n.c.

This package implements a pipeline for generating 3D reconstruction from a set of pictures, because it is composed of Python scripts that automate the different steps of the entire digital process. Thanks to an user-friendly graphical interface, the entire process is reduced in two commands, calibration performed with Bundler, and the reconstruction is done through a dense stereo matching tool (CMVS/PMVS).

While the other SfM applications allow to perform automatically the entire pipeline, the PPT user can control the final result setting up the image size parameter (determining in this way the computation time), and the feature detector (the use of SIFT combined with VLFEAT algorithm can generate a more accurate result) [MOULON et al. 2012].

Thanks to its Open Source license, PPT represents one of the most important FLOSS project in the field of SfM technologies, which can also count on a big community who works for a better development and improvement of the software, sharing code modification, feedback and of course knowledge [BEZZI et al. 2011].

26.3. The workflow

One of the goals proposed for this project, was to experiment a SfM approach in the field of digital epigraphy, which could give to everyone the possibility to easily record and produce 3D data, for research and communicative purposes.

The principal steps of our workflow have been: images acquisition and data mesh processing.

26.3.1. Images acquisition

In the first step we used a Canon EOS 350D equipped with fixed focal lens of 18 mm with a sensor size of 22,2 × 14,8 mm, and the images used for the processing were at a pixel resolution of 8 mp.

During the photo-session in the crypt of the Church of Holy Mary in Palo del Colle (Bari), where is situated the inscription of Damaris, we also used a spotlight mounted on a tripod, because of lighting conditions of the room, thus avoiding too many dark areas.

This was the only circumstance when we used an artificial light source, because the other image acquisitions (the medieval inscription at the Cathedral of Bari and the Roman milestone at Trani) were conducted outdoor, with good and uniform lighting conditions (cloudy sky).

Every set of pictures have been planned in advance, because it is essential to produce a good documentation, as the quality of the photos is more important for the data-processing and the entire reconstruction; for this purpose, in addition to some standard procedure for the image acquisition (keep a sharp focus and constant environmental lighting avoiding the flash), a complete coverage of the object was essential [DELLEPIANE et al. 2012].

To do this we have planned a potential path for taking photos, if possible moving all around the inscription to gain a 360-degree coverage, because it is important that each part of the object is covered from multiple angles (we paid attention to take shoot every few step and with a precise order, ensuring a good overlapping between two photos). Moreover we took close-ups of specific part of the inscriptions, focusing on the letters, because we wanted to add more details to our 3D models.

At least we have taken 80 images for each inscription, to be sure that all of these photos were suitable for a complete 3D reconstruction.

26.3.2. Data and mesh processing

The dataset were processed using three different dense reconstruction tools, first of all the Open Source Python Photogrammetry Toolbox (PPT), then the freeware Autodesk 123D Catch, and a demo version of Agisoft Photoscan v.0.9, just to present a complete comparison with the available tools.

We used the version of PPT included in ArcheOS (Archaeological Operating System)⁷ version 4.0. Cesar, developed and released by Arc-Team s.n.c. This is a GNU/Linux live distribution which includes several tools built for archaeological purposes (e.g. 2D and 3D GIS applications, raster and vector graphic software, etc.).

The entire data workflow is organized in a temporary directory, generated at the beginning of the process. Once opened PPT, we choose

⁷ GNU/Linux Archaeological Operating System developed by Arc-Team s.n.c. and built for archaeological purposes.

the panel “RunBundler” to perform the camera calibration step, and after a while we clicked on “RunCMVS” to generate the dense 3D point cloud (this tool takes as input the images collection, camera poses and the previous sparse point cloud).

The final output produced by PPT has required a further processing necessary to obtain a complete 3D model. For this occasion we used MeshLab⁸ an advanced 3D mesh processing tool, developed by the ISTI-CNR of Pisa (Italy) and released under GNU/General Public License (GPL). This software provides a set of useful tools for editing, cleaning, healing, inspecting, rendering and exporting the mesh. After importing the point cloud from PPT as .ply file, we have cleaned it erasing not useful 3D points, and created the mesh using the “Poisson surface reconstruction filter”; this filter removes part of the sampling noise and produces a triangulated mesh from the sampled points, closing all the small missing gaps as well. Afterwards we have applied a colour map from the generated cloud to the mesh, but also re-projecting the photos used in the reconstruction as detailed texture.

The model was scaled by measuring distance between some specific points on the 3D model, knowing their equivalent real-world distance, and then bringing the data in a correct scale.

At least we exported the output as an .obj file, which represents one of the most common format, useful for further processing operations within a wide range of open source and commercial 3D graphic software (i.e. Blender, Autodesk 3DS Max, etc.).

D.M.

26.4. Other reconstruction tools: Autodesk 123D Catch and Agisoft Photoscan

Continuing our research and experimentation on the same epigraphic data, it seemed right to evaluate the contribution of using other SfM applications, and among them we chose to test Autodesk 123D Catch and the demo-version of Agisoft Photoscan.

Autodesk 123D Catch is a freeware web-based solution, available as a desktop version but also as application for mobile devices (smartphone and tablet) [SANTAGATI and INZERILLO 2013].

⁸ An open source, portable and extensible system for the mesh processing and editing.

The software produces automatically a 3D model (mesh and texture) from a set of pictures previously uploaded, and the user can perform some post-processing operations.

Indeed 123D Catch implements simpler but less effective instruments for editing the geometry of the mesh; the cropping tool recognizes and modifies just the vertices of the mesh, without a perfect control on the general geometry. Therefore it was necessary to deal with this issue, using MeshLab and Blender to perform the post-processing operations, in order to obtain a complete 3D model.

One of the useful tools included in the software, is the “Manual stitch”, which allows to align manually photos choosing three points recognizable in three pictures; this can be useful when the software doesn’t perform the automatic alignment procedure.

It is also possible to set the resolution of the final mesh: the three options (mobile, standard and maximum quality) allow the user to manage the model, generating a mesh starting from a medium resolution (optimal for mobile devices), up to a high density mesh (recommended for further processing operations).

Even if the texturing process seems to be fully automatic, the user can manage some parameters of the texturing.

Unlike other photogrammetric software where the final product consists of a vertex color map, 123D Catch creates a texture based on the uploaded images as a first step of the processing. Unfortunately one of its limits is the automatic reduction of the image resolution, performed by the software; despite the impossibility to manage this option, the final output presents a middle-high quality, appearing as a competitive software compared to other commercial ones.

The software easily provides several output options, such as OBJ, FBX, 3DP, RZI, DWG, LAS, IPM, and allows to create an intuitive animation automatically or with just simple command; moreover it allows to save and export the same video, or to share it immediately on the personal YouTube channel.

Agisoft Photoscan is a commercial software, developed by Agisoft LLC, and for this test we used the demo version 0.9. It is a cross-platform software, able to generate an accurate 3D model starting from an unordered and uncalibrated camera.

Even if it is not so intuitive during the first operative step, it provides a series of automated and manual tools that make it a complete commercial solution for SfM projects.

After the process of alignment of the uploaded pictures (camera positions), the software produces a point cloud and a mesh, which can be managed by the user with several editing tools (i.e. remove superfluous areas, filling the holes in the mesh, decimate or merge multiple meshes).

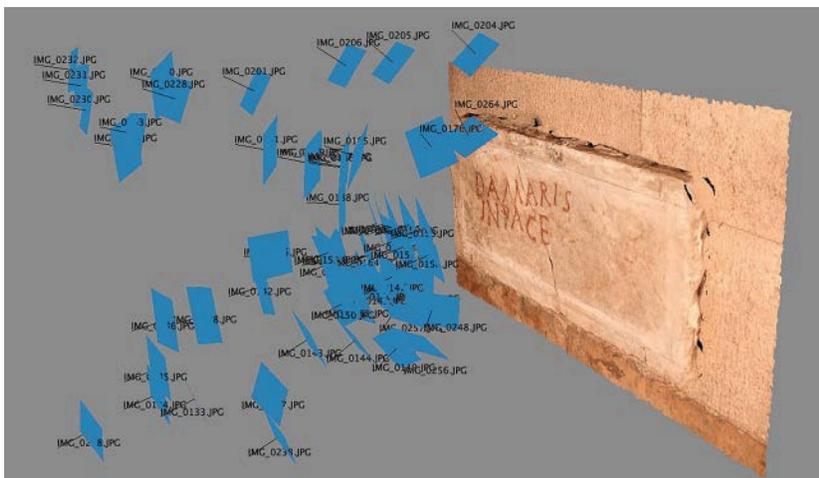


Fig. 26.5. Camera positions in Agisoft Photoscan

The texturing is one of its quality points; indeed the texture mapping can be completely controlled by the user, and allows to generate a high-quality texture.

The parameters can be modified during the entire texture processing and the the mapping-blending mode, which allows to create and merge the original images and the size of the image-texture.

Photoscan also supports the export of the geometry towards a different 3D modelling software (e.g. Maya, Blender, etc.), allowing a manual UV mapping, which sometimes can help to improve the final outcome.

The final model can also be exported in the usual formats (OBJ, 3DS, VRML, COLLADA, Stanford PLY, DXF, U3D), even in a PDF3D, a powerful tool for displaying, presenting and sharing 3D data.

M.P.

26.5. 3D model management: visualization and presentation

The tests carried out to produce three different 3D model for each inscription has allowed to set up the parameters of an effective workflow for archaeological and epigraphic purposes.

There are different reasons of using a 3D model during an epigraphic analysis, such as the possibility to extract measures, the chance to easily visualize the same object, using the tools provided by the software. In this sense MeshLab represents a valid choice, as it is a cross-platform open source software, but also because it supports several visualization and rendering options. Indeed it is possible to load 3D models even generated with other software, turning on and off the various layers, and of course to use the “measure tools” to take point-to-point measures on the 3D models [DELLEPIANE et al. 2012].

Moreover we have noticed that it is possible to set different rendering modes, sometimes using advanced shading options, maybe for enhancing some material feature of the inscription (i.e. a particular engraving of the letters on the marble), running a real-time control of lighting and rendering parameters, which are also essentials for a better visualization and analysis of the object.

With the same software we have produced several high resolution images of 3D models starting from a specific view and rendering mode, using an easy snapshot function available; this gave us the possibility to have instantly a better visual comparison of the three inscriptions, and of course to speed up the epigraphic analysis and interpretation.

26.6. Conclusion and possible developments

The project has outlined the high potential of the Structure from Motion techniques for extracting 3D model from a picture-set, which represents a positive alternative to the much more expensive and complex technologies, like laser scanner. Furthermore the availability of Open



Fig. 26.6. The 3D model of the Roman milestone elaborated with Autodesk 123D Catch (wireframe – smooth – texture rendering)

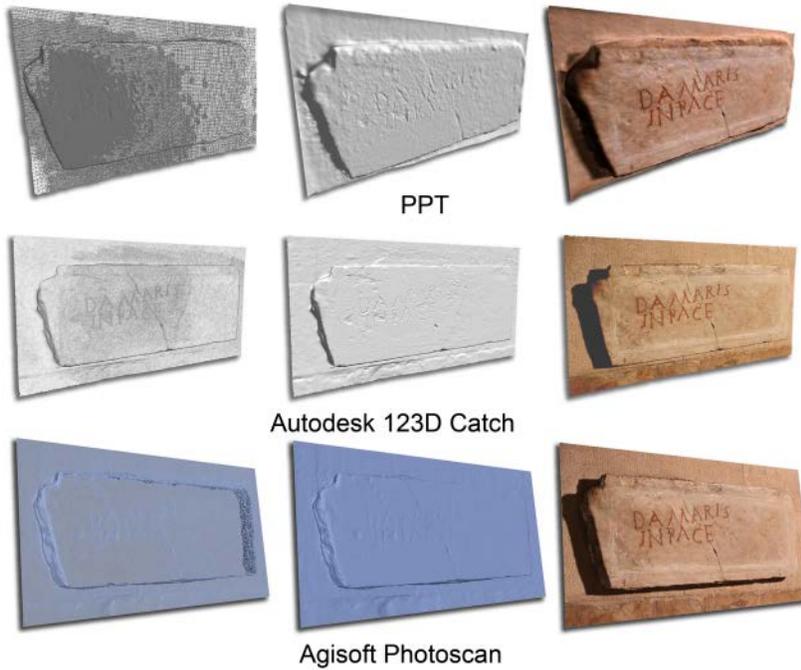


Fig. 26.7. 3D models of the inscription of Damaris (wireframe – smooth – texture rendering)

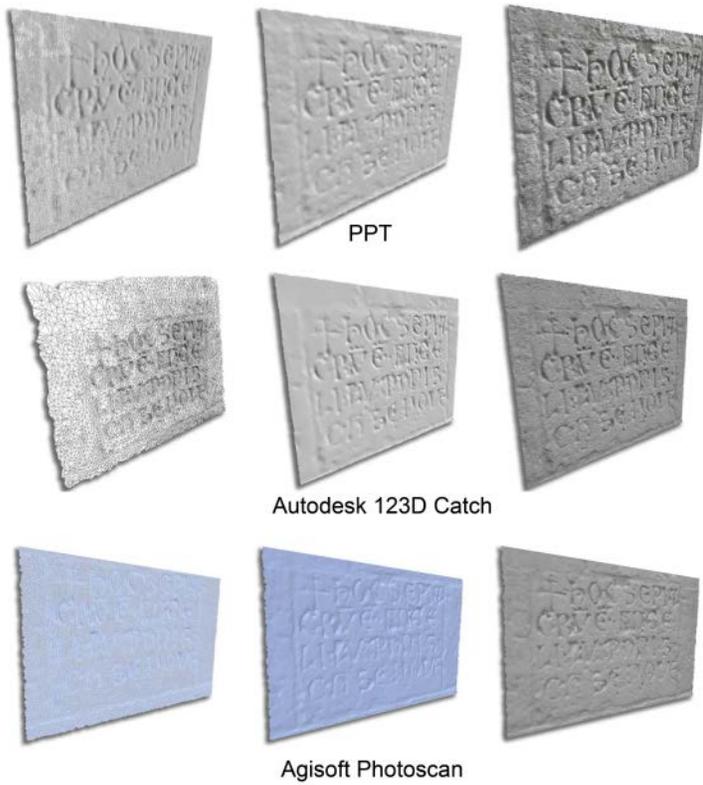


Fig. 26.8. 3D models of the medieval inscription (wireframe – smooth – texture rendering)

Source solutions or web-based software, can be an added advantage to improve the quality of the epigraphic documentation, and in general to satisfy some of the basic needs of a typical archaeological research. This technology can be well applied in different contexts (i.e. epigraphy, archaeology, architecture, etc.) and at different levels of “scale” (from archaeological layers or structures, to small finds).

There may be other possible developments related to this technology, that is becoming more user-friendly, not just to create 3D models, but also to share them in an open and accessible way. Strictly connected to this, is the widespread use of some web solutions such as 3DHOP (3D Heritage Online Presenter) developed by Isti-CNR of Pisa, for the creation of web presentations of the digital Cultural Heritage, or Sketchfab a platform for publishing, sharing and embedding 3D models online. These WebGL-based services include different tools for a real-time navigation, plus edit options, supporting the most common file format created using other 3D graphic software.

It is well known the role of the PDF as a common and diffuse format for sharing and visualizing data in several professional sectors (e.g. engineering and architecture, design, archaeology, etc.). Nowadays it is possible to insert several multimedia files into a single PDF, including 3D models often combined with texts or descriptions, thus providing a valid support for publishing data. This is also an easy and affordable way for everyone (all we need is a simple and free PDF viewer) to interact with all types of digital products, producing a different cognitive experience.

In the last years we have noticed the fast and wide diffusion of the 3D printing in the field of Cultural Heritage, as a real “technological revolution”. The 3D scanning, carried out using several techniques (SfM, Laser scanning, etc.), and the following printing of archaeological materials, from complex architectures, to inscriptions as well, brings in the tactile nature of production and builds a new relationship between the users and these derivative replicas.

Not only three-dimensional models and plastic replicas of artifacts do help us to promote a better knowledge of a specific heritage with the materials we recover, but they offer the public a unique and tangible connection with the past that they may otherwise never experience. On the other hand printing archaeological objects could be a great tool for students who long for an interactive and readily available form of

research material, thus making the efforts and studies of archaeologists and professionals in public outreach and education even more effective. In addition of being a great tools for these mentioned purposes, we can also notice that the 3D scanning and printing could involve people with different disabilities, such as visual impairments, in order to allow access to a wider and more diverse audience, stimulating a deeper engagement through the quality of a new and “social” interaction.

D.M.

