

Digital and Traditional Epigraphy in Context

Proceedings of the EAGLE 2016
International Conference

edited by

Silvia Orlandi, Raffaella Santucci, Francesco Mambrini, Pietro Maria Liuzzo



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Serie Antichistica

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In copertina: Logo EAGLE – *The Europeana network of Ancient Greek and Latin Epigraphy.*

*This volume is dedicated
to the memory of*

SILVIO PANCIERA

*without whom EAGLE
would have never existed.*

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Preface

Information Technologies have set made many unexpected changes in motion in the field of cultural heritage; they continue to provide dynamic and exciting media platforms through which new possibilities perpetually emerge. This wave of changes has been particularly significant for the field of the antiquity and classical studies, where a wide range of possibilities for digital exploitation continues to present itself to users, constantly opening the doors to new and as-yet-unexplored synergies. Many technological developments concerning content access and fruition, the renovation of digital libraries, the facilitation of education and research are being proposed, applied, and utilised by the public.

Of this constant innovation, the pool of research institutions, museums and business companies reunited in the EAGLE network have been both the grateful beneficiary and one of the leading promoters. EAGLE is a best practice network co-funded through the ICT Policy Support Programme of the European Commission. EAGLE aims to stimulate exploitation of new ICT technologies for digital content access to epigraphy resources, and provide guidelines about the adoption of metadata standards for indexing, searching and browsing content. The institutions involved are prestigious and leading in the field. An ever-growing fund of digital resources is accessible through a common, multilingual, easy-to-use EAGLE portal. The EAGLE metadata are available on Europeana, a European multi-lingual online collection of millions of digitized items from museums, libraries, archives and multimedia collections.

One of the main commitments that the EAGLE project made to the funding institutions was to foster the dialogue between the different professional figures and communities that work in the field of digital epigraphy, in a constant effort to discuss our common problems together, and to share methodologies, tools and results. Over the years, the EAGLE network has been continuously expanded, while several agreements of different forms with companies, research groups and cultural institutions were signed. The list of partners with different type of affiliations can be consulted. But we believe that present volume, who is one of the product in the project's effort toward a global shared knowledge, speaks well for the degree of success in this enterprise, as the list of the contributions, the affiliations of the different presenters and the variety of topic touched by the contributions make clear. Also, together with Europeana (the European platform for cultural heritage that integrates EAGLE's work) and the EAGLE's sister projects we are building a movement towards openness, interoperability and common standards that will influence the way that others in the cultural sector view and use cultural content online. We are committed to actively contributing to the mission (which is at the core of Europeana) of creating new ways for people to engage with their cultural history, whether for work, learning or pleasure, while promoting the exchange of ideas and information and contributing to a thriving knowledge economy.

The EAGLE 2016 Conference, held in Rome in the Odeion of La Sapienza University from January the 27th to the 29th, marked the conclusion of the works of the EAGLE's consortium funded under the UE-funded ICT Policy Support Programme. This volume, that collects all the keynote speeches, the papers of the conference presentations and some of the posters, provides to us and to the community of the enthusiasts of (digital) epigraphy, whatever their background or professional title is, with an opportunity to make an overall assessment on the group's activity, and especially look at the future of the technology and of our discipline(s).

In addition to that, and just like the previous conference held in Paris in 2014, the EAGLE 2016 conference aimed to function once again as a forum in which progress-oriented individuals and institutions find a place to collaborate and present results. It also aimed to provide an overview of the state of the art for epigraphy 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 consisted of a set of sessions and panels that conform to our standard of excellence. After the opening by Silvio Panciera and Silvia Orlandi, we hosted a keynote-speaker lineup consisting of some of the most salient voices in the field. Figures as diverse as Mary Beard, who is universally known not only for her outstanding scholarly production, but also for her presence in popular media; Werner Eck, one of the world's leading expert in Ancient History and epigraphy, who has authored several fundamental publications in the field; Charlotte Roueché, whose commitment to the digital publication and digitally-oriented research in epigraphy, as well as her friendship and generosity, are equally well known; Lorna Hughes, Professor of Digital Humanities at the University of Glasgow and Head of Subject at the Humanities Advanced Technology and Information Institute (HATII), whose research addresses the creation and use of digital cultural heritage, with a focus on collaborations between the humanities and scientific disciplines; these world-leading specialists have contributed to review the work of the EAGLE community in the context of the history of traditional research in Epigraphy, in the Digital Humanities and in the panorama of the technologies for Cultural Heritage.

The EAGLE 2016 conference international committee selected only the best proposals. We received 45 submissions, all in anonymous form, which were blindly peer-reviewed by our scientific committee. This board was chosen so as to reflect the manifold expertise, interests and scientific traditions of our network at large, including professionals from different areas (industry, research, cultural heritage, institutions) and countries (from Europe, Asia and North America). The list of the committee members is reported in the final appendix of the present volume. EAGLE 2016 featured more than 30 presentations, with speaker coming from several countries and professional fields. United States, Israel, United Kingdom, Italy, Spain, Germany, France, to name but a few countries that hosts the presenters, are represented in various degrees in the proceedings.

As we mentioned, particular emphasis was placed in shaping the conference as the meeting place for different professional figures to discuss about inscriptions in the cultural landscape of the world. The conference was open to researchers, professionals, industries, institutions, technicians, practitioners in the area of classical studies and technologies, cultural heritage, and digital library. The EAGLE 2016 conference has become a place in which institutions, industries, and

the Europeana family projects in the areas of cultural heritage could find a wealth of opportunities for networking, debating, and sharing ideas and best practices. Readers will find several traces of this ongoing debate in the volume.

We will not attempt to provide a summary of the multiple subjects that are touched in the various papers. For readers will find an illuminating and inspiring discussion about the published contributions and, in general, about the work of the EAGLE network at large in the first chapter of these proceedings. This text is the English version of the introductory speech that was delivered by Silvio Panciera and Silvia Orlandi at the opening of the EAGLE 2016 conference. Professor Panciera passed away on August, the 16th 2016, not long after the conclusion of the project, leaving an immense legacy in terms of research and teaching, as well as an affectionate memory in his students and friends. However, far from simply reflecting on the past, his introductory pro-clusion casts a sharp and inspiring look onto the future and on the work that remains to be done. We are both honored and deeply saddened to publish here one of the very last scientific writings of Professor Panciera: the EAGLE project owes a lot to his scientific knowledge, sensible advice and “digital wisdom”.

As co-chairs of the conference and editors of the present volumes, we wish to express our gratitude to the keynote speakers, the dedicated program co-chairs, committee members and conference support staff who have contributed to making EAGLE 2016 a success.