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27. Open-Access Epigraphy

Electronic Dissemination of 3D-digitized Archaeological Material

Eleni Bozia, Angelos Barmpoutis, Robert S. Wagman

Abstract

Preservation and dissemination of archaeological material has always been an issue of concern for the academic research community. On the one hand, the fragility of the material limits their study. On the other hand, such material is housed in museums, libraries, and institutions worldwide, something that significantly thwarts their accessibility. Technology, high resolution 2D pictures, and electronic databases have attempted to overcome the aforementioned limitations. However, lack of contact with the physical object as a tridimensional structure still significantly obstructs research. In this paper we present the latest advances of the *Digital Epigraphy Toolbox*, a novel project that focuses on the digitization in 3D of ancient inscriptions from ektypa, the multi-modal visualization of their 3D models, the facilitation of interlinked 3D digitized records, and the easy and effective electronic dissemination of archaeological material. This project offers options for cost-effective shape-from-shading 3D digitization of ektypa, using a flatbed scanner, and various visualization modes, such as photorealistic 3D views and informative fingerprint map and depth map that assist scholars understand the structural characteristics of the artifacts. Finally, the project facilitates the dissemination of the 3D digitized objects by providing the users with an embeddable 3D viewer which can be easily imported in third-party databases, collections, and personal websites.

Keywords

3D reconstruction, digital preservation, open-access, dissemination, visualization.

27.1. Introduction

Any usage of the term Digital in relation to the Humanities, such as the designations “Digital Classics” [CRANE 2004, pp. 46-55], “Digital Epigraphy”, “Digital Archaeology”, has been highly charged and extensively discussed. Issues, such as what the above terms mean and

are meant to encompass, the possibilities and difficulties of interdisciplinary collaboration, and the place of Digital Humanities in academia and academic curricula have instigated scholarly discussions, aiming at redefining and reinventing the Humanities with the assistance, enhancement, and collaboration of computers (for discussions of the issue see [BANTZ 1990, BERRY 2012, McCARTY 2012, DENLEY 1990, GOLD 2012, HIRSCH 2012, HOCKEY 2004, JONES 2013, McCARTY 2005, McCARTY 2010]). Project development, relevant publications, cross-disciplinary collaborations, and applications seeking financial support clearly indicate the co-existence of five types of scholars-adopters who have motivated and promoted the espousal of technology, computer-enhanced humanities, and their application on real data, as well as the posing of problematic questions: innovators, early adopters, early majority, late majority, and laggards [ROGERS 1962, p. 150]. Innovators consist of those scholars who first envision a better future for their field. In our case, this refers to two types of scholars: the humanist, who wishes to forgo the current limitations of research and promote the humanities by means of a diametrically different field such as computing, and the computer engineer, who repurposes his technical knowledge to advance the academic community. The early adopters include those who are proponents of technology, the enthusiasts that have wholeheartedly accepted new media, sometimes failing to question their purpose, or even regulate their usage. Early and late majority consist of the scholars who, albeit initially hesitant or unaware of the technology, are eventually willing to adopt new methods and methodologies and slowly integrate them into their academic routine. The last category describes those who are defensive and fear that digital media will vitiate the integrity of scholarship. The main reason for the aforementioned dissensions lies in that the introduction of technology has caught some by surprise; thus, they have failed to ask the right question: "what do-should we expect from technology?" On the one hand, innovators occasionally lack focus and proceed with the technology for the sake of technology. On the other hand, traditionalists refuse to reconsider the original research-study paradigm and have not yet dealt with the coexistence of humanities and computers and their synchronous evolution that can also result in simultaneous progress of both areas.

The focus of both the inventors and the adopters has mostly turned to the collection of data, the creation of databases, automatic metadata analysis, and the digital publishing of those results. As many Human-

ities fields are language and text based, as are Linguistics and Classics, for instance, the capabilities of the computer indubitably provide an unprecedented assistance—the computer constitutes not only a storage space, but it can also be used as a search engine that provides easy access to a large amount of data.¹ Also, it can perform etymological comparisons and confirm the authorships of texts.² The keyword that describes the above processes is “facilitation”. According to Unsworth’s presentation of primitives, “a useful tool-building enterprise in humanities computing” should assist and enhance the following: Discovering, Annotating, Comparing, Referring, Sampling, Illustrating, and Representing [UNSWORTH 2000]. Any library of texts with basic Text Encoding Initiative (TEI) features [CAYLESS et al. 2009, RENEAR 2004, SIMONS 1996] can satisfy almost all the above except for “Illustrating” and some profound aspects of “Discovering”, which are indispensable to the study of epigraphy and archaeology.³ Starting with “Illustrating”, current epigraphic databases include 2D still images of the inscription and/or the ektypon (an impression of an inscription formed by pressing wet paper onto the surface and peeling off when dry).⁴ The quality of the picture can be significantly compromised due to lighting conditions, and a 2D picture cannot convey all the information that one would acquire had they had the original ektypon.⁵ Therefore, most of the databases include the inscribed text, following the conventions of Leiden [HUNT 1932, VAN GRONINGEN 1932, WOODHEAD 1982] and Epidoc [CAYLESS 2003].⁶ Digital access to those texts significantly facilitates and promotes study and research. However, two aspects that have yet to be considered are: the improvement of the illustrations of the artifacts and the enhancement of discovery.

¹ *The Perseus Project*, <http://www.perseus.tufts.edu/>

² See discussion about the Oxford Text Searching System in HOCKEY 2004

³ see BODEL 2012 for a history of digital epigraphy

⁴ *The US Epigraphy Project*, <http://usepigraphy.brown.edu/>; *Epigraphische Datenbank Heidelberg*, <http://edh-www.adw.uni-heidelberg.de/home/>; *Inscriptions of Aphrodisias*, <http://insaph.kcl.ac.uk/>; *Inscriptions of Roman Cyrenaica*, <http://ircyr.kcl.ac.uk/>; *Pleiades Project*, <http://pleiades.stoa.org/>; *Electronic Archive of Greek and Latin Epigraphy*, <http://www.eagle-eagle.it/>; *Center for the Study of Ancient Documents*, <http://asp.classics.ox.ac.uk/research/projects/csad3.asp>. See also PASQUALIS DELL’ANTONIO 2005, CROWTHER 2002.

⁵ For other imaging techniques see BARMPOUTIS et al. 2010.

⁶ For information on Epidoc, see *The EpiDoc Collaborative for Epigraphic Documents in TEI XML*, <http://epidoc.sourceforge.net/>

27.1.1. From 2D to 3D open-access epigraphy

Jameson eulogizes the inclusion of images of manuscripts in digital databases and states that, “the images dramatically increase access to source materials, reduce the power of the scholar as gatekeeper, expose the scholar’s judgments to wider scrutiny, and make it more likely that readers or users will actually collaborate in the work of perfecting the state of scholarship”. In [JAMESON 2004] she discusses the issue of open-access scholarship, presenting projects that provide images of manuscripts. The point she makes, though, is espoused by *The Digital Epigraphy and Archaeology Project (DEA)*⁷ project that intends to not only create repositories of artifacts, but also publicize them and invite new interpretations. The *DEA Project* has espoused this “democratization of knowledge”, as it was eloquently called by Jameson. More specifically, the *Digital Epigraphy Toolbox*⁸ (Fig. 27.1) aims at filling the two aforementioned gaps in research and study of ancient inscriptions and other archaeological artifacts. First, the implementation of the DEA shape-from-shading algorithm onto ektypa automatically produces their 3D model [BARMPOUTIS et al. 2010], which can then be rotated, zoomed in, and re-lighted. Thus, the user can better visualize the object of his study and reexamine weathered parts of the ektypon by manipulating the perspective and the lighting. Furthermore, the *DEA* database includes all the relevant (contextual) metadata, that currently consist of more than 50 fields of information about the inscription. The metadata for the physical object follow the Heidelberg Epigraphic Database protocol, and the user has the option to add any field from a drop-down menu list. Being in the position to have a collective record of the ektypon and the inscription, the researcher has the opportunity to pose new questions or old questions on a new basis. So, instead of a simple hyperlink that addresses the user to other resources and has been described by Bodel as crude contextualization [BODEL 2012, p. 280], one can comprehensively study the artifact, the text, and take advantage of every available resource. The existence of such records also facilitates comparative studies of large numbers of inscriptions. Furthermore, we should not forgo the case of the Classicist who ventures into the study of archaeological artifacts to perform an all-encompassing study of a particular historical era. The possibility of such comparative studies

⁷ <http://www.digitalepigraphy.org>

⁸ Digital Epigraphy Toolbox, <http://www.digitalepigraphy.org/toolbox>

has been impeded mainly by the difficulty to access information in a new research area. The *DEA* Virtual Museum⁹ provides a user-friendly interface that purports to ease the exposure to new information and is meant to be used by scholars of all fields.

With regards to “Discovery”, today there are several online collections of inscriptions which intend to enhance scholarship by facilitating access to epigraphic texts for scholars and students. What needs to be considered, though, is that most of these databases only provide access to textual information assembled from previous printed editions, not to the original artifacts— a fact that limits the potential for original research, as the scholar is reduced to studying the information from someone else’s perspective. The *DEA* project aims at providing a space where scholars can re-quantify results, pose new questions, provide different answers based on new available resources, and ultimately reconsider their research. The *DEA* is not only meant to be another database that also includes alternative visual representations; instead the *DEA* explores and adopts new state-of-the-art technologies, creating a truly “Open-Access Epigraphy”.

Another issue that relates to the dissemination of knowledge and the democratization of academic research is the need for interlinked epigraphic databases. The existence of digital databases does not in itself guarantee the accessibility or the comprehensive accumulation of all the information necessary for well-founded research and valid results. This concern has been posed by Álvarez, Gómez-Pantoja, and García-Barriocanal in [ÁLVAREZ et al. 2010] who have created a system on *Hispania Epigraphica* where epigraphic data are shared as linked data, recommending the adoption of a similar strategy for other digital libraries.¹⁰ The *DEA* project gives users the option to add hyperlinks to other digital libraries and online data that are incorporated into the record of the artifact. Thus, the project intends to facilitate the retrieval of information by minimizing the search time and providing comprehensive metadata about the entries. Moreover, users have the option to save the records of their work on their devices, thus creating their own libraries of artifacts, their 3D models, and the accompanying metadata.

⁹ <http://www.digitalepigraphy.org/museum>

¹⁰ For linking epigraphic data, see also CAYLESS et al. 2009

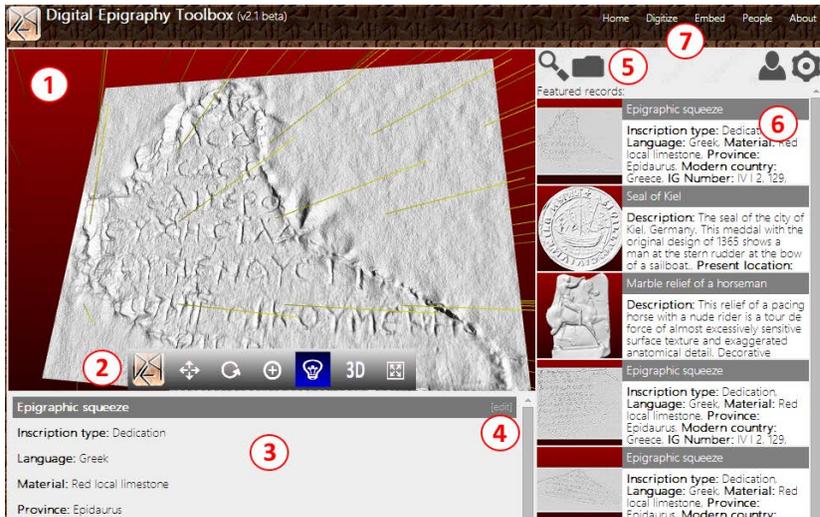


Fig. 27.1. A screenshot of the *Digital Epigraphy Toolbox* v2.1. Several key features are marked: 1) 3D embeddable viewer, 2) 3D toolbar with several options to move, rotate, zoom, relight, view in full screen, and change visualization mode such as 3D view, depth-map, and fingerprint-map, 3) meta-data viewer, 4) open-access record editor, 5) search toolbar with options to search by keywords, or browse by collection, 6) comprehensive list of search results with color-coded keywords and automatically generated outline of each record based on your keywords, 7) shape-from-shading 3D digitization tool, using flatbed scanner.

The *DEA* project also focuses on the 3D representation of other archaeological artifacts, such as statues, vases, coins, medals, and seals (Fig. 27.1). The importance of having access to the object and being able to examine details by zooming, moving, and relighting cannot be overstated. As Tupman emphasizes in her chapter on the effect of digital technologies on the study of funerary monuments, the study of a cemetery, for instance, requires the collaboration of a number of specialists who can study the funerary stele, the inscribed text, and the funerary dedications, among other artifacts [TUPMAN 2010, pp. 73-86]. Tupman stresses the significance of digital 3D representations of the findings and ultimately of the site in its entirety. Also, Eiteljorg states the significance of 3D imagery for archaeologists and suggests that “these processes provide unprecedented access to objects without risk of damage” [EITELJORG 2004, p. 27]. Paoletti et al. examine the teaching and research possibilities that a virtual museum can offer [PAOLETTI et al. 2004]. Therefore, there seems to be a scholarly demand for exploring

new ways in which technology can further archaeological research. The *DEA* project has set the ground for the creation of an online dynamic library of 3D artifacts. The user is given digital access, the ability to manipulate them (rotate, move, zoom, relight), and organize them comparatively for analysis (several of these features are depicted in Fig. 27.1 that shows the interface of the *Digital Epigraphy Toolbox*).

27.2. Dissemination of 3D epigraphic content

In order to facilitate the dissemination of any type of digitized content through the internet, an on-line database or dissemination mechanism should provide solutions to several technological challenges including the following: a) identify and support widely-used open file formats, b) ensure that the file size is optimal for on-line delivery, c) minimize hardware and software requirements in order to provide access to the widest possible audience, and d) facilitate interoperability across databases.

In the case of text or image-based epigraphic content, the first three of the aforementioned problems are now automatically solved internally by the web-browsers; therefore, any of the text or image epigraphic databases do not have to face such technological challenges. More specifically, the file formats for digitally storing texts and images have been standardized and are now supported across browsers and operating systems. In the case of textual content, UNICODE is widely supported and adopted by TEI as the preferred digital format. Similarly, in the case of images, PNG or JPG formats can store 2D visual content in a compressed way and are universally supported across systems. Hence, 2D images can be efficiently disseminated to the widest possible audience with the smallest possible computational cost.

In the case of 3D content, however, all of these problems and technological challenges exist. One of the goals of the *DEA* project is to provide solutions to these problems and set the standards for open-access dissemination of 3D epigraphic content.

27.2.1. Accessibility and visualization of 3D content

Several file formats have been established for storing 3D objects or 3D environments that have been either digitized by scanning a physical object or designed using a software for computer-assisted design. OBJ and STL are two examples of 3D file formats that are supported by

special purpose software for 3D design and can open and render their content on the screen. Besides these special purpose software packages, 3D file formats are not supported by default in web-browsers or computer operating systems. Therefore, even if a 3D epigraphic database provides access to files of 3D digital objects, these files can only be handled and viewed by users who use appropriate third party software. This hinders significantly the dissemination of 3D epigraphic material to the general scholarly community.

To overcome this issue, the *Digital Epigraphy Toolbox* provides a web-based 3D viewer along with the 3D epigraphic content. The viewer is based on the new canvas capabilities of HTML5 and WebGL, which can render 3D graphics on websites. The 3D viewer of the Digital Epigraphy Toolbox can be used without requiring additional software or plugins, since WebGL is already included in the majority of the popular desktop and mobile web-browsers. Furthermore, the 3D viewer offers advanced features for visualizing the model of the digitized inscription, using photorealistic 3D graphics, as well as other 2D visualization modalities that help the users study the structure and variations of the digitized artifacts (Fig. 27.2). The 2D visualizations include the depth-map of the inscription (Fig. 27.2 center), which is a grayscale image, whose intensities are proportional to the depth of each pixel, and the fingerprint-map (Fig. 27.2 right), which highlights the peaks and valleys of the surface to help the user understand the changes of curvature. These 2D visualizations are also ideal for publishing an inscription in print as they depict better their 3D structure compared to a photograph.



Fig. 27.2. The *Digital Epigraphy Toolbox* offers different visualizations of the same 3D digitized inscription. Left: 3D visualization, Center: depth-map (deeper inscribed areas appear darker), Right: fingerprint-map (visualizes local peaks and valleys in cyan and black respectively).

27.2.2. File size compression for 3D epigraphic content

The size of digital files with text or 2D images is in general considered small either due to the simplicity of the digital information stored in these two modalities, or because it can be effectively compressed. This facilitates notably the dissemination of textual or image-based information, because such files can be instantly transferred through the network and presented in a browser-based database; they can be downloaded or attached in emails and stored as an entire database locally in personal computers.

However, in the case of 3D digitized objects the file size is significantly larger as they contain the information of the 3D location of every point in these models as well as the information regarding their triangulated mesh, which in general corresponds to 5 numbers per 3D point (or equivalently 20 bytes) for a uniform grid of triangular strips. This results in inconveniently large files that cannot be easily disseminated and cannot be instantly loaded in a web-browser. In the *Digital Epigraphy Toolbox* we have developed a novel method for storing the 3D structure of an inscription that uses only 1 byte per 3D point, which effectively compresses the overall 3D model by a factor of 20. Our technique stores the depth of the inscription's anaglyph captured as an orthographic projection of the inscription. This method produces a 2D depth-map image stored in PNG format (Fig. 27.2 center) which contains all the information needed to effectively transmit and visualize the original 3D model of the inscription (Fig. 27.2 left). The proposed compression technique can be used in any anaglyph, inscribed, or embossed surface and can encode the depth of each pixel with very high precision up to 9.76 micrometers (which is derived by dividing the depth range 0.5cm by 256×2). As a result, the 3D inscriptions of the *DEA* database can be effectively loaded and visualized, using any desktop or mobile web-browser.

27.2.3. Embeddable 3D viewer to facilitate interoperability

The *Digital Epigraphy Toolbox* provides an easy-to-embed viewer that facilitates the interoperability of various epigraphic and archaeological projects, which is a significant step towards the unification of digital epigraphic databases. Scholars can easily embed the 3D objects of the *DEA* database into their own web-sites, blogs, or personal databases, using this embeddable viewer. Each virtual exhibit has an HTML tag

that can be found in the archaeological metadata record of the exhibit. Users can copy and paste the corresponding HTML tag into their own web-sites:

```
<iframe src="http://www.digitalepigraphy.org/view?
heightmap=d1a7a25fdaf3010f" width="600px" height="400px"
frameborder="0" scrolling="no"> </iframe>
```

The width and height can be customized according to the design of the user's website by changing the corresponding parameters in the above HTML tag. Multiple objects can be added to the same website by using this tag with the corresponding identification number of the archaeological artifact from the *DEA* database, which can be accessed through the interface of the *Digital Epigraphy Toolbox*.



Fig. 27.3. Dissemination of 3D digitized artifacts using the touch-based natural user interface of the *Digital Epigraphy Toolbox* (left), and tangible 3D printed replicas of the inscriptions (right).

27.2.4. Dissemination of tangible 3D content

Although the importance of 3D digitized archaeological artifacts or sites is evident [EITELJORG 2004, PAOLETTI et al. 2004, TUPMAN 2010], the interaction of the users-scholars with the virtual objects could be problematic. More specifically, the manipulation of 3D virtual objects and the navigation in virtual spaces are actions that should imitate the way that humans interact with physical objects and real-world spaces. The conventional keyboard or mouse interaction is far from natural since multiple key strokes and/or mouse movements are required in order to move, rotate, and in general manipulate in multiple degrees of freedom 3D virtual objects.

To overcome the above limitations the *Digital Epigraphy Toolbox* provides the users with two different options for natural interaction with 3D digitized inscriptions:

- a** touch-based natural user interaction, which enhances the dissemination of the digitized inscriptions by providing a natural experience that resembles the interaction with physical objects (Fig. 27.3 left);
- b** 3D printing of the objects in the *DEA* database, which allows the study of physical replicas of the original inscriptions and can be used as a valuable educational or research tool. Figure 27.3 (right) shows one of our experimental samples of 3D printed inscriptions from the *DEA* database printed in life-size dimensions using Replicator II.

In conclusion, the *DEA* project is the first on-line 3D epigraphic library and has set several standards for effective open-access dissemination of 3D epigraphic content as presented in detail in this paper.

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28. Travelling back in Time to Recapture Old Texts

The use of Morphological Residual Model (M.R.M.) for epigraphic reading: four case studies (*CIL* 02, 02395a, *CIL* 02, 02395c, *CIL* 02, 02476, *CIL* 02, 05607)

Maria João Correia Santos, Orlando Sousa, Hugo Pires, João Fonte, Luís Gonçalves-Seco

Abstract

The objective of this article is to present the possibilities and advantages of using the Morphological Residual Model (M.R.M.) technique as a new and accurate method for epigraphic reading, through the display of four paradigmatic case studies from Portugal. For each inscription, this new application allowed to recapture nearly the entire original engraved text, including the traces unseen to the human eye that were until now, impossible to recover through traditional epigraphic procedures. Each of these cases produced new readings that enlighten not only the text but also the context to which they were associated, pushing forward the epigraphic research.

Keywords

Morphological Residual Model - *CIL* 02, 02395a - *CIL* 02, 02395c - *CIL* 02, 02476 - *CIL* 02, 05607

28.1. Introduction

Four paradigmatic case studies of difficult readings are brought together to demonstrate the possibilities and advantages of Morphological Residual Model (M.R.M.) as a new accurate tool for epigraphic research as it is further discussed by the authors in this same volume [Chapter 7].

Each one of the five inscriptions used as examples allowed to correct previous readings, significantly enough to review former interpretations: the two inscriptions from the famous sanctuary of oriental cults of Panóias [*CIL* 02, 02395a, *CIL* 02, 02395c] that in 1721 were already reported as extremely difficult to read; [AGUIAR 1721, p. 97] the inscription of Penedo de Remeseiros [*CIL* 02, 02476], a long epigraphic text with a sequence of difficult abbreviations that is now much more clear;

the Penedo das Ninfas [CIL 02, 05607], to which the M.R.M. allowed to clarify, the name of the summoned deity and finally, the shield of the warrior statue of Lesenho's hill fort [CALO LOURIDO 2003, 10-11, n11, SILVA 2007, 683, Est. CXXI, n° 1], which allowed seeing the unseen: a radial decoration pattern carved on the shield, and engraved over it, a funerary inscription that poses several important questions.

28.2. Methodology

Until now, epigraphic readings depended on several procedures limited to the visible traces carved on the stone. The M.R.M., when applied to epigraphy, allows going further and recapture the non visible carving traces that still exist.

The process of restitution of the original traces happens basically in two stages: firstly, the measuring of rock relieve of the epigraphic field; and after, the calculation of the M.R.M. [PIRES et al. n.d.]. This method is based on the assumption that in the same object coexist multiple scales of relieve, from the general shape of the rock itself to the microscopic crystals morphology that are part of it. Briefly, this application allows to detect and contrast the subtle differences of relieve at multiple scales, calculating the difference between them. To simplify the following tasks, the 3D residual models are converted in high resolution color coded images.

Once acquired the M.R.M., starts the work of the epigraphist that involves several phases: the direct observation of the stone in which the inscription is carved; the preparation of the M.R.M. images as templates for on-screen tracing, using a vectorial computer software; the drawing procedure itself; upon which is finally made the reading and the epigraphic interpretation.

With the M.R.M. image placed on the screen, it is created another overlapping layer, in which are traced all the visible characters. For this procedure, it is used a vector line, consisting not of individual dots, but of vectors between specific points placed on the screen, which result in a smoothly rendered line entirely adjustable.

One immediate advantage over all other epigraphic methods is the ability to magnify the high resolution M.R.M. images on the screen, hundreds or thousands of times, to capture and analyze the smallest details, not only of the visible letters, but also of the residual traces of

carving of almost totally disappeared characters. Of course this procedure involves a certain degree of subjectivity, since in some severely eroded areas of the inscription, one is forced to interpret and reconstruct the missing letter, but this restitution is always made based upon the remaining residuals of carving.

By being built in several distinct layers, this procedure allows also applying contrast masks, to color the lines temporary red, yellow or other bright hue for maximum contrast, and, since each layer can be turned off or turned on, we are able to edit each and all of the elements at any moment. Hence, all the elements of a drawing may be treated separately or together as group, enabling to apply several degrees of contrast, in order to make the carved text more visible.

The drawing file can also be imported directly into a page layout or separately by layers, depending on what is needed: in positive or negative, bichromatic or polychromatic, with or without the enhanced reading, which permit to see the engraved characters at any phase and can be used for publication, without the expenses of photographic reductions from large-scale or of producing blueprint proofs from inked drawings.

This method also avoids excessive physical contact with the stone that sometimes may increase the material's degradation; such is the case of silicon molds that are particularly dangerous when applied to granite inscriptions.

Therefore, the M.R.M.-based tracing offers, then, a number of advantages for epigraphic reading, allowing to work on a more manageable scale, ease of handling, being also a much quicker and accurate method of producing epigraphic depictions, as well as a much more efficient off-site analysis of the epigraphic elements.

28.3. Travelling back in time to recapture old texts: four case studies

28.3.1. The inscriptions from the sanctuary of Panóias, Assento, Vila Real (*CIL* 02, 02395a, *CIL* 02, 02395c)

Known since the 18th century, the sanctuary of Panóias already motivated several publications, being one of the Portuguese sites more frequently mentioned in bibliography. Its importance is related with three aspects: 1) Panóias is one of the few sanctuaries of oriental cults in all Western Roman Empire; 2) The existence of an assemblage of

rock-cut inscriptions that prescribe several liturgical procedures; 3) The intimate association of the inscriptions with several rock-cut pits and cavities.

The detailed epigraphic study made by Alföldy [1995; 1997], imposed itself as the best interpretation of this sacred place, according, of course, to the data available by then. Nowadays, the use of the M.R.M. [PIRES et al. n.d.], allowed to correct several of the former readings and to improve the understanding of the religious cult of the precinct that, after all, is dedicated to Serapis and Isis [CORREIA SANTOS et al. 2014].

28.3.1.1. CIL 02, 02395a

According to Alföldy [1995, p. 255, 1997, pp. 189-191]¹ the text should go as follows (Fig. 28.1):

Diis Seve[r]is in hoc / templo lo[ca]t[i]s / aedem G(aius)
[C(?) C]alp[urnius] Ru/finus v(ir) [c(larissimus)]

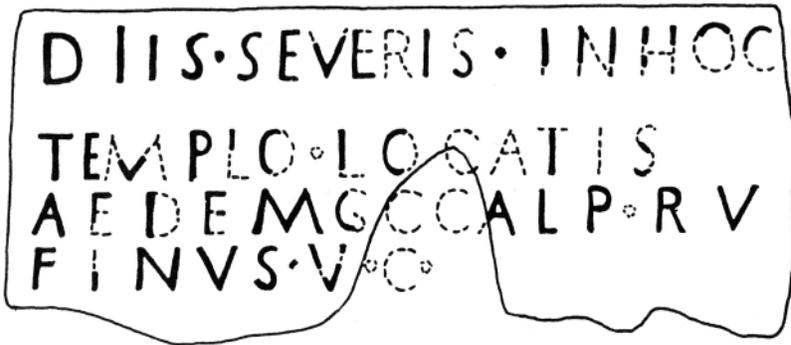


Fig. 28.1. CIL 02, 02395a [ALFÖLDY 1997, Abb. 3]

The M.R.M. results revealed a different reading, allowing the identification of a new line – l.2 -, unsuspected so far (Fig. 28.2)²:

¹ See also ILER 523; AE 1997, 858; HEp 5, 1995, 1062; HEp 6, 1996, 1081; HEp 7, 1997, 1263; RAP 471; RODRÍGUEZ COLMENERO 1995, p. 86, RODRÍGUEZ COLMENERO et al. 1999, pp. 84-85.

² Granite; 1,10-1,20 x 0,50 m; l.1: 7, l.2: 6; l.3: 6, l.4: 6, l.5: 7 cm.

Diis Serapidi Isidi / Diis Deabus Omni/bus lacum et
[hanc?] / aedem C [C]alp Ru/finus v(ir) c(larissimus).

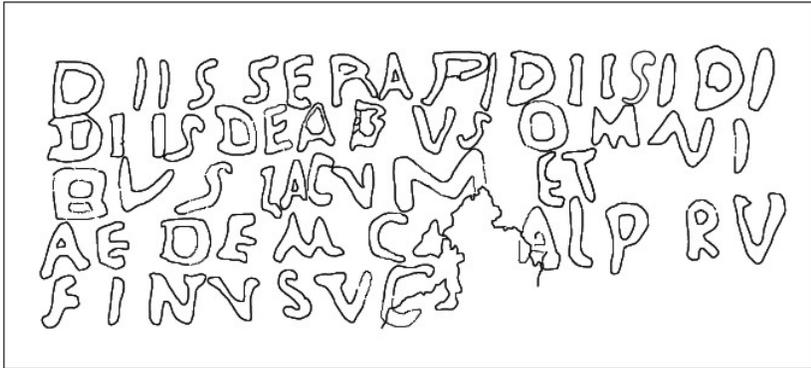


Fig. 28.2. CIL 02, 02395a: Reading from polychromatic M.R.M.

The new reading not only allows to identify clearly the names of the deities in l.1 as *Serapidi* and *Isidi*, instead of *Diis Sever[r]is*, disregarding an interpretation that was somewhat forced and without parallels; but also to recognize another line, unknown until now - the l.2 -, in which the dedicatory proceeds, to the *Diis Deabus Omni/bus*, which is much more coherent and alike to the rest of the inscriptions.

Also, the identification of Serapis and Isis altogether in the first preserved inscription, allowed to prove wrong the idea of a ritual path in which the gods would gradually reveal themselves [ALFÖLDY 1995, p. 257; ALFÖLDY 1997, pp. 244-246; TRANOY 2004, p. 97; DE HOZ 1997, n 28.1; DE HOZ 2011, p. 81].

28.3.1.2. CIL 02, 02395b

For this inscription, Alföldy [ALFÖLDY 1995, p. 256; ALFÖLDY 1997, p. 196]³ proposed (Fig. 28.3):⁴

Υψύστω Σερά/πιδι σὺν γάστ/ρα καὶ μυστα/ρίοις. G(aius)
C(.) Calp(urnius) / Rufinus v(ir) c(larissimus)

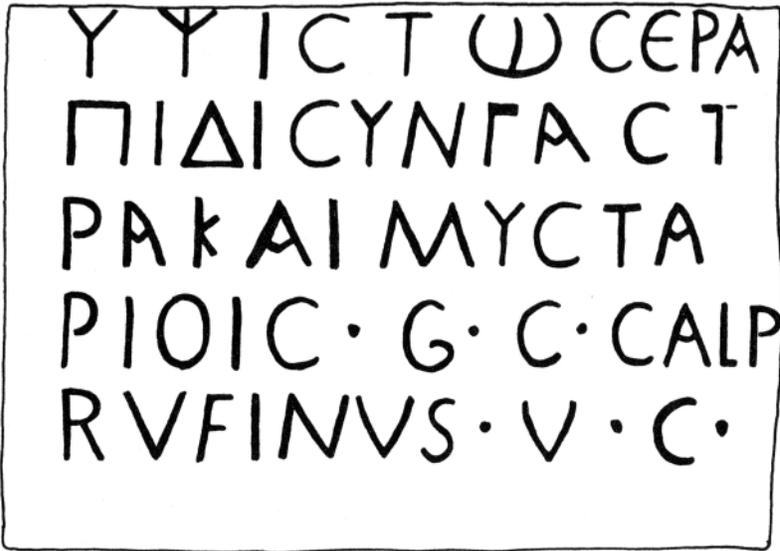


Fig. 28.3. *CIL* 02, 02395c [ALFÖLDY 1997, Abb. 5].

The result of the M.R.M., however, also differs (Fig. 28.4):

Υψύσ.τῶ Σερά/πιδι σὺν ἄν Κόρα καὶ μυστα/ρίοις.
 P(osuit?) G(aius) C(λ) Calp(urnius) / Rufinus . v(ir)
 c(larissimus).

There are several aspects that, immediately, draw the attention. In the first place, the use of the epithet *Hypsistos*⁵, very rare (ALFÖLDY 1997, p. 231); secondly the association of *Hypsistos* Serapis to κόρα, also rare, but that agrees with the doric μυστα/ρίοις in l.3.

Core, “the maiden”, is Persephone, the daughter of Demeter⁶, assimilated to Isis⁷. In the Iberian Peninsula, Core appears together with

³ See also AE 1897, 86; AE 1951, 278; AE 1997, 860; HEp 5, 1995, 1060; HEp 6, 1996, 1083; HEp 7, 1997, 1265; RAP 473.

⁴ Granite; 55 x 35 cm; ll: 6, l.2: 6; l.3: 7, l.4: 6, l.5: 7 cm.