The EAGLE 2016 Co-chairs and Organizers
Silvia Orlandi (Sapienza University of Rome)
Pietro Liuzzo (University of Heidelberg)
Francesco Mambrini (Deutsches Archäologisches Institut)
Raffaella Santucci (Sapienza University of Rome)

KEYNOTES

EAGLE: Past, Present and Future

*Silvio Panciera[†], Silvia Orlandi**

Past and Present

Like any other European project, EAGLE had to be reviewed, at the end of each year, by the Project Officer of the European Commission and two external reviewers.¹ Both in 2014 and in 2015, after 12 and 24 months respectively, our project was evaluated as “excellent”, even if we were invited to consider some critical points. From the very formal point of view of the European Commission, this means essentially that a given budget was used and reported in the correct ways and time, that documents and items were delivered by the deadline, and that tasks and milestones declared in the Description of Work were achieved. Actually we are approaching the final goal of the project, that is to make accessible to the public — not only to scholars — a huge amount of texts and images, with related metadata, pertaining to ancient Greek and Latin inscriptions. The technical aspects and the positive results are illustrated by Claudio Prandoni, EAGLE Technical Coordinator, in a dedicated presentation and panel (see the EAGLE panel, and the contributions by Mannocci, Prandoni, Rocco and Vassallo-Damnjanovic). As Scientific Coordinator, I would like instead to make some more theoretical observations and share some thoughts on the significance of this “excellent” evaluation and the reasons that lay behind what we can call a successful case.

* Sapienza University of Rome.

¹ This text reproduces without substantial changes the speech held on January 27th, at the opening of the EAGLE Final Conference. The first part (*Past and Present*) is by Silvia Orlandi, the second part (*Future*) is by Silvio Panciera.

In fact, EAGLE is not only a project that is careful in spending money and sending deliverables and reports, ready to pass any review: EAGLE was born to be much more than this.

The possibility of free online access to all the Greek and Latin inscriptions of the ancient world has been a real need of the academic community for a long time. Our aim is to reach this goal not with the creation of a new, single database, but with the aggregation of the digital archives of different institutions around a common project and a common idea of what an inscription is, and how to read it; this idea was born after years of preliminary discussions and agreements that preceded and fostered the European project. Knowing clearly the need that we wanted to meet, and the way in which we wanted to do it, has surely helped us to focus our energies on the project's main goals: the harmonization of very different materials and the creation of a new portal that could make them accessible through a search form specifically designed for inscriptions. We can say that both goals have been achieved, even if corrections and improvements are still possible and necessary. However, strange as this statement may seem, I don't think that this is the real indicator of the success of the project. In my opinion, what actually shows that EAGLE is meeting a real need, is that our *modus operandi* is becoming an international standard: a larger and larger number of projects are using the controlled vocabularies that are one of the most interesting and immediately re-usable products of the harmonization job that EAGLE has done, are adopting an EAGLE compatible metadata model, and are sharing their content through the same system.

This scenario was already clear during the First EAGLE International Conference, which was held in Paris in autumn 2014, and it is now confirmed by the papers and posters selected to be presented in this volume, and by the huge networking activity of the project, which has widely enlarged the EAGLE consortium. Among the new partners — too many to be listed here — I would like to mention at least two examples that are — for different reasons — particularly important: the Inscriptions of Greek Cyrenaica (<https://igcyr.unibo.it/>) and the EPNet project (www.roman-ep.net), which is currently digitising the *tituli picti* on the Roman amphoras from the Monte Testaccio in Rome. In the first case, one can clearly see the importance of a project dealing with inscriptions from a region corresponding to present-day Lybia: thanks to this digital archive, they will not only

be better known, but also virtually preserved and protected against war damages and illegal commerce. In the second case, EPNet is an important step towards a digital archive for inscribed *instrumentum*, a type of inscription that is fundamental to our knowledge of the ancient economy, but that is still lacking a policy of aggregation and harmonization of the existing digital resources.

This role as project of reference, of course, gives EAGLE a great responsibility, not only for the present, but also for the future, since now we must not only continue to meet the need for which the project was born, but also to show the direction in which we want to continue.

In this sense, and not by chance, I think, Europeana has also shown an evolution in its policy: as has been recently stated by Joris Pekel during the final conference of the Athena Plus project (<http://www.athenaplus.eu/index.php?en/202/athenaplus-final-conference>), in the future Europeana will pay much more attention to the quality over the quantity of its digital items. This decision may have been made possible by the influence of projects like EAGLE, that are particularly careful about the curation of content and its usability in research activity.

The same observation can be made with respect to another aspect of the project. One of the main goals of the EAGLE project is to make inscriptions accessible not only to scholars, but also to a broader public, made up of students, teachers, tourists, and curious and interested people. To reach this audience it's necessary to overcome the barriers represented by ancient languages and sometime ancient alphabets, epigraphic formulas and abbreviations, but also by the characteristics of traditional academic language and means of communication, using the huge potential of images, social media, and storytelling techniques. The results of this effort are particularly interesting: the realization of a mobile application using an image-based recognition system, the creation of the EAGLE MediaWiki platform to collect and organize thousands of translations in modern languages of epigraphic texts of varying complexity, a new storytelling application to illustrate the narrative content of many inscriptions, not to mention a virtual exhibition and a promotional video (see the EAGLE featured panel).

All this was included in the proposal submitted to the European Commission, but — once again — the fulfillment of promises is not the only indicator of the success of our project. In this case too, I think that much more significant is what went beyond the promises: the unexpected, but no less interesting, developments.

The possibility to have in a single online archive most of the existing translations of Greek and Latin inscriptions has raised a whole series of theoretical reflections about the often underestimated problems and difficulties that a translator has to face. On this subject, scientific contributions and practical solutions have been proposed (see, for example, the Guidelines for Translators in EAGLE MediaWiki: http://www.eagle-network.eu/wiki/index.php/Guidelines_for_Translators), but new questions still must be answered. And this shows that even a task born as a dissemination activity can successfully interact, if seriously undertaken, with research activity.

In the same way, the enormous work of enriching the content of the project with images has led to an effort to clarify the different laws that in different countries of the European Union govern the use of photographs of cultural heritage for both educational and commercial purposes. In this framework, the EAGLE Consortium has shared the position of Europeana on the review of the EU copyright rules (<http://pro.europeana.eu/blogpost/a-first-glance-into-the-future-of-eu-copyright-reform>) and the re-use of digital images on the web, especially within projects related to the digitalization of cultural heritage. We also hope that in the future this assessment will be accepted by all the institutions that don't yet recognize the civic value of scientific projects like ours.

In this field, too, the effort originally intended to enlarge the accessibility of the epigraphic material through the EAGLE portal is having — and will have in the future — interesting repercussions for scholars.

The importance of non textual elements for the correct and complete understanding of epigraphic messages has been recognized for some time. This implies the need not only to read, but also to look at the inscription. Not by chance, the theme chosen for the last International Conference of Greek and Latin Epigraphy, held in Berlin in 2012, was *Öffentlichkeit — Monument — Text*, and the same approach can be found in some of the papers presented in this volume, dealing with the relationship between form and content in epigraphic studies (see papers by Felle, Benefiel, Graham).