⁵ Υψύσ(τος). See LEFEBVRE 1907, p. 237. Τω – τ(ιτ)ω, see ANDERSON et al. 1910, p. 132; Oikonomides 1964.

⁶ Hdt., VII, 65; Ar., V, 1438; Ar., Thesm., 298; Isoc., 4, 28; IG 2.1217.

⁷ Pap. Oxy. 1380, 72, 105; Plu., De Iside et Osiride, 361 F; Tac., Hist., IV, 83; App. Met., XI, 2, 5, 6; Porf. De imag. apud Eus., Paerp. Ev., III, II, 50.

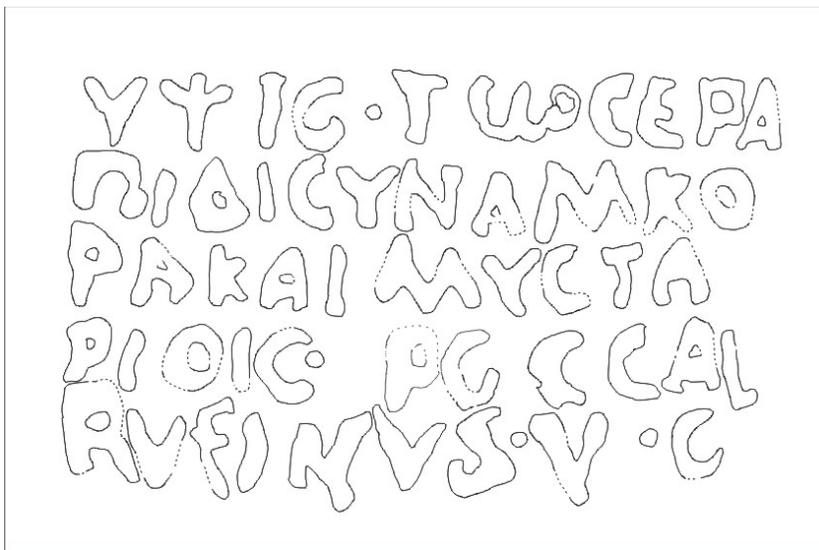


Fig. 28.4. CIL 02, 02395c: Reading from polychromatic M.R.M.

Serapis and Isis only in another inscription, from Astorga [AE 1968, 230].

However, the association of *Hypsistos* Serapis and κώρα seems to diverge of a supposed henotheist context, eventually implicit in *Hypsistos* [De Hoz 2011, p. 220]: it appears, moreover, to testify a transition period, from a predominantly chthonic cult of Serapis and Isis to a new concept of both divinities, documented, mainly, from the 3rd century onwards.

28.3.2. The Inscription of Penedo de Remeseiros, Vila Real (CIL 02, 02476)

This inscription is engraved in a small granite outcrop of 1,20 x 2,33 m, showing a profusion of abbreviations that made the reading of some parts of the text a true challenge, hence originating different interpretations (Fig. 28.5).⁸

In general, it appears to refer to a rented property, summoning a deity to assure the observance of a contract of *locatio-conductio*, in many ways similar to another one of Mérida (CIL 02, 00462).⁹

⁸ Granite; 2,50 x 0,75 m; l.1: 9; l.2: 10; l.3: 9,5; l.4: 8,5; l.5: 11; l.6: 10 cm

⁹ *Dea Ataecina Turi/brig(ensis) Proserpina/ per tuam maiestatem/ te rogo oro obsecro/ uti*

According to Argote [1732, p. 1325; apud *CIL* 02, 02476]:

Allius Reburri rogo deu(m) adiutorem / in (h)a(e)c
 conducta conservanda / si q(u)is in (h)a(e)c conducta
 p(ossessionem) mici aut meis / involaverit si R(.) quaecun-
 quae res at(?) mi(h)i / [.]A[.]S si L si qui ea res V S L V F /
 Danceroi

The proposal of Dopico Caínzos and Pereira-Menaut [1993, pp. 633-641] is quite similar:

Allius (vel os) Reburri . rogo . Deu(m) . adiutorem / in .
 (h)a(e)c . conducta . conservanda / s[i] q(u)is . in . (h)a(e)c .
 conducta . p(ossessionem) . mici . aut . meis / involaverit . si
 . R . quaecunquae res . at . mii / [.] . A . S . SI . L . Siquit . ea
 res . V . S . L . V . F / Danceroi.

On the other hand, to Búa Carballo [2000, pp. 407-412], the text should go as follows:

Alli [...] Reburri . rogo . Deu . Adiutorem / in . ac . conducta .
 conservanda / s[i]qis . in . ac . conducta . P . migi . aut . meis
 / [I]nvolaverit . si . R . quaecunquae res . at . miis / [.] . A .
 S . SI . L . siquit . ea . res . V . S . L . V . [.] / [.]anceroi .

More recently Rodríguez Colmenero [2010, pp. 134-135] considered an alternative:

Callida Reburri (filia) . rogo . Deu(m) . Adiutorem
 Dan(cerum?) / in ac(tam) . conducta(m) conservanda (m) /
 q(uis)q(u)is . in ac(ta) . conducta P(artem) . migi aut meis /
 I(?)nvolaverit . Si . R(etineretur) . Quaecumquae . Res .
 F(uratum) . Miis(?) / O(?) (mnino) . A(pportabit) . Si S(entit) .
 Si . L(iquet) . Si Quit ea pr(a)es(ens) . V(otum) . S(olvit) .
 L(ibens) . V(olenti) . D(eo) . / Danceroi .

vindices quot mihi / furti factum est quisquis / mihi im(m)u(t)avit involavit / minusve fecit eas [res] q(uae) i(n)fra s(c)ripta s(unt) / tunicas VI[p]aenula / lintea II in[dus]ium I cu(ius) [.] IOM[.]M ignoro / IA[.]lius / VI. See PEREIRA MENAUT et al. 1981, pp. 142-145.



Fig. 28.5. CIL 02, 02476: reading from polychromatic M.R.M.

It is now possible to read:

Allius L. Reburri (filius). rogo. Deu(m). Adiutorem / in.
ac . conducta . conservanda. / siqis. in . ac . conducta
. p(ossessionem). mici . aut. meis ./ invidia verit. si .
r(estituerit). quaecunquae . res. at . mii(s)./. A. N. S. SI.
L. siquit. ea . res . V. S. L(ibens). V(otum). P(osuit). /
Banceroi.

The new reading allows to correct several former proposals [FONTES 1980, p. 11, RODRÍGUEZ COLMENERO 1981, pp. 141-150, RODRÍGUEZ COLMENERO 1995, p. 136, SILVA 1986, 286-287, n. 309], and to give a new reading for the 1.4, where it is written *invidia ver(r)it*, instead of *involaverit*: the expression *invidia* is also found in a juridical Italian inscription from Canosa di Puglia.¹⁰

The contract of *locatio-conductio* is generally made *in perpetuum*, as long as the one who rents pays his *vectigal*, which lead Dopico Caínzos

¹⁰ ERCanosa 11; AE 1984, 250; AE 2003, 359; AE 2008, 417.

and Pereira-Menaut [DOPICO CAÍNZOS et al. 1993, pp. 638-639] to read in l.4 *involverit*, indicating that the *possessio* was of hereditary right, the dedicant pleading to a god to avoid anyone usurping his property.

The new reading allows a slight correction that changes this interpretation: of course this contracts had a major flaw, since according to the roman law (BOVE 1959, p. 90), if someone prevents the individual to use the possessed item, there is not much to do, besides reclaiming the owner intervention and if the owner was the state, then, it was not certain for sure; but what *Allius*, son of *Reburrus* seems to plead for, is protection against jealousy.¹¹

28.3.3. The inscription of Penedo das Ninfas, Sanfins de Ferreira, Paços de Ferreira (CIL 02, 05607)

This other inscription is also carved on a small rounded granite outcrop, of approximately 2,40 x 3,60 x 1,20 m, located at the base of an important Romanized hill fort: the *citânia* of Sanfins (Fig. 7.5).¹²

The epigraphic text is engraved on both faces of the rock, east and west, which presents on its summit, a small cross orientated precisely according to the four cardinal points that lead us to suppose it is a *decussis*, coincident with the *kardo* and *decumanus* of the urban settlement nearby, which dates from the IInd century BC till the Ist century.

¹¹ In this particular case, it seems to be related to the indicative present or perfect of the verb *verrere*, eventually meant to “sweep the jealousy away”. Another possibility could be to read *verb(o)* instead of *verit*: in this case, the expression would correspond to *absit invidia verbo*, meaning “be the jealousy be absent from these words”, since it was believed that excessive good fortune caused envy to the unseen powers (Livy, IX, 15). Nevertheless, it is written *verit*, with a clear T at the end.

¹² Granite; Side W: 55-80 x 59 cm; l.1: 12, l.2: 10; l.3: 26 cm; Side E: 75 x 145 cm; l.1: 10, l.2: 28 cm.

According to Argote [1732, pp. 766-768], it was possible to read in the eastern face

Cos . neae / P. S.

and in the western,

Fidu [...] Hic.

Vasconcelos (1905, pp. 188, 326-327) proposed, respectively:

Cosuneae / F(idem) S(olvit) numinib(us)

and

Fidu [...] Hic.

In the opinion of Silva (1980, pp. 80-82), both the inscriptions are part of the same text, which he suggests to read as:

Numidi / Cosuneae / Fiduenarum / hic / l(ibentes?) /
F(idem?) S(olverunt).

Another alternative is the one of Tranoy [TRANOY 1981, p. 273], who reads

Munidi Fiduenarum / hic

and, on the other side of the rock,

Cosuneae

To Rodríguez Colmenero [1993, pp. 80-81; 1995, pp. 194-196] is more plausible the following reading:

Munidi / Fiduene aram / hic / l(ibens) [p(osuit)]

on one side, and

Cosuneae / F(ideuene) s(olvit votum)

on the other one.

Still another proposal is the one of Búa Carballo [2000, pp. 382-383], to whom the text facing W presents

Nimidi Fiduene arum hic (finis)

and the one facing E,

Cosu Ne(meae)co Ae(dem) F(..) [(...)] S(acrauit)

More recently, Silva [2003] published again this inscription, giving an alternative reading:

Munidi/ Fiduene arum/ Hic

and

Cosuneae . / Hic S.

The result of the M.R.M confirmed the last reading of Silva, clarifying, the name of the deity as *Munidi* :

Face W:

Cosuneae . / hic s(tatuit vel statuerunt?)

Face E:

Munidi/ Fiduene arum/ hic

The principal doubts regarding this inscription concerned the name of the deity, which was read as *Niminid* or *Nimid* [ARGOTE 1732]; *numinib(us)* [VASCONCELOS 1905], *Numidi* [DA SILVA 1980]; and *Munidi* [TRANOY 1981; RODRÍGUEZ COLMENERO 1993; RODRÍGUEZ COLMENERO 1995], generally related with *nemed*, *nemeton*, from which this inscription should mark the place of an open air sanctuary [SILVA 1986, p. 300; MARCO SIMÓN 1993, p. 319]. Instead it appears to be a landmark. Given the existence of engravings in the upper part of the rock, it is possible that it was previously already a landmark, making sense, in such way, to name the indigenous tutelar deities.

28.3.4. The inscription on the shield of the warrior of Lesenho, Boticas, Vila Real.

The last case study is a possibly funerary inscription recently identified as such, engraved on a shield of a warrior statue, found at the Lesenho hillfort [CALO LOURIDO 2003, pp. 10–11; SILVA 2007, p. 683, Est. CXXI, nº 1]. This text was previously referred by Koch [2003, 80–81, 85], Redentor [2008, p. 196, 2009, p. 227] and Silva, but it was never read before, due to its extraordinary difficulty.¹³

The obtained M.R.M. allows the following reading (fig. 28.6):

Sal[i vel u?]qus / Ael[i vel l]o/ situ es[t] c(uravit)
p(onendum) a(nimo libens).

These results not only allowed perceiving an intricate decoration sculpted on the shield or *caetra*, similar to another Lesenho's statue, but also to read the Latin inscription that was carved over it, in a clear reuse of the statue.

If this statue had been designed intentionally to receive a Latin inscription, one would expect an epigraphic area to have been prepared for this purpose [RODRÍGUEZ-CORRAL 2013, p. 287]. However, it does not seem to be the case, since there isn't a clear pattern in how the inscription was placed, in contrast with the circular *caetra* decoration [GONZÁLEZ RUIBAL 2004].

Also, the fact that it corresponds to a possible epitaph posed several questions that deserve further attention. It's worth noticing that in a

¹³ Granite; l.1: 8; l.2: 6; l.3: 7-8 cm.



Fig. 28.6. Reading from polychromatic M.R.M. of the shield

total amount of 32 documented warrior statues [CALO LOURIDO 2003], so far, only 5 of them have Latin inscriptions, so it seems quite reasonable to point out that we are dealing with the exception rather than the rule [RODRÍGUEZ-CORRAL 2013, p. 287].

28.4. Towards some conclusions

The only possible conclusion drawn from this method, so far, is that there is so much work still to be done, since each and all of the difficult cases approached, implied a revision of former interpretations in several ways. Much more difficult inscriptions await and, from now on, with the support of the M.R.M. method, we are, at least, a little more prepared to accept the challenge.

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29. The EPNet Project

Production and distribution of food during the Roman Empire: Economics and Political Dynamics

*José Remesal, Albert Díaz-Guilera, Bernardo Rondelli, Xavier Rubio,
Antonio Aguilera, Daniel Martín-Arroyo, Alessandro Mosca, Guillem Rull*

Abstract

The EPNet project aims to examine the framework of the Roman economic organisation and its networks by analysing epigraphical data from amphorae. This aim is to be realised through complex network analysis, model building and computer simulation. The objective is to create an experimental laboratory for the exploration, validation and refutation of historical theories, and the formulation of new ones.

Keywords

Amphora, epigraphy, big data, network, computer simulation, Roman economy, Roman policy.

29.1. Setting the focus

The EPNet project, which recently started (March 2014), aims to apply an innovative framework and groundbreaking vision to shed new light on the ongoing debate over the political and economic implications of the Roman trade system, its organization and dynamics. The Roman Empire trade system is generally considered to be the first complex European trade network. It formed an integrated network of interactions and interdependences between the Mediterranean basin and northern Europe. Over the last couple of centuries, several scholars have developed a variety of theories to explain the organization of the Roman Empire trade system. In this context, the study of food management still represents one of the main debates among the field specialists. However, due to the lack of suitable sources, these theories continue to be speculative and difficult to falsify [GARNSEY et al. 1983, Lo CASCIO 2000] especially due to the lack of a formal framework for the analysis of the available data.

The project intends to re-examine the framework of the economic organisation and its networks by re-analysing existing empirical data through complex network analysis, model building and computer simulation. The objective is to create an experimental laboratory for the exploration, validation and falsification of existing theories, and the formulation of new ones. This approach is made possible by (among other) a large dataset of Roman amphorae and their associated inscriptions [Fig. 29.1 - 29.3] created by the CEIPAC (Centro para el Estudio de la Interdependencia Provincial en la Antigüedad Clásica) in the last 22 years [REMESAL RODRÍGUEZ et al. 2008] as well as by front line theoretical research done by José Remesal and his group in the political and economic aspects of the Roman trade system. The current version of the CEIPAC database is available at <http://ceipac.ub.edu/>.

The EPNet project team includes specialists from Social Sciences and Humanities and from Physical and Computer Sciences. These groups are all characterized by their transdisciplinary perspective and have a long experience at collaborating with specialists from different domains.

29.2. An ongoing debate: the economy of Roman Empire

A crucial aspect of any society is the production, supply and re-distribution of food. This topic has long been, and still remains, one of the open problems for sustainable decision policies in a world scale perspective. The food distribution during the Roman Empire is commonly associated with the control of the army. It is argued that the emperor and his circle managed the relationship between food and army in order to supervise and control the whole Roman territory and to strengthen and maintain their own political power.

Two approaches are particularly evident in the current debate over scales and modalities of the Roman economics system:

- a the Roman Empire trade system as a specific model not connected with modern global economies
- b the Roman Empire trade system as a sort of predecessor of modern global economies perfectly explainable through modern economic theories.

Assuming or not an analogy between past and present or vice versa, the scientific debate has focused mostly on the influence of the Empire

in long distance trade and it has not considered the role played by periphery and regional distribution.



Fig. 29.1. The result of searching for the stamp ACIRGI in the current version of the CEIPAC database. The first 10 occurrences of the stamp are shown (out of 140)

This said, the ongoing debate remains exclusively speculative and often based on rhetoric. Even recognizing the important role played by dialectic speculation and rhetoric argumentation in ancient history, we consider a different approach to be mandatory to move forward.

29.3. A groundbreaking vision

We propose to study the Roman economy by analysing food production and trade using a formal approach, focusing on the role played by regional distribution and periphery. We are not here defending a specific hypothesis against another, but we aim to contrast the several existing in a more experimental way.

Roman archaeology provides us with an incredible source of data and information about economic productions and transactions around modern Europe and the Mediterranean basin. However, a formal study of the mechanisms that have characterised these economic and political relations is still missing. The main reason is the lack of formal approaches in historical and archaeological contexts. Specialists from these disciplines often do not even consider the possibility that their research can be expressed using a formal language (a codified non-ambiguous grammar capable of generating models that can be solved,

by analytical or computational methods) such as that often used in the so-called “hard sciences”. On the contrary, ancient societies provide a great opportunity to evaluate diachronic real-world data with a virtual laboratory in which formal models can be built and different hypothesis and theories about the past explored [EPSTEIN 2008].

EPNet aims to use computer simulation as a virtual laboratory in which different techniques are exploited to encourage the formalization and falsification of scientific hypotheses about economic and political mechanisms of the Roman Empire trade network. Many practitioners of social and historical sciences continue to consider that it is not possible to reproduce “inside a computer” what past societies did and believed, because of the perceived complexity of the social, economic and political structures. Human behaviour is complex, however it is not the only complex system studied in sciences and many other systems have similar properties and behaviours to those of social structures [EPSTEIN et al. 1996]. Furthermore, complexity science and artificial intelligence have shown how the appropriate interconnection of very simple computational mechanisms is able to show extraordinary complex patterns, and now that access to distributed supercomputing (grid technologies) has become affordable, it is no longer possible to justify not applying these methods to the perceived complexity of the humanities and social sciences.

Computer simulation was first pioneered as a scientific tool in meteorology and nuclear physics just after World War II. Computer modelling and complex systems simulation have thereafter dominated the scientific debate, providing important outcomes in other sciences such as biology, environmental and life sciences. The humanities, and especially archaeology, have been lagging behind this trend and only few research groups worldwide have developed or are currently developing research programs in this direction [LAKE 2000, KOHLER et al. 2007]. However, the results are extremely promising and we think that simulation technologies have the potential to become an essential tool in the field.

In archaeology, computer simulation has been applied to study mainly prehistoric societies and rarely to explore ancient history and more recent societies. EPNet aims to fill this gap: we aim to model and simulate Roman trade networks, the paradigm of past complex trade networks. Most of the actual social simulations define a basic society through a so-called “toy” model, where a simple set of rules



Fig. 29.2. Stamp over Dressel 20 amphora that belonged to Septimius Severus and his sons

is defined in order to explore the interaction between the different possible behaviours of the agents. We aim at expanding this approach to virtual societies with complex interactions in order to explore the role and weight assumed by different aspects (parameters) and mechanisms (behaviours), which different theories have proposed or are proposing as fundamental and explanatory. Existing datasets and new data gathered during the project provide the opportunity to validate the simulation experiments with empirical data. Correlation between simulation experiments (driven by existing theories) and empirical data allows a more critical evaluation of the existing explanations as well as the possible discovery of the role played by underestimated values. In addition, computer simulation of social phenomena allows the researcher to detect important relations between parameters and behaviour that can be hidden if the system is studied by classical approaches.

29.4. Innovation

The project is articulated through three main innovative aspects. None is “new” by itself, but the combination of them represents an unexplored aspect, determining the originality and also the risk of this research.



Fig. 29.3. Titulus pictus in delta position over Dressel 20 amphora. [R A]stigis arca p(endo) ccxl / [act]us agatephori · p(ensit) · atimtion / [d(omino)] n(ostro) antonino iii et comazonte co(n)s(ulibus) [222 A.D.]

29.4.1. To explore our dataset using an exhaustive semantic approach

Semantic approaches can account for discrete data in addition to qualitative influences, so as to answer broader questions about motives and patterns of behaviour. In that perspective, a semantic model consists of a network of concepts and the relationships between those concepts. The concepts and relationships together are often known as ontology. Semantic models enable users to ask questions about the information in a natural way and help identifying patterns and trends in this information and discover relationships between disparate pieces of it. The extensive data provided by the CEIPAC database is to be connected and subsequently interpreted in a variety of levels that will give new insight to the complexity of exchange relations in the Roman Empire by moving beyond the limitations of a simple relational database. We consider this aspect essential for the generation of new knowledge about the object of study and for the definition of values and parameters that will be integrated in the simulation experiments.

In the current initial phase of the project, we are exploring and adapting existing ontologies from the domain of epigraphy with the aim to develop such a semantic model for the CEIPAC database. In this direction, the work done by the EAGLE project [ORLANDI et al. 2014] is being very helpful. We intend to reuse as much of the EAGLE's ontology as possible, not just because it is already based on solid standards such as CIDOC-CRM [CROFTS et al. 2011] and Epidoc [ELLIOTT et al. 2007], but also to leave open the possibility of a future incorporation to the Eagle federation of epigraphy databases.

29.4.2. To apply network theory to the analysis of existing data

Complex networks have become a very active field of research in the last decade, providing a common language, which tools can have a wide range of applications. A clear example of this is the application of complex networks in economy in general, and trade in particular. Examples of trade between companies or banks, and even between countries have been the subject of intense research in the last years. We aim to extend this characterization of trade networks for current economic data to the ancient trade network of some of the most basic products of Mediterranean diet (wine, oil and salsamenta). Historically, wine and oil network distributions were complementary. On the one hand, oil was a strongly controlled good and produced in a single region (first in the Bética and later on in the Roman province of Africa) to be then transported to the most distant corners of the Empire. On the other hand, wine production escaped from state control and was hence distributed from many different sources all across the empire. The complementarity of these two networks, together with new techniques developed in the complex network community to infer real networks from empirical data, is to be exploited to obtain a global image of food distribution throughout the whole Empire.

29.4.3. To use agent-based simulation to analyze the structures and dynamics of the Roman Empire trade network

The project aims to implement computer simulation as a tool to explore research hypotheses. Complex network analysis can generate several ideas about the dynamics of the system, but we need additional techniques to understand complex social spatiotemporal patterns such as those involved in Roman trade. Agent-Based Modelling is a particular type of computer simulation specialised in exploring problems which entities are capable of executing decision-making processes. These entities, the agents, interact both with other entities and with the virtual world where they live (the environment). The different processes are executed in a sequential series of regular time steps in order to check the evolution of the model over time. This mechanism can produce a chain of events capable of modifying the system and enabling new behavioural patterns to emerge from a bottom-up perspective, portraying complex qualities (the system as a whole exhibits traits that were not defined in the individual parts). By modifying and improving the

simulation we can produce data suitable to be compared with our empirical one, in such a way that this shows us the most probable historical situation. Moreover, this way we can improve the understanding of the interaction between local and large-scale trade interactions.

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30. A Multi-Layered Reserach on an Ancient Cypriot Inscription

Michalis Georgiou, Spyros Armostis, Sorin Hermon, Elena Christophorou, Valentina Vassallo

Abstract

This paper is the result of collaborative, cross-disciplinary research that integrates epigraphy, music studies and computer graphics, in order to exemplify the benefits of such a multi-layered approach in the study of ancient inscriptions. The paper is documented by a rich, descriptive multi-disciplinary metadata schema that captures the characterization of the inscription from archaeological, epigraphic, musical and 3D documentation aspects. As a case study, we analyzed a Cypriot inscription dedicated to Eulalios from an epigraphical perspective and attempted to compose the music based on its metre. Moreover, the instrument likely used to perform such music was physically reconstructed. This replica was documented in 3D with a laser scanner. All information was integrated in a digital repository, whereby the user is able to study the text of the inscription, its Modern Greek translation and *apparatus criticus*, to read about the history of its investigation, to listen to the reconstructed music and to explore the 3D model of the instrument.

Keywords

Ancient Cypriot inscriptions, digital epigraphy, Eulalios epigram, ancient music, 3D documentation, metadata.

30.1. Introduction

Digital libraries [ROSS 2012, LYNCH 2002, CRANE 2002] are in continuous development and improvement. Since their beginning more than 20 years ago, they have developed from warehouses of digital data to partners in the way one searches, retrieves and analyses digital information. The impact of such an approach on science is tremendous; one may have access instantaneously to a wide range of information about nearly anything. Many technological challenges remain, including the questions of data storage and query. Many digital libraries,

by copying their behaviour from their physical counterparts, have ignored powerful tools which digital technologies offer. Others often are still domain restricted, with limited access and content. In this paper, we will present an example of a digital library created around multi-disciplinary research that can enhance the characterization of cultural heritage assets, including an ancient inscription now without direct access.

The Eulalios epigram [Voskos 1997, pp. 112-3], the subject of this paper, is one of 84 epigraphic texts included in the *Archaia Kypriaki Grammateia* Digital Corpus project (AKGDC), an online digital library consisting of Ancient Greek and Latin texts produced within a time span of ca. 13 centuries (from the 7th century BC to the 6th century AD), which are attributed to Cypriot (or likely Cypriot) authors or were produced in Cyprus [PITZALIS et al. 2012]. The epigraphic texts of the *corpus* consist mainly of funerary or dedicatory epigrams, published with their translation in Modern Greek, critical apparatus and philological comments. AKGDC data includes 3D models, digital texts, images, audio and video material that will be made available to the wider public through the EAGLE (Europeana Network of Greek and Latin Epigraphy)¹ and Europeana² portals. EAGLE, an EU funded project, aims at creating a one-stop portal for a multi-disciplinary information on Ancient Greek and Latin inscriptions. Users will be able, through direct access to a large corpus of data and metadata descriptions stored in various collections across Europe, to browse, query and investigate various fields of information (epigraphy, philology, archaeology, geology, etc.) about these ancient inscriptions. One such inscription (the subject of this paper) demonstrates the advantages of a multi-disciplinary approach and its related digital technologies. The metadata integrate textual information with audio and 3D data; users have access both to the rich metadata description, as well as to the digital objects themselves. Such metadata includes the original inscription, its translation into Modern Greek, its “translation” into musical sounds and the 3D model of an instrument presumably used during its performance.

¹ <http://www.eagle-network.eu/>

² Europeana is an internet portal that acts as an interface for millions of books, paintings, films, museum objects and archival records that have been digitized throughout Europe. Europeana gives access to different types of content from various heritage institutions. <http://europeana.eu/portal/>

30.2. The Eulalios inscription (AKGDC, E40)

30.2.1. Historical Background

The inscription dedicated to Eulalios is dated to the 2nd-3rd century AD, according to Peek and Hadjioannou [HADJIOANNOU 1980, p. 110, PEEK 1955, p. 1325] and was found in Nicosia, Cyprus. Its current location is unknown. The description of the inscription itself and the consequent edition of its text by scholars derive mainly from secondary sources. References and details about the inscription and the epigram are found in Engel and Peristianis [ENGEL 1841, p. 152 (vol. I), PERISTIANIS 1995]. The text of the inscription, engraved on the cover's upper part of a marble larnax, was published by Engel (although the latter did not visit Cyprus) and was later elaborated by Boeck [PERISTIANIS 1995, p. 708]. Sakellarios [1890, p. 213 (vol. A)] also did not see the inscription but copied the epigram from other sources without commenting on it [PERISTIANIS 1995, p. 708]. Peristianis provides extensive details about the dimensions of the sarcophagus, which is 2.11 × 1.86 m. long, 96 cm deep, 11 cm thick and weighs approximately 2 tons. A supposed George Tsielepis offered 2000 piastres to the pasha of Nicosia in 1821 to acquire the sarcophagus, but his offer was rejected. After several years, the sarcophagus' cover was probably sent to Instabul and may still be in the museum [PERISTIANIS 1995, pp. 707-8]. From Peristianis' description, the sarcophagus' cover depicted the image of the dead Eulalios, together with an epigram of eight lines dedicated to him. The first two lines of the text have larger letters than the other six, and a horizontal gap exists between the first two lines and the remainder of the text [PERISTIANIS 1995, pp. 707-8]. The epigram is engraved within a frame of 68 × 4 cm, with two triangles near the vertical sides of the frame [PERISTIANIS 1995, pp. 707-8]. Although direct access to the inscription is impossible today, we may reconstruct aspects of it through this multi-layered study.

30.2.2. Metrical analysis of the inscription and its reflection in the musical composition

Although the inscription does not bear any musical notation, the poem creates such sentiment that, from a musician's point of view, this sentiment could be enhanced if conveyed also in music. Thus, the musician M. Georgiou undertook the task of composing music for this inscription, based on the composition of original ancient Greek music

pieces. When composing music for a modern piece, a composer has much freedom regarding melody movement, scale, tessitura, tempo, and —to some extent— rhythm and note values. This was not the case with ancient Greek musical composition: scale and tessitura were selected according to the sentiment of the lyrics (and genre conventions), while melody movement followed word pitch accents in a very specific manner [30.2.3], and note values and rhythm were more strictly bound by the lyrical metre. Therefore, composing music for an Ancient Greek epigram requires knowledge of the ancient language, metrical and prosodic structure of the poem and the sentiment produced by the lyrics. While these elements do not guarantee that the resulting composition exactly reflects the ancient version (had an ancient poet composed music for his poem), they do render the attempted composition plausible.

Regarding its metrical structure, the editions of the inscription vary with regard to line numbering and text reconstruction, as some letters were not easily decipherable, especially in the first three lines. The metre of the inscription is elegiac (with the exception of the first two lines). The inscription was found divided into eight lines, or four couplets [PERISTIANIS 1995, pp. 707-8]. In all other editions, the first two lines are merged into one, in order to create a hexametric line. However, this merged line not only exceeds the hexameter by one foot but also lacks a second line to form an elegiac couplet. Whether we choose to keep the inscription as it is or to merge the first two lines, metrical anomalies emerge which need to be resolved for the purposes of musical composition [Fig. 30.1].

The composer M. Georgiou has adopted the choice of merging the first two lines, with the caveat of the extra foot and the absence of the second line of the elegiac couplet. In order to resolve the lack of this line, Georgiou added the line in orchestral form, the closest solution to forming an elegiac couplet at the beginning of the composition. The remaining couplets exhibit no metrical anomaly. In addition, an instrumental elegiac couplet was added at the beginning of the composition as an introduction that adds tonal and emotional balance to the audience before the main composition [Fig. 30.2]. Regarding the rhythmical aspect of the composition, the duration of the musical notes corresponds to the text metre: short syllables are rendered as one beat, with long syllables as two [WEST 1992, p. 130]. Long syllables may be

mentions that 'the musical mode and rhythm must match the language', while Aristotle [*Politics* 1340a-b] characterizes melodies in relation to the modes as 'imitations of character'. Regarding its character, the Eulalios epigram is of great interest. The deceased addresses the passer-by and informs him about his death. He analyses his transition from the physical and ephemeral world to the world of the ether and the immortal soul. His words are redemptive for the living relatives and friends, as the epigram creates the feeling of joyous sorrow. This most intensive feeling appears, for example, in ancient Greek tragedy as the final sentiment that leads to catharsis and redemption of the soul. Based on these emotions, the Dorian mode is most appropriate for the musical composition of this epigram: Socrates in his dialogue with Glaucon refers to this mode, which was considered the Greek mode *par excellence*, and mentions that it 'would fittingly imitate the utterances and the accents of a brave man who [...] confronts fortune with steadfast endurance and repels her strokes' [Plato, *Republic* 399a-b].

In this composition, the Dorian mode appears in two *genera*, the diatonic and the chromatic. The *genus*, the basic structural unit in Ancient Greek musical theory, is the structure of a *tetrachord* with regard to the musical intervals used [WEST 1992, p. 162]. Different *genera* create different sentiments and play a role in the character of the piece [MICHAELIDES 1978 s.v. *ethos*]. In this composition, the diatonic and chromatic *genera* alternate with one another according to the character and the sentiments created by the lyrics. The tonal pitch of the musical composition is determined by the vocal range of the singer. In this case, the pitch of the Lydian *Tónos* was selected (the several *Tónoi*, or keys, were particular vocal ranges of different pitches), as the Dorian mode in this *Tónos* is closer to the vocal range of a tenor, and because this *Tónos* was frequently used in extant musical pieces of the same era [HAGEL 2009, pp. 287-9].

Ancient Greek did not have stress (as is the case of Modern Greek), but rather pitch accents. The pitch accents of Ancient Greek were three: acute, grave and circumflex. A syllable with an acute accent was one of high pitch, while a syllable with a grave accent was one of lower pitch. A syllable with a long vowel or diphthong bearing a circumflex combined a high and low accent within the same syllable [ALLEN 1968, pp. 106-114]. This nature of pitch accents and the metrical structure of the lyrics are directly reflected in musical compositions regarding melodic movement and rhythm respectively [DEVINE et al. 1994, pp. 171-194].