You can imagine how many possibilities in the field of palaeography and writing technique can be opened by the ability to search for “similar images” through the EAGLE portal. Once again, a project can be recognized as successful if it not only meets a present need,

but also shows new directions for future research, that will benefit from a constant and closer relationship between texts and images.

Finally, let me say something that is not strictly epigraphic, but is no less important. Among all the things that I have learned during these three years of work as coordinator, there is the persuasion that all these results would have never been possible without the help of all the people who, in different ways and with different roles, are involved in the project. People first of all curious and keen to ask questions, ready to listen and observe, who don't use problems as a pretext not to do things, but rather try to solve them. People, above all, able to connect ideas, places, projects, and other people in the awareness that every success is not a point of arrival, but part of a continuing journey.

We can learn something from this experience, not only for our present satisfaction but also as a suggestion for the future: even in the field of digital epigraphy we have to move, I think, towards a wider connection and interoperability of projects, allowing us not only to progressively fill the still existing gaps, but also to better use our human and financial resources.

In the XIXth century, the *Corpus Inscriptionum Latinarum* would have never been completed without the huge net of collaborators, correspondants and scholars from the whole of Europe with whom Theodor Mommsen intensively exchanged letters and documents. In the same way, I think, the new frontier of epigraphy is the broadening of studies and research made more and more open, collaborative and constantly updated thanks to a clever use of technology and digital resources.

Future

There is no doubt that mine is the most difficult of the tasks assigned for this introduction. When we speak about past and present, we already know what has happened or what is happening. And this can also be a very pleasant task if, as in our case, there are many achievements and good results that can be praised.

On the contrary, it's very different to speak about the future, that is something that has not happened yet, and that we don't even know with certainty will ever happen.

When I organized the XIth International Conference of Greek and Latin Epigraphy, which was held in Rome about 20 years ago, I asked

Giancarlo Susini to open the conference, with the lecture “Ten conferences plus one: the way of epigraphy”; on the opposite side, I asked Géza Alföldy to close the conference with a paper on “The future of epigraphy”, and he, with the same embarrassment that I have now, observed: “As historians, we already have problems understanding the past. What could we say about the future?”

As a matter of fact, the future doesn’t lean on solid, measurable facts: it’s the reign of the unknown, in which one projects rational and irrational desires, mixed with fears or even anguish. But it’s also a temporal space in which many of our previsions are going to be swept away by facts that nobody had foreseen or even imagined.

It would have seemed more logical for the future of the project to be presented by a young person, who will have the time to experience it, and not by an old man, who will never see it. By the way, I’m rather upset when I see the media invaded every day by some old men — I hope not to be one of them — who, after having had a long time to express their opinion, and having failed, think that they still have the right to give rules for the future, while — maybe — it’s the moment to open the floor to others.

But let’s speak of lighter things!

I don’t think that you want me to become a “futurologist” and to make predictions of what is going to happen in the world, or, more modestly, in EAGLE, in a more or less distant future. But we can’t do without the future.

Every action presupposes a future, and this feeling leads our steps and gives them a meaning. But we can also say that the future is nothing but the present of yesterday. To speak about the future of EAGLE, therefore, there is no need to imagine complex scenarios for the coming years. We can just ask ourselves: What am I going to do tomorrow? In English, there is a convenient distinction between the simple future, that is used for actions that happen spontaneously, and the intentional future, that is used for actions that are consequences of a plan, an intention. That’s what we should talk about now, but we can’t do that without considering:

- a) What was our original goal and how much of it has been achieved
- b) What has worked well and is to be kept, and what, according to this experience, should be improved
- c) What has been set aside or not originally included, but should be planned for the future

Since the beginning, I've thought that my role in the project was not to define every detail, but to establish some key points, and check that they would not be forgotten or changed. That's why today I would like not to illustrate every aspect of the project, but just to say a couple of words about the points already mentioned.

"Old fashioned" EAGLE was born as a federation of databases with the goal of "recording all Greek and Latin inscriptions older than the VIIIth century AD, according to the best existing edition, possibly checked and improved, along with some fundamental data and images" (see the documents collected in http://www.eagle-eagle.it/Italiano/documenti_it.htm). We can say that this goal has been adopted by the "new version" EAGLE, too. But, due to a difficult coordination between Greek and Latin epigraphers (an old problem...) most attention has actually been paid to Latin inscriptions. We have known since the beginning that the complete recording of all known inscriptions was practically impossible. Nevertheless, we can probably state that in a short time the number of inscriptions searchable through the EAGLE portal will reach about 550.000, thanks to the enlargement of the consortium and to the enormous work of harmonization and disambiguation of content, and above all thanks to the inclusion of the epigraphic texts put at our disposal by Manfred Clauss and his database (I would like to thank Pietro Maria Liuzzo for this and other information).

It's not all that we need (I'll come back on this point later) and, above all, the metadata set of the texts and their degree of elaboration is not homogeneous in all the records. But nobody can deny that the original plan has been mostly fulfilled, and looking at what has been done we can be rather confident in the work that awaits us in the future.

Our tasks for tomorrow are the subject of my second point, concerning what to keep, and what to change according to our past experience. In my opinion, and — as it seems — according to the European Commission too, the general structure of the project, what we can call its philosophy, has been successfully tested — as the facts testify — and should, therefore, be maintained.

The philosophy is based on two fundamental principles:

1. The first is common to every project that aims to be a scientific research project, and it's the awareness that we do not have definitive solutions, but just hypotheses, which must always be checked

because every attempt involves the possibility of errors that can and must be corrected. The large number of changes and improvements made during the project are not a proof of weakness, but a sign of its strength.

2. The second point is the clear need for as wide a collaboration as possible, to ensure not only a large quantity of data, but above all a high quality of content, checked by experts in different geographic regions and thematic fields. This aspect has been particularly curated in these last years, so that the number of institutions and single content providers has been greatly increased. In this way, and thanks to great technical work including the fundamental creation of controlled vocabularies, the EAGLE portal now gives access to many different databases, originally independent and with different characteristics and purposes. In my opinion, this is the path to follow in the future as well, in order to face and solve bigger and bigger problems.

EAGLE looks different from other similar projects because, since the beginning, it has paid much attention not only to the quality of information, but also to the combination of textual and non-textual data, according to the current definition of an inscription as an inscribed monument. Moreover, in recent years, we have seen a huge increase in the visual documentation available online, and now EAGLE includes about 250.000 digital photos of inscriptions. This is another aspect that should be maintained, and — possibly — even strengthened. In fact, thanks to projects like ours, the problems related to the legal treatment of images of cultural heritage seem to be at the moment under discussion, both nationally and internationally (see paper by Modolo). Silvia Orlandi is also right to underline how important the inclusion of images of inscriptions and the technical possibility to search them will be for paleographic studies. I have recently discussed with Silvia Evangelisti how to improve the “*scriptura*” field of EDR with more detailed information about writing techniques, materials and tools. But the analysis of the graphic forms of inscriptions has not yet been adequately confronted, as it still lacks the contribution of professional paleographers. Maybe this conference will give us the chance to begin this kind of discussion.

Speaking about old goals to be taken up again, or new goals to be achieved, I have to come back to the problem of Greek inscriptions and the inscribed *instrumentum*. They are both essential components of our research field, with a number of independent digital repositories, but since the beginning we have had problems with their inclusion in the project. At the moment, EAGLE includes more than 7000 Greek inscriptions, while a specific commission of the International Association of Greek and Latin Epigraphy is currently working on the digital *instrumentum*. Now it seems that, after a long period of inactivity, we are having in recent years an awakening on both sides, and particularly on the side of Greek epigraphy, thanks above all, to the *Inscriptiones Graecae*. Now it's time to aggregate this fundamental material too, with the help of new technologies. I would just suggest that we first reach a preliminary agreement among the participants using past experience rather than starting from scratch both in terms of base requirements, and of open and flexible structure.

All this is about the future: not a vague and undefined future, but a very positive future, modeled according to our past and present plans, constantly checked and renewed. But at least part of the future doesn't depend on us.

For example: Will there still be somebody who will trust and fund projects like ours?

And will there still be, in Italy and elsewhere, enough scholars, old and young, adequately educated and motivated, who will take care of it?

The tendencies that we can see in Italian and European policy in the field of culture and the university, or at least some of them, could lead us to pessimism, but I don't think that we should give up. First of all because there are also signs of hope. The European Union, for example, with other important national institutions whose moral and financial support should never be forgotten — has trusted and supported the proposal that we submitted three years ago, and, during annual reviews, has appreciated the way in which the project has been carried out under the guidance of Silvia Orlandi and her many collaborators. Why should we exclude the possibility that something similar will happen again in the coming years? I continue to believe that EAGLE is not an ordinary project and that its cultural importance, both for the scientific community and for civic life, will be adequately recognized.

Moreover, my confidence is increased by the enthusiasm with which so many young people have taken part in the project, giving and receiving so much, not only on the professional and cultural side, but also in terms of education and ethics, learning to work not only for themselves, but also for others.

We live in a time of very quick changes — and this is even more true for a university, where the population of students is almost completely renewed every five years. Therefore, to foresee the worst is not necessarily more realistic than having some hopes.

Anyway, I think that not only a scholar, but any person who believes in something, should not give up only because of a mere calculation of probability: luckily we are not working only for the market, so that we can leave to others the task of dealing with risks and probabilities.

Where eagles dare

*Charlotte Roueché**

I couldn't resist this title, taken from Shakespeare's *Richard III* to use for a Hollywood film, full of daring wartime adventures. As academics we may underestimate the importance of courage in our undertakings. But the early epigraphers required a good deal of *daring*; while recording inscriptions was straightforward enough in Italy or north-western Europe, the eastern and southern regions of the Greco-Roman world remained difficult and dangerous to visit until the late nineteenth century or even later – as is again becoming true. The early travellers also suffered from practical constraints; in the 18th and 19th centuries they were limited by the quantity of paper that they had brought with them just as in the 20th century; Robert 'Palmyra' Wood recorded inscriptions on pages of his copy of Homer. He was travelling for several months, and was saving his paper for sketches, plans and drawings of buildings.¹ Similarly John Deering recorded texts in a notebook with very small pages.² Twentieth century travellers were to experience similar constraints on the amount of photographic film available to them.

At the same time, epigraphers have always been ingenious in their use of technical solutions. The most dramatic of these is perhaps the development of squeezes, which have turned out to provide records of enduring and continuing value. The driving force here was the need to record inscriptions in languages – hieroglyphics, cuneiform – which could not be interpreted, and even incised designs; copyists who know Greek or Latin could record texts in those languages with relative ease,

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¹ On Robert Wood (1716/17–1771) see White 2004.

² On John Peter Deering (1787–1850) see Burnet 2004.

but they too came to find squeezes useful in representing what they saw. Over time the technology was improved; while the plaster casts of Egyptian paintings could seriously damage the monument, paper squeezes improved in quality.³

During the 19th century, travel became steadily safer, and also easier – most dramatically as railways began to open up new regions. Over the same period, the creation of the first great corpora of inscriptions encouraged an increasing standardisation of records. Early travellers recorded as much as they could, often in haste: this normally took the form of a simple transcription, or drawing, of the text, with sometimes a brief mention of its support. Gradually, measurements start to appear – often only of letters, then of the monument or fragment itself. In 1890 the Austrian government set up the *Kleinasiatische Kommission*,⁴ which provided travellers with special notebooks: these were pre-printed with headings for Location and Position, Material, Height, Width, Depth, Letter heights, Shape and Condition, Number and location of squeeze, When copied and by whom.⁵ On return to Vienna, the notebooks could be filed, and the squeezes stored, in bookshelves and drawers specially designed for the purpose.

At the same time, the publication of the corpora, and the great projects from Boeckh's *CIG* to Mommsen's *CIL* was revealing the volume of material. The Ottoman world was becoming increasingly accessible; in the western part of the Roman Empire development and industrialisation – particularly the redevelopment of Rome as a capital city – increased the torrent of material. Publishing an abundance of texts, accompanied by increasingly detailed information, required a systematised response. Organisation could be thematic: Christian inscriptions, for example, were identified as a separate category, requiring different expertise, although this division has remained problematic. It could be geographic: the Berlin Academy took responsibility for publishing the material from Italy and the west, while the Austrian Academy was to deal with Asia Minor and the East; but national interests also played a part, with Italian and French scholars publishing materials from the epigraphically prolific north African regions which their governments controlled.

³ http://www.asia.si.edu/research/squeezeproject/sq_making.asp

⁴ <http://www.oeaw.ac.at/en/science-and-society/commissions/kleinasiatische-kommission/geschichte/>

⁵ Fund- und Standort, Material, Höhe, Breite, Dicke, Buchstabenhöhe, Form und Erhaltung, Nummer und Ortsangabe des Abklatsches, Wann und von wem copirt.

The situation also demanded finding aids – the *PIR* can be seen as a tool for accessing the material in *CIL*. And the pressure for standardisation continued, although it was not until the 1930s that use of the Leiden conventions for publishing inscribed texts was agreed (and modifications continued).⁶

Much of this reflected a response to the increased volume of material becoming available as the world changed. But the end of the nineteenth century saw the beginning of a further technological revolution with the arrival of photography. The use of cameras for archaeological records was at first limited to established excavation sites, or cities such as Athens, with a reasonable amount of infrastructure and protection for cumbersome equipment; but by the 1920s cameras were sufficiently portable to be taken out into the countryside. More and more inscriptions were photographed; but the traditions which had already developed meant that they were not immediately seen as essential elements in publication. The *Monumenta Asiae Minoris Antiqua* represent an honourable exception, established with the specific aim of taking and publishing photographs; but they had the support of American funding.⁷

Gradually, however, photographs began to effect transformations in scholarly practice. They permitted a far better understanding of regional, cultural and chronological distinctions, which could be communicated to readers who would have no opportunity to see the stones themselves. And they provided an increasing understanding of context – whose importance was emphasised by both Louis Robert and, more recently, Werner Eck. The photograph can present the support, and, when applicable, the setting of that support; Robert emphasised the importance of visualising the landscape surrounding a particular community.