Thus, the general outline of the piece's melodic movement is inferred from the lyrics, while the exact melodic line the piece will follow is left to the creativity and inspiration of the composer [Fig. 30.2].

30.3. 3D documentation of musical instruments

Two key areas of ancient music research are the manufacture of ancient instruments and their actual sound. The *Terpandros ensemble*, with its musicians, researchers and M. Georgiou, the composer and creator of replicas of ancient instruments, have attempted for several years to revive Ancient Greek music [GEORGIU 2007]. Such comparative research is based on textual analysis, graphic representation on ancient artefacts (e.g. inscriptions, reliefs, vessels, etc.) and historical research. The reconstructed instruments are played by an ensemble,³ whose aims are the research of ancient Greek civilization and revival of ancient Greek music. The instruments belong to three categories, according to the modality of the sound they produce: stringed, percussion and wind. All were used, among others, to perform the musical score that the composer Georgiou wrote for the Eulalios epigram.

In order to visually enhance the inscription and to improve accessibility to a variety of aspects of its interpretation, one instrument was documented in 3D with a laser scanner. This work will be integrated with the activities of EMAP (The European Music Archaeology Project),⁴ in order to create an exhibition on the history of European music with digital and physical replicas of ancient instruments and recordings of ancient music. The first instrument chosen was the *phorminx* (κιθάρα or φόρμιγξ in Ancient Greek), one of the oldest stringed musical instruments and intermediate between the lyre and *kithara*. Mentioned in Homer's *Odyssey* and described by numerous adjectives (beautiful, graceful, golden, cast in ivory), it belonged to the family of hollow *kitharas* (the term *phorminx* was often used in poetry to replace the general term of the lyre) and likely was the instrument used by singers.

³ The orchestra is called *Terpandros* after the Greek poet and citharede of Antissa in Lesbos, who was considered the father of Greek music.

⁴ The European Music Archaeology Project (EMAP, <http://www.emaproject.eu>) is funded by the Cultural Programme of the European Union (Education, Audiovisual and Cultural Executive Agency - EACEA). The project aims to highlight Europe's ancient cultural roots from unusual perspectives: musical, scientific and "sensorial". The Cyprus Institute - STARC is a project partner in this initiative.

It consisted of two to seven strings, decorated arms and a crescent-shaped sound box. This sound box has a hollow shape and each arm rests on a specific part of the soundbox, thus enabling an imperceptible lateral motion which creates a wave-like resonance. The reconstructed instrument, reproducing a *phorminx* of the 8th century BC, is made entirely of wood and measures 65 × 46 cm; the depth of the sound box is 6,5 cm.

The instrument was digitally documented using a Next Engine laser scanner, based on multi-stripe laser triangulation. Given the high geometric complexity of the instrument, its size and its fragility, 99 scans were needed in order to register all facets, often with changing scanning parameters, given the high variability of reflections within small areas along the object's surface. The object was also digitally photographed (48 photos) using diffused light, in order to apply a texture that returns an exact colour of the original. The final 3D model, including the applied texture and meshes, was obtained using Meshlab open-source software, following a procedure that guaranteed a high accuracy of the digital reproduction [ATHANASIOU et al. 2013] [Fig. 30.3].



Fig. 30.3. 3D model of the replica of an ancient phorminx

The whole range of information regarding the above work (data on the history of the inscription, its musical translation, the creation of the ancient instrument replica, the composition of the song and the 3D replica) has been gathered together and archived in a digital repository. A metadata schema (described below) [Fig. 30.4] covers

the multi-disciplinary research presented above, in such a manner that users comprehend the complexity of such an approach through access to heterogeneous types of information.

30.4. Metadata for Ancient Cypriot Inscriptions

Inscriptions represent ancient life in all its aspects, including religion, history, science, medicine, philosophy, and social relations. Thus, any descriptive system for a digital library with inscriptions should include related heterogeneous information. A proposed metadata schema for Ancient Cypriot inscriptions [VASSALLO et al. 2013] integrates multi-disciplinary information regarding the objects and their digital ‘surrogates’ (3D models, photographic documentation, digital texts, transliterations, videos, audios, etc.). Such a schema is the result of the assessment and comparisons of schemas, models and ontologies already in use in the digital epigraphy field (e.g. TEI Epidoc, Dublin Core, CIDOC-CRM) and implemented by main digital archives. While traditional schemas describe inscriptions mostly from an epigraphic perspective, we propose a multi-disciplinary approach for such descriptions, as proven efficient elsewhere [HERMON et al. 2012], particularly when dealing with 3D surrogates of cultural heritage artefacts. Such descriptions detail the process implemented in creating the 3D representation (and its various multi-media components), data provenance and its digital manipulation. Thus, along with philological information (e.g. genre of the text of the inscription, metre, critical apparatus, philological debates), bibliographical data and commentaries, we describe other aspects of the inscription, along with the construction of its digital representation, with each component along the production process. Consequently, by fully tracing the scientific process, one may evaluate the quality of data produced at each stage.

The metadata schema is organized in groups corresponding to different research areas clustered in wrappers and sub-wrappers, in order to fully describe all information that the ‘asset inscription’ contains. This schema, distinguished by its multidisciplinary structure, embraces all disciplines relevant for description and representation, including archaeology, philology, chemistry, geology, conservation, visualization and museology.

As with the Eulalios inscription, one can describe not only the inscription itself, but also the digital provenance of the instrument’s 3D

model used to play the musical composition. In the same way, the audio file of the musical performance contains all digital characteristics. This information provides the description of its creation (the technique, the tool, the specification of the tool, the specification of the output, etc.) the post-processing (the operative info, the file specifications, etc.) and the digital output (data format, software, etc.) [Fig. 30.4].

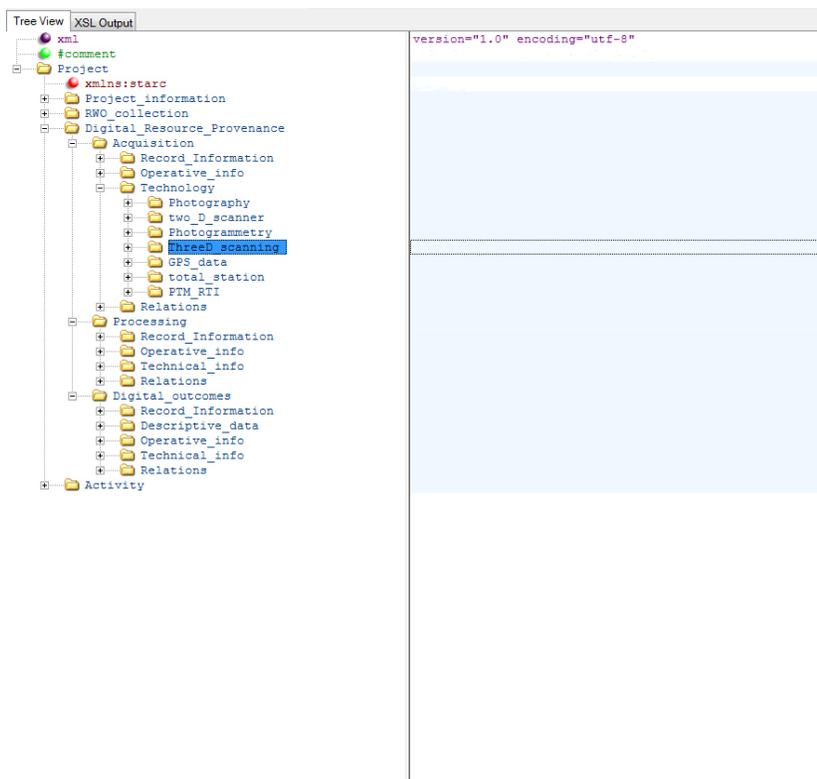


Fig. 30.4. The metadata schema: the structure

30.5. Conclusions

Since the beginning of the 21st century, with the development of internet technologies and web 2.0, the number of online accessible repositories and archives for ancient inscriptions has increased substantially. Many projects developed by universities and cultural institutions for the digitization of epigraphic corpora are currently available online. The research presented in this paper demonstrates the usefulness of

a cross-disciplinary metadata schema for ancient Cypriot inscriptions, given the nature of such artefacts. A pivotal role in accessing the information and revealing the multi-faceted aspects of ancient inscriptions is played by tools that reveal embedded information, such as those developed and presented above. A rich characterization of ancient inscriptions, based on heterogeneous yet complementary research disciplines, reveals through multi-disciplinary research both to the scientific community and to the general public the great amount of embedded information for such objects. Moreover, the use of the entire range of multimedia available (music recordings, video recordings of performances, digital texts and 3D models of instruments) clearly demonstrates the worth of digital libraries in creating a new approach to science and its dissemination.

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A. Panels

Number	Chairs	Title
A.1	Michele Brunet, John Bodel and Marie-Claire Beaulieu	Dealing with the Whole Object: the Archaeological Dimension of Epigraphy
A.2	Federico Boschetti, Marion Lamé, Matteo Dellepiane, Eleni Bozia, Angelos Barmpoutis, Serge Rosmorduc, Stéphane Polis and Giulia Sarullo	Technology and tradition: a synergic approach to deciphering, analyzing and annotating epigraphic writings
A.3	Sorin Matei, Beatrice Joyeux Prunel, Catherine Dossin, Lea Saint-Raymond and Olivier Marcel	Digital Humanities Publishing and Collaboration Strategies and Frameworks
A.4	Vittore Casarosa, Giuseppe Amato and Fabrizio Falchi	Mobile Applications in Cultural Heritage
A.5	Faith Lawrence and Terhi Nurmikko	Linked Ancient World Data

Tab. A.1. Panels at the EAGLE 2014 conference

A.1. Dealing with the Whole Object: the Archaeological Dimension of Epigraphy

Michele Brunet, John Bodel and Marie-Claire Beaulieu

Due to the double nature of inscriptions as both archeological objects and texts, the study of epigraphy must be rooted in the material context of inscriptions. How can digital tools and methods enhance epigraphical scholarship so as to produce editions and studies that treat inscriptions as whole objects, both textual and material? How can we train the next generation of epigraphists to put these orientations into practice? The project “Visible Words: Research and Training in Digital Contextual Epigraphy”, recently funded by the Partner University Fund, addresses these questions from different angles. Our panel will focus on the main aims and goals of this project, as well as on pressing issues in digital epigraphy of more general concern.

Three short presentations from the panel chairs will address:

- the issue of metadata categories, definitions and taxonomies
- steps toward a Linked Open Data implementation of a core epigraphic taxonomy, an ultimate goal being to make an adaptable template available to the wider digital community
- the technical framework, image mapping capabilities and future plans for the Perseids Platform as they apply to epigraphy.

Each presentation will be followed by a brief question period, and the session will include ample time for a roundtable discussion. In particular, we are eager to identify other practitioners of «digital archaeological epigraphy» and to map out possible collaborations. Secondly, we are interested in defining common needs and resources of the EAGLE consortium. One crucial topic is the question of bibliography. How are we to handle bibliographical information across the various projects and platforms participating in EAGLE? Can we and should we establish a shared bibliographical repository?

A.1.1. Panelists

Bridget Almas (Perseus Digital Library)

Marie-Claire Beaulieu (Tufts University)

Monica Berti (Universität Leipzig)

Scott DiGiulio (Brown University)

John Bodel (Brown University)

Michèle Brunet (Université Lyon II-IUF)

Laurent Coulon (CNRS-HiSoMA)

Thomas Elliott (New York University)

Arlo Griffiths (EFEO)

Emmanuelle Morlock (CNRS-HiSoMA)

Elli Mylonas (Brown University)

A.2. Technology and tradition: a synergic approach to deciphering, analyzing and annotating epigraphic writings

Federico Boschetti, Marion Lamé

This panel intends to discuss the advantages of computer-assisted study of writings as well as the exigency for collaboration between digital and traditional epigraphists. The advances in computing in the past few decades have resulted in the development of several digital tools meant to assist scholars decipher and analyze inscribed symbols. Some of the techniques involve 2D or 3D digitization of the inscriptions and various post-processing methods that help scholars recognize the inscribed characters or symbols, analyze their structure, and study writing techniques. This interdisciplinary panel that consists of computer scientists, computational linguists, heterogeneous writings experts (archaic Latin, cursive Latin, Egyptian writings), and epigraphists will address the following issues: the use of traditional and digital methodologies for deciphering and analyzing inscriptions, the accuracy and efficacy of a computer algorithm that tries to solve the same problem, text representation problems when iconicity is involved, optimal ways to train digital tools, and to what extent 2D, 3D representations, and text encodings follow, imitate, and enhance traditional methodologies.

Panelists

Federico Boschetti (ILC - CNR, Pisa)

Marion Lamé (ILC - CNR, Pisa)

Matteo Dellepiane (ISTI - CNR, Pisa)

Eleni Bozia (University of Florida - Universität Leipzig)

Angelos Barmpoutis (University of Florida - Universität Leipzig)

Serge Rosmorduc (Conservatoire National des Arts et Métiers, Paris)

Stéphane Polis (National Fund for Scientific Research - Belgium)

Giulia Sarullo (Università degli Studi di Enna "Kore")

A.3. Digital Humanities Publishing and Collaboration Strategies and Frameworks

Sorin Matei

As the number of publishing, mapping, and data management platforms proliferate, many technical and methodological incompatibilities may also appear, endangering the ideal of open communication. Scholars need practical methods to connect them so that information can efficiently flow across them to generate new scholarship. Removing potential walls between narratives, primary data, and maps holds particular importance for the spatial humanities. As the publishing world shifts from static, paper-based to interactive, online platforms need to make sure that established practices for evaluating and disseminating humanities endeavors are continued, even as new publication methods are encouraged. One strategy for meeting this strategy is loose coupling. By it researchers can loosely integrate data synthesis, curation, and dissemination between already well-established databases, content management, and publishing systems. In loosely coupled systems, components share only a limited set of (usually simple) assumptions. The projects discussed in the panel use a more evolved type of “loose coupling” which relies on open APIs and data feeds (RSS and JSON) to send information back and forth. Feeds are streams of data units, containing descriptions of the content found on a site that is broadcast by a site widely and can be picked up and reused by any other site as if it were its own data. In proposing “loose coupling” for integrating digital humanities projects we advocate for an evolutionary design philosophy, since components that have very few dependencies on one another can evolve independently.

Panelists

Sorin Matei (Purdue University, Brian Lamb School of Communication)

Beatrice Joyeux Prunel (ENS)

Catherine Dossin (Purdue University)

Lea Saint-Raymond (ENS)

Olivier Marcel (ENS)

A.4. Mobile Applications in Cultural Heritage

Vittore Casarosa, Giuseppe Amato and Fabrizio Falchi

In the last few years, there has been a growing attention to applications based on mobile devices. Recent consumer mobile devices (such as smartphones and tablets) support a good interactivity and the possibility to transmit and receive multimedia content. High definition cameras, high computing power (parallel CPUs) and high definition displays have also made possible to augment the reality with context dependent multimedia information and 3D objects. In parallel with that, the use of Information Technologies in Cultural Heritage, though not yet as widespread as it is in the STEM disciplines (science, technology, engineering, and mathematics) is becoming more and more common in many different application fields, like for example social sciences, linguistics, philology, history, music, archaeology, etc. It is therefore natural that the interest for mobile applications in Cultural Heritage has grown rapidly in recent years. In fact, Cultural Heritage offers many environments where mobile applications can provide a really added value to the user experience, such as touristic routes, cities, parks, archaeological sites, ancient buildings, and museums. Mobile applications are very often context and location aware applications, and the added value therefore may come in the form of providing context dependent information. For location awareness, mobile applications can offer image recognition capabilities, by identifying an image sent by the mobile device within a pre-defined data base of images, and providing the associated information; this capability can be in addition or in substitution of GPS information, which is nowadays almost always provided by mobile devices. Another aspect of mobile applications is that the user can be not only the information consumer but can be also an information producer, by collecting context tagged data and providing them to a central repository, for later use of for the benefit of other mobile users. At the same time, the possibility of providing information interactively, in a context and location aware environment, with information tailored to the preferences and profile of a specific user, can open the way to a new set of issues regarding privacy and trust. The objective of this panel is to bring together experts and researchers from both information science and humanities, so that they can share their experience with the audience and hopefully

stimulate some debate and discussion engaging the audience in the comparison of different opinions and solutions.