Robert also demanded ever higher standards in the accompanying commentaries on inscriptions. But all of this raised a huge logistical problem: a text accompanied by a detailed description, a detailed commentary and one or more photographs requires a good deal of space – and more and more texts were appearing. From the 1980s onwards

⁶ Van Groningen 1932; for further modifications, see Dow 1969; Krummrey and Panciera 1980; Panciera 1991.

⁷ Roueché 2013.

it was also becoming standard to provide a translation into a modern language. Publication in book form was becoming increasingly expensive and burdensome.

It was therefore changes which had been brought about by a series of technological developments which led far-sighted scholars – in particular Silvio Panciera and Geza Alföldy – to look to yet another technology. As early as the 1980s they both saw the value of computers as tools for holding, organising and searching large volumes of text; others quickly followed. Panciera also understood early on that working in this medium required collaboration, and the use of agreed standards, convening meetings to discuss such matters from 1989 onwards. With the arrival of the web, and the resultant possibilities for communication, these requirements became ever more important; in the early 2000s the agreed conventions of epigraphy were translated into a set of machine readable instructions by Tom Elliott, when he developed EpiDoc.⁸

At the same time, the steady improvements in technology were making it possible, by the 2000s, to exchange images as well as texts; and the arrival of the digital camera was transforming the possibilities for photographing texts. The epigrapher in the field no longer depends on a finite supply of film: the traditional shot of several fragments photographed together for reasons of economy is disappearing. Instead, the epigrapher should be expected to present images of every side of a monument and its setting. All these developments both enabled and necessitated the first large scale publications of inscriptions on line: *Vindolanda Tablets Online*,⁹ (2003), the *U.S. Epigraphy project*,¹⁰ (2003–), *Aphrodisias in Late Antiquity* (2004),¹¹ the *Inscriptions of Aphrodisias* (2007),¹² and others in preparation.

While we were working on the materials from Aphrodisias, new possibilities were opening up: connections were becoming faster and more ubiquitous. More and more relevant material was being published online: what Tim Berners-Lee calls *the next Web of open, linked data*.

⁸ <http://epidoc.sourceforge.net/>

⁹ <http://vindolanda.csad.ox.ac.uk/>

¹⁰ <http://usepigraphy.brown.edu>

¹¹ <http://insaph.kcl.ac.uk/ala2004/>

¹² <http://insaph.kcl.ac.uk/iaph2007/>

In 2008 we received a grant to start exploring the use of geodata with inscriptions, in the *Inscriptions of Roman Tripolitania* (2009);¹³ this approach has been further developed in *Monumenta Asiae Minoris Antiqua* XI,¹⁴ and other kinds of interconnection are being actively explored. Linking is closely connected to sharing: it is becoming increasingly clear that one way of ensuring the survival of our materials is by making them openly available for others to reuse and share as widely as possible.

One of the aims of both Alföldy and Panciera had been to develop collaborative corpora, places where large quantities of texts could be shared to enable extensive searching. After their projects moved onto the web it also became possible to include more and more material – photographs and other images, and geodata. It was Silvia Orlandi who realised that the next step was a portal, to offer access across these and many other online epigraphic collections. Work over several years, by many different scholars, had established EpiDoc as a robust system, particularly for the exchange of information, and it was therefore available to build EAGLE. The spirit of this enterprise was exactly the spirit behind Europeana – a project to present high quality records of heritage materials to a worldwide audience.

This is an account, therefore, of an academic discipline which has evolved by engagement with a series of technological developments over two centuries, and is continuing to do so; it is also a story of developing steadily higher standards for the publication of heritage materials. The current challenge is to confront the fact that such materials will now be universally available, and must therefore be presented in a way that helps and supports new audiences. For this the EAGLE project has been developing valuable new resources – such as the mobile app –and, very importantly, encouraging translations. The crucial thing to realise is that it will not be possible to revert to earlier models: this project sets new, higher standards for epigraphic publication. This is a project which will take the subject into the future ‘on eagles’ wings’, as the Bible puts it – in another phrase used by Hollywood.¹⁵ They should be taking us all with them.

¹³ <http://inslib.kcl.ac.uk/irt2009/>

¹⁴ <http://mama.csad.ox.ac.uk/>

¹⁵ Exodus 19.4

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Putting ancient inscriptions in the limelight

*Mary Beard**

Note of the Editors: we reproduce here the abstracts of Professor Beard's keynote presentation. The full text of the lecture (including the multimedia files shown to the audience) will be published in the "Storytelling Platform" on the EAGLE website at the address: <http://www.eagle-network.eu/story/putting-ancient-inscriptions-in-the-limelight/>

This lecture reflects on public engagement with ancient inscriptions: what is it about inscriptions that interests a wider audience, and – just as important – what puts them off? Mary Beard draws on a series of BBC documentaries, "Meet the Romans" which used Roman epitaphs and other inscribed texts as a way into the life of ordinary Romans, but reflects more widely on how academics and museum professionals can (and already do) make inscriptions come alive for the public.

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Tradition and progress. The Roman World in the Digital Age - seen through Inscriptions

Werner Eck*

Epigraphy has caught up with the digital age. If this point needs to be proven, this very conference speaks for itself. Its celebration in Rome does not happen by chance. Indeed, the first real attempt to create a collective compilation and presentation of all the Latin (and Greek) inscriptions in a single database or as a connection of the existing databases was made here in Rome in 1997 through Silvio Panciera during the 11th International Congress of Greek and Latin Epigraphy.¹ His fundamental initiative set in motion a process, which step by step will lead to a complete database. Very important steps in this direction have been made in the meantime and the development is progressing with particular emphasis at the Sapienza thanks to the collaboration between traditional epigraphists such as Silvia Orlandi and IT-people, who are affiliated to the Centro Linceo Beniamino Segre. These two and all the other partners in many European countries have to be thanked for these present steps and we wish them both courage and success in the following phase.

Whoever is dealing with inscriptions, at least since the 16th century, has to deal with a continuously growing mass phenomenon. One of the reasons, which instigated Mommsen to establish the *CIL*, was the amount of epigraphic texts, which were known at that time but had not been collected in one single place but were, instead, spread in countless manuscripts and publications. Even when one looks into a representative selection such as the *Inscriptiones Latinae Selectae* by Hermann Dessau – completed in 1916 – there are more than 9500 texts.

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¹ See Panciera 2006, 1913ff. – I would like to thank Aitor Blanco Perez for the translation of the paper.