Panelists

Giuseppe Amato (ISTI-CNR, Pisa)

Sorin Hermon (Cyprus Institute)

Philippe Martineau (EUREVA)

Andrea Zanni (Wikimedia Italia)

Susan Hazan (The Israel Museum and Europeana)

Franco Niccolucci (Polo Universitario Città di Prato)

A.5. Linked Ancient World Data

Faith Lawrence and Terhi Nurmikko

The Linked Open Data (LOD) approach, which entails the use of URIs and Semantic Web technologies to publish datasets in machine-readable formats under open licences, has become increasingly popular to digital humanists as a way of breaking away from the specter of the infamous 'data silo'. The success of the Pelagios project has demonstrated how classical geographic information can be used to bring together a wide variety of projects while the newly founded SNAP:DRGN initiative aims to provide a similar service for prosopographical and onomastic data. At the same time the use of CIDOC CRM/FRBR-OO has grown in cultural heritage and archaeological domains resulting in significant collections of linked-data ready material just waiting to be connected. The ancient world offers a real opportunity to enhance understanding on both the technological and humanistic sides of the digital humanities. This panel brings together a group of international pioneers and experts from a range of academic disciplines and professional backgrounds to discuss the role of LOD in the scholarship of the ancient world as well as current general best practices with a specific focus on the themes of:

- Place
- People and people-like entities
- Texts as evidence
- Interoperability and the exploitation of structured data

s The panel will also address the problem of data creation by and the communication and dissemination of ideas to both non-technical and non-specialist audiences.

Panelists

Gabriel Bodard (King's College London)

Hugh Cayless (Duke University)

Faith Lawrence (King's College London)

Daniel Pett (The British Museum)

Ryan Baumann (The British Museum)

B. List of Posters presented

All posters can be seen in the digital poster exhibition on the Eagle website. www.eagle-network.eu/about/events/eagle2014/digital-poster-exhibition/

Author	Title
Karin Lundqvist and Giacomo Landeschi	From CIL to GIS: Exploring Pompeian Inscriptions through an Integrated 2D-3D Approach
Paola Cavaliere, Danila Piacentini and Massimiliano Vassalli	Minima Epigraphica: Project Scrittura su Argilla e Ceramica. Everyday Writing in the Phoenician-Punic West
Rebecca Benefiel and Sara Sprenkle	The Herculaneum Graffiti Project: Reenvisioning the Ancient City
Csaba Szabó	Géza Alföldy on the facebook. Popularizing ancient history and epigraphy: future perspectives
Valentina Bachi, Manuele Buono, Antonella Fresca, Tania Masi, Claudia Pierotti and Claudio Prandoni	digitalmeetsculture.net - Interactive e-zine where digital technology and culture collide
Alessandra Giovenco	IPR issues. The British School a Rome: a case study
Daria Spampinato	BILG - Inscriptiones Graecae et Latinae Bruttiorum. A digital corpus in EpiDoc of Roman Law inscriptions
Julie Masquelier-Loorius and Mélanie Flossmann-Schütze	Database of Egyptian Sed-Festival & Ritual Texts and Scenes (Deserts)

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Author	Title
Adeline Levivier	E-Stampage Project : Towards a Digital Library of Squeezes
Pierfrancesco Bellini, Paolo Nesi and Michela Paolucci	IPR Tools for Content Aggregators
Elisa Orlando	Geographic Information System-A suitable bridge between Epigraphy and Archeology
Jonathan Prag	I. Sicily: A digital corpus of inscriptions from ancient Sicily
Anna Maria Marras	The first (social) time The Archeological National Museum of Cagliari 2.0
Maude Côté-Landry, Haley Bertram and Lisa Tweten	From Stone to Screen: Digitizing Epigraphic Squeezes
Stefania Chipa	Free, open and mobile. An open platform solution changes the rules of the game into museums.
Fabio Paglia	Flickr and Epigraphy. Description of an experience
Valentina Zović and Marina Zgrablić	Promotion of Ancient Heritage on Social Networks (Example of Croatian Regions Istria and Dalmatia)
Amanda Kelley	Best Practices of an Amateur Epigrapher: One Woman's Experience with an Epigraphy Database
Lorenzo Calvelli, Francesca Crema and Franco Luciani	The Nani Museum: Towards the Virtual Reconstruction of a Dispersed Epigraphic Collection
José Remesal, Albert Díaz-Guilera, Bernardo Rondelli, Xavier Rubio, Antonio Aguilera, Daniel Martín-Arroyo, Alessandro Mosca and Guillem Rull	The EPNNet Project. Production and distribution of food during the Roman Empire: Economics and Political Dynamics
Anita Rocco, Daniele Mittica, Michele Pellegrino	Low-cost structure from motion technology. An open approach for epigraphical digital reconstruction

– continued on next page

Table B.1 – continued from previous page

Author	Title
C. Breytenback, K.Hallof,	Inscriptiones Christianae Asiae
U. Huttner, E. Sironen, C. Zimmerman, J. Ogereau, M. Veksina, J. Krumm	Minoris / Graeciae
RICHS Project: Recalibrating Relationships	www.riches-project.eu
PREFORMA Project: Future Memory Standards	www.preforma-project.eu
Europeana Space	www.europeana-space.eu
Civic Epistemologies	www.civic-epistemologies.eu
Paul Hudson	Romans Go Home: Latin and Greek apps for iPhone, iPad and Android

Tab. B.1. Posters presented at the conference

C. List of authors

Agócs Nándor

agocs.nandor@gmail.com
Hungary
University of Pécs

Bachi Valentina

bachi@promoter.it
Italy
Promoter Srl

Armostis Spyros

spyros@terpandros.com
Cyprus
Terpandros Ensemble

Barmpoutis Angelos

angelos@digitalworlds.ufl.edu
United States
University of Florida

Agrimonti Simone

simone.agrimonti@gmail.com
USA
University of Cincinnati

Bartoli Dante

dante.bartoli@gmail.com
Italy
Gruppo Archeologico
Ambrosiano, Milano

Aguilera Antonio

aguilera@ceipac.ub.edu
Spain
Universitat de Barcelona

Beaulieu Marie-Claire

Marie-Claire.Beaulieu@tufts.edu
United States Tufts University
PUF Program Visible Words

Amato Giuseppe

giuseppe.amato@isti.cnr.it
Italy
ISTI-CNR

Bellini Pierfrancesco

pierfrancesco.bellini@unifi.it
Italy
University of Florence
DINFO

Antonini Anna

annant58@yahoo.it
Italy
a) Associazione MiMondo
b) Museo delle Culture, Milano

Bencivenni Alice

alice.bencivenni2@unibo.it
Italy
Alma Mater Studiorum
Università di Bologna

Avanzini Alessandra

avanzini@sta.unipi.it
Italy
University of Pisa

Benefiel Rebecca

benefielr@wlu.edu
United States
Washington & Lee University

Berti Monica

monica.berti@uni-leipzig.de
Germany
University of Leipzig

Bertram Haley

h.bertram@alumni.ubc.ca
Canada
University of British Columbia

Bigi Francesca

frabigi@googlemail.com
Italy
British School at Rome

Bodel John

john_bodel@brown.edu
United States
Brown University
PUF Program Visible Words

Bonacini Elisa

elisabonacini@iemest.eu
Italy
Invasioni Digitali

Boschetti Federico

federico.boschetti@yahoo.com
Italy
Istituto di Linguistica
Computazionale
"A. Zampolli" - CNR

Bozia Eleni

bozia@ufl.edu
United States
University of Florida

Brunet Michele

Michele.Brunet@univ-lyon2.fr
France
Université Lyon 2
PUF Program Visible Words

Buono Manuele

buono@promoter.it
Italy
Promoter Srl

Calvelli Lorenzo

lorenzoc@unive.it
Italy
Università Ca' Foscari Venezia

Campedelli Camilla

campedelli@bbaw.de
Germany
Corpus Inscriptionum
Latinarum

Casarosa Vittore

casarosa@isti.cnr.it

Italy

ISTI-CNR

Cavaliere Paola

paolacavaliere@inwind.it

Italy

Independent Researcher

Ceci Michelangelo

michelangelo.ceci@uniba.it

Italy

University of Bari "Aldo Moro"

Chiesa Sara

sara.chiesa@polimi.it

Italy

a) Associazione MiMondo

b) Museo delle Culture, Milano

Chipa Stefania

stefaniachipa@gmail.com

Italy

IZI.travel

Christophorou Elena

e.christophorou@cyi.ac.cy

Cyprus

The Cyprus Institute - STARC

Consonni Cristian

kikkocristian@gmail.com

Italy

a) Wikimedia Italia

b) Digital Commons Lab

Fondazione Bruno Kessler

Trento (TN)

Correia Dos Santos Maria Joao

saxumsacrum@gmail.com

Portugal

University of Lisbon

Côté-Landry Maude

maudecl@alumni.ubc.ca

Canada

University of British Columbia

Crema Francesca

fcrema@unive.it

Italy

Università Ca' Foscari Venezia

De Gottardo Francesca

francescadegottardo@gmail.com

Italy

#svegliamuseo

Dellepiane Matteo

matteo.dellepiane@isti.cnr.it

Italy

Istituto di Scienza e Tecnologie

dell'Informazione "A. Faedo" -

CNR

De Nicolao Pietro

powerdn@gmail.com

Italy

Wikimedia Italia

De Santis Annamaria

annamaria.desantis@sns.it

Italy

Scuola Normale Superiore

Di Marco Rossella

dimarco.rossella@libero.it

Italy

a) Associazione MiMondo

b) Museo delle Culture, Milano

Díaz-Guilera Albert

albert.diaz@ub.edu

Spain

Universitat de Barcelona

Dossin Catherine

dossin@purdue.edu

United States

Purdue University

Falchi Fabrizio

fabrizio.falchi@isti.cnr.it

Italy

ISTI-CNR

Felle Antonio Enrico

ae.felle@gmail.com

Italy

Università degli Studi di Bari
"Aldo Moro"Dipartimento di Scienze
dell'antichità

e del Tardoantico

Fernández Martínez Concepción

cfernandez@us.es

Spain

CIL XVIII/2 and CIL XVIII/3
Project

Universidad de Sevilla

Flossmann-Schütze Mélanie

melanie.flossmann@web.de

Germany

Ludwig Maximilians

University Munich

Fonte João

joaofonte@gmail.com

Portugal

Instituto de Ciencias del Patri-
monioConsejo Superior de Investiga-
ciones Científicas**Franco Sara**

sarwilce@tin.it

Italy

a) Associazione MiMondo

b) Museo delle Culture, Milano

Frasson Federico

federico.frasson@gmail.com
Italy
Università degli Studi di Genova

Fresa Antonella

fresa@promoter.it
Italy
Promoter Srl

Giovenco Alessandra

a.giovenco@bsrome.it
Italy
British School at Rome

Gasparotti Valeria

valeria.gasparotti@gmail.com
Italy
#svegliamuseo

Georgiou Michalis

terpandros@cytanet.com.cy
Cyprus
Terpandros Ensemble

Gonçalves-Seco Luis

lgseco@gmail.com
Portugal
Instituto Superior da Maia

Farkas István Gergő

farkas.istvan.gergo@gmail.com
Hungary
University of Pécs

Hermon Sorin

s.hermon@cyi.ac.cy
Cyprus
The Cyprus Institute

Paul Hudson

paul.hudson@gmail.com
United Kingdom
Romans Go Home

Kelley Amanda

akelley1@kent.edu
United States
Kent State University

Lamé Marion

marion.lame@ilc.cnr.it
Italy
Istituto di Linguistica
Computazionale
"A. Zampolli" - CNR

Landeschi Giacomo

giacomo.landeschi@gmail.com
Sweden
Lund University

Lambert Stephen

stephen2lambert@yahoo.co.uk
United Kingdom
Attic Inscriptions Online

Lawrence Faith

faith.lawrence@kcl.ac.uk
United Kingdom
King's College London

Levivier Adeline

adeline.levivier@gmail.com
France
UMR 5189 HiSoMA

Limón Belén María

mlimon@us.es
Spain
CIL XVIII/2 and CIL XVIII/3
Project
Universidad de Sevilla

Liuzzo Pietro Maria

pietro.liuzzo@
zaw.uni-heidelberg.de
Germany
University of Heidelberg

Losa Lorenzo

lorenzo.losa@sns.it
Italy
Wikimedia Italia

Löser Laura

laura.loeser91@gmail.com
Netherlands
University of St Andrews

Luciani Franco

franco.luciani@unive.it
Italy
Università Ca' Foscari Venezia

Lundqvist Karin

karin.lundqvist@yahoo.se
Sweden
Lund University

Manghi Paolo

paolo.manghi@isti.cnr.it
Italy
ISTI-CNR

Mannocci Andrea

andrea.mannocci@isti.cnr.it
Italy
ISTI-CNR

Marcel Olivier

oliv.marcel@gmail.com
France ENS

Marcucci Marianna

marianna@invasionidigitali.it
Italy
Invasioni Digitali

Marotta Daniele

daniele.marotta@sns.it
Italy
Scuola Normale Superiore

Marras Anna Maria

am.marras@gmail.com
Italy
Self employer

Martín-Arroyo Daniel

martinarroyo@ceipac.up.edu
Spain
Universitat de Barcelona

Martinelli Luca

martinelliluca@gmail.com
Italy
Wikimedia Italia

Masi Tania

taniamasi@promoter.it
Italy
Promoter Srl

Masquelier-Loorius Julie

julie.masquelier-loorius@cnrs.fr
France
CNRS UMR 8167
Université Paris-Sorbonne

Jane Masségia

jane.massegia
@classics.ox.ac.uk
United Kingdom
University of Oxford

Matei Sorin

smatei@purdue.edu
United States
Purdue University

McCourt Finlay

finlaymccourt@gmail.com
United Kingdom
Attic Inscriptions Online

Mittica Daniele

danielemittica@gmail.com
Italy
Università degli Studi di Bari "A.
Moro"

Morlock Emmanuelle

emmanuelle.morlock@mom.fr
France
CNRS UMR 5189 HiSoMA

Mosca Alessandro

a.mosca@sirisacademic.com
Spain
SIRIS Academic

Nesi Paolo

paolo.nesi@unifi.it
Italy
University of Florence
DINFO

Nurmikko Terhi

tmtn1g10@soton.ac.uk
United Kingdom
University of Southampton

Orlandi Silvia

silvia.orlandi@uniroma1.it
Italy
University of Rome
"La Sapienza"

Orlando Elisa

elisa.orlando@gmail.com
Italy
Independent researcher

Paolucci Michela

michela.paolucci@unifi.it
Italy
University of Florence
DINFO

Paglia Fabio

super.fabius@libero.it

Italy

University of Rome

"La Sapienza"

Polis Stéphane

s.polis@ulg.ac.be

Belgium

FNS-FNRS

Université de Liège

Pellegrino Michele

pellegrino.michele1990@

gmail.com

Italy

Università degli Studi di Bari "A.