Since the time of Mommsen and Dessau, however, the number of epigraphic documents has increased to a size previously unknown. On the website of EAGLE one can read of more than 1.5 million items, currently scattered across 25 EU countries as well as the east and south Mediterranean, which should be collected in the EAGLE database. In order to illustrate this growth in a more accessible way, let me refer to the following example. Since the conclusion of the first edition of *CIL II*, namely with the supplement in 1892, the number of inscriptions from the Iberian Peninsula has tripled. For some types of inscriptions, the increase is even bigger. When Herbert Nesselhauf collected all the military diplomata in 1935, he could put together a total of 187 documents in *CIL XVI*. Today, we know more than 1100 such texts, i.e. an increase of 7 times. Not in all regions of the early Roman Empire and for all types of inscriptions is the increase as dramatic as in the aforementioned examples. Even so, a doubling can be identified in many Roman places. Just to mention some examples: in Sarmizegetusa, the first Roman colony following the conquest of Dacia, around 330 inscriptions were collected in the different volumes of *CIL III*. Since then, more than the same number of new texts has appeared, perhaps around 400.² The growth is almost always dramatic when intensive excavations lead to a massive increase in the amount of inscriptions available, as somehow happens in the cases of Sagalassos or Perge in Pamphylia.³ Perge provided only 4 Latin inscriptions for the *CIL III* and today there are at least 42.⁴ Even more dramatic is the growth in Caesarea Maritima. In *CIL* there were only 3 Latin inscriptions known from the capital of the province of Judea, while now we have in the *Corpus Inscriptionum Iudaeae/Palaestinae* more than 270 Latin documents.⁵

Each of us is familiar with this massive increase in epigraphic monuments and we are reminded of this every year by the always more extensive volumes of *AE* and *SEG*. Even if it is impossible to provide an exact number of all the Latin inscriptions, one can still take as a starting point the fact that there are approximately 500.000 texts available for our work, including the so-called *instrumentum domesticum*. There are more than 495.000 inscriptions in the Database Claus-Slaby.

² According to information by Ioan Piso.

³ In Sagalassos almost all the new inscriptions are in Greek.

⁴ See the Claus-Slaby database.

⁵ Eck 2013, 17 ff.

Around 72.000 we can find in the Heidelberg Database and around the same number in the Epigraphic Database of Rome, from which the Project EAGLE emerged, not to mention other participants as, among others, *Hispania Epigraphica* or the Bari Epigraphic Database.⁶ With regard to the Greek inscriptions, it is much more difficult to give an approximate number because their digital record is not as advanced as in the case of the Latin inscriptions. As for inscriptions in other languages – such as Punic, Hebrew-Aramaic, Demotic or Nabatean – let me exclude them from this discussion, even though they are just as part of the epigraphic tradition of the Greek and Roman antiquity as Latin and Greek inscriptions – we should not forget this very important fact.⁷ Our work as historians or philologists is based on all those texts. But, the bigger the number of documents providing information is, the more difficult it becomes to find all texts. Even more difficult is to collect selectively those texts related to the topic on which one wants to work. And yet, the complete collection is crucial for the scientific result.

Let's go back only two or maybe three decades, a time which many of you in this room have vividly gone through. In that time it was clear, what we had to do, when we wanted to explore a topic on the basis of epigraphic evidence. We were to search – sometimes in countless volumes of inscriptions and partly supported through more or less detailed indexes. Depending on the type of subject on which we were working, these indexes were not always perfect tools to find the material. Very often they could not even be such perfect tools, since many phenomena are not accessible through precise termini in the epigraphic material, but rather through the entire content of the text. I am sure that you all have your own experiences. When I worked on the administration of Italy in the high Roman Empire, the indices were helpful but not sufficient. I had to go through each and every of the epigraphic corpora, which means that at least the inscriptions had to be read. In total, the look through all the necessary volumes took me almost two years.

Is that different today because there are numerous databases available? At least with regard to the Latin inscriptions almost all of them are collected, although with very different individual information.

⁶ See the individual databases.

⁷ At the 14. International Congress of Greek and Latin Epigraphy there was a special section for this phenomenon: Eck *et al.* 2014, 159 ff.

With few clicks, we can find an answer for many questions in few seconds – sometimes one has to wait a bit longer, since the server does not work properly or some other problems exist. Indeed, as an already deceased colleague once told me long before the digital period in 1973: *Pazienza* is the greatest virtue of the epigraphist. Today we are ready to forget this virtue thanks to our computers. At any rate, most of the relevant material available in databases appears quickly on the screen. It is not necessary to give examples. And yet, something which we all know: it is by no means guaranteed that we have found absolutely all the relevant material which exists; the reason for these gaps are inter alia, that not a small part of our epigraphic testimonies survives only as fragments and can be restored in different ways. For example, if we would try to find all the *quaestores* of the province of Achaëa in the imperial age, we would not find the following fragmentary inscription from Corinth, the capital of the province, because the text has read as follows:⁸

Q(uinto) Vili[o--]/Titia[no]/Quadra[to--]/IIIvir(o)vi[ar(um)cur(andarum), trib(uno)] / la^ricl(avo) leg(ionis) [--, leg(ato) prov(inciae)] / Ach(aiae), ob ius[titiam et fidem,] / quam circa [universam] / Achaia[m exhibuit,] / qu^am pro praetore [administravit.] / M(arcus) Antonius M(arci) [filius)] / Nigrinus [--].

Our search in a database would have recorded a proconsular legate of Achaëa whose function in the inscription is nevertheless restored. The restoration of the position of provincial legate is not impossible, but it is also not very likely. The restoration of the office of quaestor: [*-- quaest(ori) prov(inciae)*] / *Ach(aiae)* instead of [*-- leg(ato) prov(inciae)*] / *Ach(aiae)* fits in the lacuna much better.⁹ For a young senator who had completed an office of the *vigintiviri* and then a tribunate in a legion, the *quaestura* should actually follow in a normal career and not the position of a proconsular legate under a proconsul. Of course, we know that exceptionally young senators already before the *quaestura* were acting as legates of a proconsul in his province. In total, there are only four of such cases. By contrast, much more senators state in their inscriptions that they have held the office of provincial *quaestor* as *pro praetore*.

⁸ CIL III 537.

⁹ In the database Clauss-Slaby there are around 68 examples in Latin inscriptions, in the database of the Packard Institute one can find 10 more in Greek texts.

The *pro pr(aetore)* preserved in the inscription could therefore refer to the *quaestura*. As the *quaestura* normally follows the *viginvirate* and the legionary tribunate, this rule should automatically be observed in a fragmentary career.¹⁰ This kind of result is not achieved through an inquiry into a database but through a constructive consideration on the basis of personal experience. Such knowledge will remain also the basis of our discipline in the future. Databases complement our knowledge but they cannot replace it. This can't be their business.

Inscriptions are in the first place texts which contain certain evidence as such. But inscriptions do not only consist of text, although this may commonly seem to be the case in the literature. In German, one speaks of „*Inschriften errichten*“ and in Italy one can say: *una iscrizione eretta*.¹¹ In the *Prosopographia Imperii Romani*, the expression *titulum ponere* was long in use and applied to inscriptions of all kinds. With these expressions, it was not clear, what specific function was connected with an epigraphic text and the support on which the inscription appears. Nonetheless, the support already contains its own message and that was, on many occasions, the primary message for the Greek and Roman public.¹² In order to understand what an inscription can today convey as evidence, it is fundamental to include the *monument* with which the inscription was connected. This can be an altar, an architrave of a temple, a mausoleum or, for instance, the base for a statue, which is explained by the inscription. In enquiring about the content of inscriptions, we must decisively take into consideration the function that inscription and monument shared in the Graeco-Roman world.

However, when one looks for the function of an inscription in a database, the difficulties begin – if I were to speak about my own experiences. On many occasions, this function is not found, if one enquires about what is directly conveyed in the inscription, because this exact function is commonly not mentioned in the epigraphic text. This is not surprising. To mention the function was not particularly necessary because the ancient observer completely saw, on what an inscription was written. Given that today this context is mostly not preserved,

¹⁰ See now the new reconstruction of the inscription by Eck 2017.

¹¹ It seems not necessary to give examples for this type of formulation; they are abundant.

¹² Cf. now Eck, *Wie ehrt man*.

we must infer it from the support whose form and particular details are connected with it. This necessity has meanwhile become almost common knowledge – in contrast with Mommsen’s time.¹³ On the EAGLE website, this is specifically taken into account with the option *advanced search*, in which it is possible to browse the database according to object type. With this option, one can find the categories, for example, of *statue*, *statue base*, *statue base shaft or plinth*. Hence it is already possible to obtain a result with a high degree of differentiation, if one browses selectively. However, not all the different categories of statues are grasped with these search terms. Just to mention an example: *bigae* or *quadrigae*, which were erected to honour a person, can only be found if these terms would also appear in the inscription. But in the epigraphic text the object is directly mentioned only in a limited number of cases. The ancient observer saw the object which did not need any additional reference. For us, on the other hand, the specific types of statues are generally recognisable only if we include the support of the inscription in the analysis. The original statues are almost always lost or, at least, not connected with the inscription. Enquiring about the types of statues is not a child’s play. For the most part, they rather say fundamental things for both the honoured and the honouring individuals.

One example from Volsinii (modern Bolsena) can illustrate this.¹⁴ It is an honorific monument set up to commemorate a senator of the Hadrianic-Antonine age. The surviving fragmentary *titulus honorarius* records his names: Pompeius Vopiscus C. Arruntius Catellius Celer Allius Sabinus, followed by his *cursus* and, finally, the city of Carthage as dedicator. The text, however, does not specify in which figurative way the senator was presented to the audience of ancient Volsinii. This is also not attempted in the epigraphic database of Rome; there it is only said (as in the Epigraphischen Datenbank Heidelberg) that the text is to be read on a base.¹⁵ While this is correct, the plain term “base” does not allow to recognise the most important element, namely with what type of honour had the city of Carthage honoured the senator coming from Volsinii. The particular quality of the honour is, nevertheless, revealed by the size and shape of the inscribed plaque.

¹³ Eck 1995, 107 ff.

¹⁴ AE 1980, 426.

¹⁵ EDR077846 = HD005099 (M.G. Schmidt).

The plaque is 76.5 cm high and 1.90 m wide.¹⁶ The monument was so wide that a normal statue could not have stood on it; this would have appeared completely out of place. Given the width of the inscribed slab, it is to be inferred that a *biga* or perhaps even a *quadriga* was set up for the senator. He should therefore have completed an action beyond his official duty on behalf of Carthage for which the city decided to recognise his activity in this lavish way and to send ambassadors to Volsinii to erect the monument.

A similar case can be inferred for Larcus Priscus, a legate of the *legio III Augusta*.¹⁷ The city of Thamugadi honoured him in a similar way to that of Carthago for the senator in Volsinii. On the forum of the colony founded by Trajan, not a normal honorary statue not even an equestrian statue – as previously suspected¹⁸ – was set up but rather a *biga* on which the statue of Larcus Priscus was presented to the citizens of Timgad.¹⁹ But in EAGLE one finds the note:

Type of object: unbestimmt = undefined (= EDH).²⁰

But one can see the type of the object on the photo, published by Zimmer in 1989.²¹ More examples of this kind could be given. In my opinion, an important consequence is therefore clear. If databases were to fulfil their function completely, then it would be not only useful but rather very necessary to record an indication of the concrete form of the honorific monument in such cases. Otherwise, a crucial part of the potential information would be lost.

Of course such a degree of precision is not always possible, but very likely when – as shown by the two previous examples – the form of the support provides evidence beyond the text of the inscription that can be searched in the database. This happens for example in many inscriptions which in antiquity were to be seen under *statuae equestres*. Sometimes this form of honour is recorded in the text of the inscription itself. In the database Clauss, there are around 45 records if one looks for *statuae equestres* or *statuam equestrem*, in the database EAGLE around 27.

¹⁶ Gros 1980, 977 ff.

¹⁷ CIL VIII 17891 = Dessau 1055.

¹⁸ Bergemann 1990, 147 Nr. E 90: „equestrian statue“.

¹⁹ The inscription is 188 cm wide, much more than necessary for an equestrian statue.

²⁰ EDH031159 (B. Gräf).

²¹ Wesch-Klein 1989, 71 Nr. T 4.

That EAGLE shows fewer cases is naturally due to the fact that this database is still under construction. Either with 45 or 22 inscriptions, this only records in any case a minority of the texts which were once to be read under such *statuae equestres*. In the monograph on equestrian statues written by Johannes Bergemann in 1990, 128 inscriptions are collected, which were once connected with an equestrian statue according to the investigations of the author.²² Besides the statues directly referred to as such in the text, there are also those containing other hints which allow us to recognise that the honoured person was once presented on a horse.

Some examples should illustrate which equestrian statues cannot be recognised as such without these extra hints. In the colonia Aelia Capitolina, modern Jerusalem, an equestrian statue was erected for Antoninus Pius through the council of decurions, apparently straight after his accession in the year 138/9. In the text of the honorific inscription, the type of statue is not mentioned but it can be inferred from the size of the inscription.²³ Therefore, it must be registered as an equestrian statue in a database. The same applies to the honours bestowed in Lepcis Magna upon the governor of the late-antique province Tripolitana, Flavius Nepotianus. In the inscription itself, it is only spoken of a *statua marmorea* that should memorialise the services of the magistrate.²⁴ However, the base enables to recognise that a *statua equestris* once stood there because this base is 170 cm deep.²⁵

Equestrian statues are, nevertheless, not uniform. They can also provide, in turn, additional information by their specific appearance. They were dedicated in very different forms; above all in very varied sizes. For example: Alfius Secundus, a *flamen perpetuus* in Africa proconsularis, set up two or three equestrian statues of the emperor Septimius Severus.²⁶ Even though these statues represent the emperor, they must have been small ones because the base is only 54 cm high and 35 cm wide.²⁷

²² See n. 18.