Moro"

Prag Jonathan

jonathan.prag@merton.ox.ac.uk

United Kingdom

University of Oxford

Piacentini Danila

danila.piacentini@gmail.com

Italy

Independent Researcher

Prandoni Claudio

prandoni@promoter.it

Italy

Promoter Srl

Pierotti Claudia

pierotti@promoter.it

Italy

Promoter Srl

Prunel Beatrice Joyeux

beatrice.joyeux-prunel@ens.fr

France ENS

Pio Gianvito

gianvito.pio@uniba.it

Italy

University of Bari "Aldo Moro"

Ragolič Anja

anja.ragolic@gmail.com

Slovenia

ZRC SAZU

Institute of Archaeology

Pires Hugo

miqhapaqnan@gmail.com

Portugal

Universidade do Porto

Centro de Investigação

em Ciências Geo-espaciais

Rabitti Fausto

fausto.rabitti@isti.cnr.it

Italy

ISTI-CNR

Remesal José

remesal@ceipac.ub.edu

Spain

Universitat de Barcelona

Rocco Anita

anita.rocco@uniba.it
Italy
University of Bari "Aldo Moro"

Rull Guillem

grull@essi.upc.edu
Spain
Universitat de Barcelona

Rondelli Bernardo

b.rondelli@sirisacademic.com
Spain
SIRIS Academic

Santin Eleonora

eleonora.santin@libero.it
France
CNRS UMR 5189 HiSoMA

Rosmorduc Serge

serge.rosmorduc@cnam.fr
France
Conservatoire National
des Arts et Métiers

Santucci Raffaella

raffaella.santucci@uniroma1.it
Italy
Digi Lab
University of Rome
"La Sapienza"

Rossi Irene

irene.rossi@sns.it
Italy
Scuola Normale Superiore

Sarullo Giulia

giulia.sarullo@unikore.it
Italy
Università degli Studi
di Enna "Kore"

Rubio Xavier

xavier.rubio@bsc.es
Spain
Barcelona Supercomputing Cen-
ter

Sousa Orlando

orlandocfsousa@gmail.com
Portugal
DRCN

Saint-Raymond Lea

lstray@clipper.ens.fr
France ENS

Spampinato Daria

daria.spampinato@cnr.it
Italy
Consiglio Nazionale delle
Ricerche

Ruiz Eydal Rivero

eydel.rivero@gmail.com
Spain
Alcala' University

Sprenkle Sara

sprenkles@wlu.edu
United States
Washington & Lee University

Stoyanova Simona

simona.stoyanova@
informatik.uni-leipzig.de
Germany
University of Leipzig

Szabados Anne-Violaine

anne-violaine.szabados@
mae.cnrs.fr
France
CNRS (UMR 7041 ArScAn)

Szabó Ádám

szabo.adam@hnm.hu
Hungary
University of Pécs
Hungarian National Museum

Szabó Csaba

szabo.csaba.pte
@gmail.com
Hungary
University of Pécs

Szabó Ernő

szaszu@gmail.com
Hungary
University of Pécs

Todisco Fabrizio

info@invasionidigitali.it
Italy
Invasioni Digitali

Tweten Lisa

ltweten@gmail.com
Canada
University of British Columbia

Vadicamo Lucia

lucia.vadicamo@isti.cnr.it
Italy
ISTI-CNR

Vassallo Valentina

v.vassallo@cyi.ac.cy
Cyprus
The Cyprus Institute

Varga Rada

radavarga@gmail.com
Romania
Babeş-Bolyai University

Vassalli Massimiliano

vassalli.max@gmail.com
Italy
Independent Researcher

Wagman Robert

rsw@ufl.edu
United States
University of Florida

Zanni Andrea

andrea.zanni@wikimedia.it

Italy

Wikimedia Italia

Zimmermann Norbert

Norbert.Zimmermann@dainst.de

Austria

Deutsches Archaeologisches

Institut - Abteilung Rom

Zgrablić Marina

mzgrablic@unipu.hr

Croatia

Juraj Dobrila University of Pula

Zoppi Franco

franco.zoppi@isti.cnr.it

Italy

ISTI-CNR

Zović Valentina

valentinazovic3@gmail.com

Croatia

Juraj Dobrila University of Pula



Supported by



EAGLE Partners

Sapienza, University of Rome (IT)
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University of Bari "Aldo Moro" (IT)
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Scientific Research Centre of the Slovenian Academy of Sciences and Arts
Institute of Archaeology (SI)
Institut de recherche sur l'Antiquité et le Moyen-Age "Ausonius", UMR 5607,
University of Bordeaux 3 - CNRS (FR)
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Associazione Rodopis (IT)
King's College London (UK)
Herculaneum Graffiti Project (USA)
Center for comparative studies of ancient civilizations, Russian Academy of sciences (RU)
E-pigramme Greek Inscriptions from the Louvre (FR)
Archeomatica (IT)
LIMC - France (FR)
Iscrizioni Latine Arcaiche Project (IT)
U.S. Epigraphy Project (USA)

Conference Organizing Committee General chair

Silvia Orlandi
Vittore Casarosa
Raffaella Santucci
Pietro Liuzzo

Local organizing Committee

John Scheid
François Bérard
Philippe Martineau

Working Groups and Sessions chairs

Silvia Evangelisti
Antonio Enrico Felle
Francisca Feraudi-Gruénais
Ulrich Gehn
Alessandra Giovenco
Sorin Hermon
Franco Niccolucci
Silvia Orlandi
Francesco Mambrini
Marco Rendina
Valentina Vassallo
Christian Uhler

International Programme Committee

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- Giuseppe Amato (ISTI-CNR, IT)
- Elton Barker (The Open University, UK)
- Marie-Claire Beaulieu (Tufts University, USA)
- François Bérard (École Normale Supérieure, FR)
- Irene Berti (Universität Heidelberg, DE)
- Monica Berti (Universität Leipzig – Alexander von Humboldt – Lehrstuhl für Digital Humanities, DE)
- Ruth Beusing (Detusches Archäologisches Institut, DE)
- Robin Boast (University of Amsterdam, NL)
- John Bodel (Brown University, USA)
- Vittore Casarosa (ISTI-CNR, IT)
- Hugh Cayless (Duke University, USA)
- Michelangelo Ceci (University of Bari, IT)
- Mark Depauw (KU Leuven, BE)
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- Antonio Enrico Felle (Univeristà degli Studi di Bari “Aldo Moro”, IT)
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- Annette Friberg (Europeana Foundation, NL)
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- Mariella Guercio (Sapienza Università di Roma, IT)
- Sanja Halling (DIGISAM, SE)
- Pirjo Hamari (Board of Antiquities, FI)
- Susan Hazan (The Israel Museum, IL)
- Sorin Hermon (The Cyprus Institute, CY)
- Leif Isaksen (University of Southampton, UK)
- Askold Ivantchik (Institute “Ausonius” CNRS Bordeaux, FR)
- Allison Kupietzky (The Israel Museum, IL)
- Stephen D. Lambert (Cardiff University, UK)
- Pietro Maria Liuzzo (Universität Heidelberg, DE)
- Francesco Mambrini (Deutsches Archäologisches Institut, DE)
- Daniele Manacorda (Università degli Studi Roma Tre, IT)
- Andrea Mannocci (ISTI-CNR, IT)
- Cristina Marras (ILIESI-CNR, IT)
- Philippe Martineau (Eureva, FR)
- Sorin Adam Matei (Purdue University, Discovery Park and Cybercenter, USA)
- Robert Matijasic (Juraj Dobrila University of Pula, HR)
- Elli Mylonas (Brown University, USA)
- Franco Niccolucci (The Cyprus Institute, CY)
- Silvia Orlandi (Sapienza Università di Roma, IT)
- Silvio Panciera (Accademia dei Lincei, IT)
- Gianvito Pio (University of Bari, IT)
- Claudio Prandoni (Promoter S.r.L., IT)
- Jon Purday (Europeana Foundation, UK)
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DIGITALMEETSCULTURE.NET

Interactive e-zine where digital technology and culture collide

Valentina Bachi, Manuele Buono, Antonella Fresa, Tania Masi, Claudia Pierotti, Claudio Prandoni

Promoter Srl

Email(s): bachi@promoter.it, buono@promoter.it, fresa@promoter.it, taniamasi@promoter.it, pierotti@promoter.it, prandoni@promoter.it

Abstract

digitalmeetsculture.net is an interactive online magazine dedicated to the encounter of the digital technologies with the cultural heritage and the arts. It provides, on a truly global scale, the widest information about international projects and initiatives for the digitization, preservation, and enjoyment of digital cultural heritage; tales and talks, as well as amazing multimedia contents, for a broad perspective of the latest findings in digital art; up to date showcases of the ongoing most relevant acts in the field. The portal counts on a steadily growing visitors number from all over the world - practitioners, cultural managers, students, researchers, amateurs – offering them a dynamic place where to meet and exchange ideas.

Keywords

digital culture, digital heritage, digital art, interactivity, online magazine, communication platform, social networks

1. Introduction

The phenomenon of globalisation and the spread of digital infrastructures created an interrelation among the fields of culture, once considered very distant. Today the sciences, the arts, the humanities, while retaining irreducible differences, tend to meet, contaminate and mutually enrich through the use of new media and new technologies. Also geographically distant cultures are becoming nearer because of easier access to information worldwide. The use of the network and of digital technology is evolving towards more and more interactive forms, with a clear trend towards the interchangeability of roles between the sender and the receiver of the information (Web 2.0). In addition, more and more artists of every discipline, from visual to performance arts, use computer technology as a tool and the web as a space for displaying and disseminating their works.

In the context of global growing access to Internet and over-flooding of on-line information about any topic, it is nevertheless sometimes hard, for users, to collect materials and news about their specific interests.

digitalmeetsculture.net, featured by Promoter Srl, has been conceived as an on-line magazine about the digital culture, for collecting and sharing, in a global dimension, information and events taking into account the different approaches that scientific, humanistic and artistic cultures respectively have to the digital age.

Aim of the portal is to discover, analyse, promote and disseminate the new achievements in the field of digital culture and act as a landmark and as a valuable mean of information and communication for different users.



Fig. 3.1. *digitalmeetsculture.net* Home Page

Furthermore, the potentiality offered by the new technologies allow to increase the visibility of cultural heritage content - works of art, texts and documents, but also video and audio repositories and archives - whose physical accessibility is limited by many factors, thus increasing the possibility for researchers, experts, enthusiasts and curious to enjoy this content. This is achieved through specific projects which are promoted by academies, organisations and companies, often with the support of governments. Such projects require indeed great visibility in order to be acknowledged: *digital-meetsculture.net* represents a useful, customisable and flexible tool to promote these initiatives, disseminating and preserving their results.

2. The portal

The portal is composed of two main sections, on the basis of which all *digitalmeetsculture.net*'s content is subdivided and categorised: Digital Heritage and Digital Art. Each section features a continuously increasing number of multimedia articles and a selection of showcases dedicated to the most important ongoing projects and initiatives in the respective field.

The Digital Heritage section collects articles and information about projects and initiatives for the digitisation and access to the digital cultural heritages all over the world as well as insights about the digitised content and the use of informatics and digital tools in museums and exhibitions.

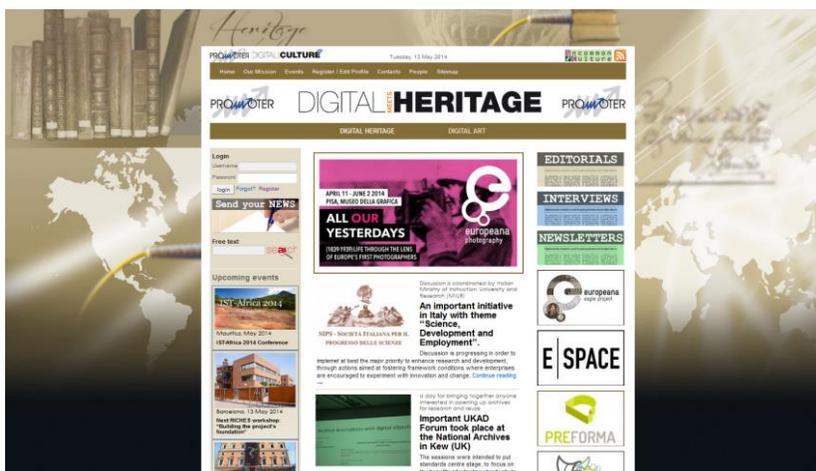


Fig. 4.1. The Digital Heritage section

The Digital Art section focuses on the latest, innovative forms of the digital art in any expression and to give space and visibility to upcoming events and

discussions about this large, open and evolving topic. This section contains articles related to the latest news pertaining to the creative industry (movies, animation, games, etc..) and to the creative uses of the digital art in all its various expressions: computer generated digital art and digital manipulation of material taken from other sources (transdigital art), digital installations and interactive art, virtual environments, photography, music, experimental performance art, etc.



Fig. 4.2. The Digital Art section

The editorial staff is assisted by Correspondents from all over the world, who cooperate to the harvesting of news and information. Particularly important are the Referents, key people who act as main contact inside relevant organizations or institutes, whose main role is to keep the portal always up-to-date on the most prominent initiatives, projects, events and progresses in the digital culture field.

Readers can interact with *digitalmeetsculture.net* by leaving a comment or by sending send their own articles.

3. The showcases

The *digitalmeetsculture.net* portal represents a useful tool for the dissemination and valorisation of the activities and results of projects and initiatives that work in the digital culture sector, by giving wide visibility to their main achievements, by deepening their topics through interviews and related articles and by offering a repository service for the projects' results.

To this aim, each project or initiative that wants to make use of *digitalmeetsculture.net* as a dissemination tool has a dedicated showcase perma-

nently featured on the homepage and and in any other page of the portal, providing easy access to a dedicated section which contains general information about the project, auto-refreshing news and events, useful material, multimedia galleries and highlighted articles about outstanding initiatives and outcomes related to the project.

Furthermore the showcase provides easy access to other useful services, such as document repository, embedding of interactive questionnaires/interviews, online registration to conferences and events, etc., thus acting as a powerful tool to raise awareness about the project, to increase the visibility to the project's results and to stimulate other institutions, organisations and projects to get in contact with it.



Fig. 4.3. Examples of showcases and blogs hosted by *digitalmeetsculture.net*

If required, the showcase can be further customised to become a real project blog hosted by *digitalmeetsculture.net*. The blogs actually offer the same functionalities as the showcases, but keep the graphic “look and feel” and visual identity of the related projects.

The showcases and the blogs are constantly living pages that combine information coming from inside the project with the discussion on the related themes that is occurring outside the project. This combination of inside and outside information offers a creative dimension to the communication of the projects' activities, thus representing a very useful instrument to widen the communication of the project towards a larger audience, including both professional and general public.

4. Join us!

Launched at the end of 2011, the portal is still very young. Nonetheless, in a couple of years it reached over 15.000 monthly visits and an average of more than 600 unique visitors per month. This number, which is constantly growing, demonstrates not only the increasing popularity of the portal, but also the great and widespread need of information in our society.

digitalmeetsculture.net's challenge is to enlarge more and more its network by establishing new relationships, cooperation and synergies. In an ever-changing digital world like ours, what is often missing is the effective relationship among the persons. *digitalmeetsculture.net* aims to foster this dialogue and exchange of knowledge and information, which contributes to the enrichment of the common heritage.

Visit our portal at www.digitalmeetsculture.net and contact us at digitalmeetsculture@promoter.it to join our community!

The image shows a screenshot of the Facebook page for Digitalmeetsculture. The page header includes the Facebook logo, a search bar, and the page name 'Digitalmeetsculture' with a 'Home' link. The cover photo features a laptop displaying the 'DIGITAL CULTURE' website, with world maps on either side. Below the cover photo, the page name 'Digitalmeetsculture' is displayed, along with '632 Mi piace' and '10 ne parlano'. There are buttons for 'Aggiorna informazioni sulla Pagina' and 'Segui'. The bio states: 'Sito di arti/discipline umanistiche. This portal for DIGITAL HERITAGE, DIGITAL ART, DIGITAL CULTURE is an interactive space for discussing about culture and new technologies: join us to share your news, information, events, and empower your projects!'. The page shows a recent post from Digitalmeetsculture: '***ALL OUR YESTERDAYS: NOTTE DEI MUSEI - SABATO 17 MAGGIO - APERTURA STRAORDINARIA DALLE 14.30 ALLE 24 *** (4 foto)'. The right sidebar shows 'Post recenti di altri utenti su Digitalmeetsculture' with posts from Karin Schultz, Istituto Europeo del Restauro, VIEW Conference, and Hyperborea s.r.l.

Fig. 4.3. Facebook page of *digitalmeetsculture.net*

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Proceedings of the First EAGLE International Conference
Silvia Orlandi, Raffaella Santucci, Vittore Casarosa, Pietro Maria Liuzzo

This peer-reviewed volume contains selected papers from the First EAGLE International Conference on Information Technologies for Epigraphy and Cultural Heritage, held in Paris between September 29 and October 1, 2014. Here are assembled for the first time in a unique volume contributions regarding all aspects of Digital Epigraphy: Models, Vocabularies, Translations, User Engagements, Image Analysis, 3D methodologies, and ongoing projects at the cutting edge of digital humanities. The scope of this book is not limited to Greek and Latin epigraphy; it provides an overview of projects related to all epigraphic inquiry and its related communities. This approach intends to furnish the reader with the broadest possible perspective of the discipline, while at the same time giving due attention to the specifics of unique issues.

Silvia Orlandi is professor of Latin Epigraphy at the Department of Classics, Sapienza, University of Rome and Scientific Coordinator of EAGLE, Europeana network of Ancient Greek and Latin Epigraphy. Raffaella Santucci is a researcher at DigiLab, Sapienza, University of Rome. Her professional interests hinge on the potential of technologies for the enhancement of research in the arts and humanities. Vittore Casarosa is a research associate at CNR-ISTI and contract professor of Digital Libraries at the University of Pisa. Pietro Liuzzo is a researcher at the University of Heidelberg.

EAGLE *The Europeana network of Ancient Greek and Latin Epigraphy* is a best-practice network co-funded by the European Commission under its Information and Communication Technologies Policy Support Programme. EAGLE provides a single user-friendly portal to the inscriptions of the Ancient World, a massive resource for both the curious and for the scholarly

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