²³ *Corpus Inscriptionum Iudaeae/Palaestinae* I 2, 718.

²⁴ IRT 565.

²⁵ Bergemann (n. 18) no. 83. Cf. the inscription for the flamen provinciae Pompeius Cerealis Salvianus in Lepcis Magna: the basis is 70 cm high, but 160 cm deep (IRT 602).

²⁶ CIL VIII 14370 (Avedda).

²⁷ Bergemann (n. 18) no. 81.

These small equestrian statues fitted probably into the context in which they stood. On the other hand, gigantic equestrian statues were erected of all the emperors – and not only of them. An exact relation between the size of a monument and social rank did not exist. Various factors could be relevant in such cases. Nonetheless, the size can already tell us something about the status of the honorand and the intention of the dedicator.

Most *statuae equestres* either rose from bricked bases or the base was made of solid stone. The base for the statue of C. Minicius Italus in Aquileia was built with bricks and then covered with marble slabs.²⁸ The one of the young senator L. Fabius Severus in Tergeste was made of a single solid stone.²⁹ The latter applies to the majority of these monuments. Even so, at least in the first century AD there was also a type of an equestrian statue that remained unattended in research until recently. For there existed equestrian statues, which seemed much lighter and did not stand on an apparently solid basis.³⁰ Sometimes the base was simply made of a foundation slab, two supporting pillars and a cover plate on top, on which the equestrian statue stood. (Fig. 1 and 2) To the best of my knowledge, there is only one fully surviving example of this type, which is today kept in the museum of Brescia. (Fig. 3) This example presents a posthumous honour for a 6-year old boy decreed by the *ordo decurionum* of Brixia. The setting up of the equestrian statue was executed by the father of the deceased.³¹ In this case, we recognise such a particular type of equestrian statue only because the entire monument survives, in the inscription the father mentioned only a *statua equestris*. Yet research did not consider the piece which can be seen in the museum at Brescia as a special type of honorary monument, but rather as a unique object. There are, however, not a few inscriptions that were connected with this statue type in the Roman age. The central feature of this type are always two supporting pillars and a cover plate on top, on which the equestrian statue stood. Two kinds of pillars can be distinguished, and they differ clearly. There are pillars such as those used as inscribed support in the form of the example from

²⁸ CIL V 875 = Dessau 1374 = Inscr. Aquileiae I 495; Alföldy 1984, 98 f. no. 87. For a photo see EDCS-01600153.

²⁹ CIL V 532 = Dessau 6680 = Inscr. Italiae X 31. Photo : EDCS-04200621.

³⁰ For the following discussion see Eck and von Hesberg 2004, 143 ff.

³¹ CIL V 4441 = Inscr. Italiae X 5, 232.

Brescia and there are the so-called *trapezophora* on which an inscription is not rarely found.³² Just to mention some: We know for the young senator P. Numicius Pica Caesianus³³ two *trapezophora* from Rome, quite a number from Torino for Q. Glitius Atilius Agricola,³⁴ a single one for T. Flavius Cimber, a municipal magistrate from Urvinum Mautaurense³⁵ and many others.³⁶

These epigraphic monuments can partly be found in the EAGLE database too. Here one has to search for the term *trapezophorus* as object type.³⁷ Table feet of this kind, which contain inscriptions, are known in relatively big numbers because of their special shape; they have always been categorised individually.³⁸ However, they were not hitherto considered as parts of statue bases but rather of tables, real *mensae*. Today it is no longer questionable that these *trapezophora* with inscriptions were in reality parts of statue dedications, with an equestrian statue which stood on this specially arranged base.³⁹ As long as these inscriptions are marked up with the keyword *trapezophorus* (sic!) in the EAGLE database, they can be found without problems. In the Heidelberg database, however, with the keyword *trapezophorus/um* one will find nothing, although there are three such objects in the database; but there they are registered under the keyword *mensa*. If one is entering *mensa* in the EDH, numerous and extremely varied objects appear, which have by no means the same function.⁴⁰ If the keyword *mensa* is entered in the EDH and connected with the search parameter “honorific inscription”, it is possible to find three *trapezophora* – in the category *mensa*.⁴¹

³² For more information see Eck and von Hesberg 2004.

³³ CIL VI 3835 = D 911 = VI 31742 = 31743.

³⁴ CIL V 6974 – 6987; Eck and von Hesberg 2004, 186 f.

³⁵ CIL XI 6062: *T(ito) Flavio L(uci) f(ilio) Ste(latina) Cimbro pont(ifici), aed(ili) bis, IIIIvir(o) i(ure) d(icundo), quinq(uennali), praef(ecto) fabr(um), d(ecreto) d(ecurionum)*.

³⁶ See Eck and von Hesberg 2004, 180 ff.: a list of the inscribed *trapezophora* which were known to us in 2003/4.

³⁷ Trapezophoron is the normal terminus technicus.

³⁸ For the literature see Eck and von Hesberg 2004.

³⁹ Eck and von Hesberg 2004 with the general discussion of this type of honorary monuments.

⁴⁰ For an example of a *mensa* in the concrete sense: IRT 590: *Ti(berius) Cl(audius) Amicus M(arcus) Heliodorius Apollonides aed(iles) mensas p(ecunia) s(ua) d(ono) d(ederunt)*; the inscription is engraved on the frame of the table; cf. also CIL III 15184, 18 = AIJ 310. On the other side also a *mensa ponderaria* can be found by surging for a *mensa*: AE 1905, 37 = HD030144; CIL III 15025 = HD005744.

⁴¹ HD002671 = EDR111713; HD006112 (Ruck) = EDR076783; HD025725 (Féraudi) =

But who would imagine that the combination of *mensa* and honorific inscription is necessary to find this type of monument? Also in EAGLE not all the objects that belong to this form of monument can be found with a single search term. That means as a consequence, that in the databases combined by EAGLE the terms for specific objects should be uniform; for the moment this is not the case.

To give one example here: We know one *trapezophoron* with an inscription from Cosa in which Drusus Caesar, son of Tiberius, is mentioned; it appears in EDR076783 with no specific characteristics for the object, because the information comes from the EDH. In EDH006112, the object of this inscription appears as a *mensa* and an “Ehreninschrift”, but not as a trapezophoron. On the other side: In EAGLE, *mensa* can almost only be used as long as the word occurs in the inscribed text, not as term for an archaeological object.⁴² Again the harmonization of search terms becomes extremely important in order to enable a quick and safe search.⁴³

As mentioned before, a total of 23 *trapezophora*, which can be described as honorific monuments for single persons, can be found in EAGLE. These are by far not all the inscriptions, which were once connected with equestrian statues, which did not stand on a solid base but rather on a plate supported by two pillars. The posthumous honours in Brescia for the 6-year old P. Matienus Proculus is, as already mentioned, such an example.⁴⁴ But in the databases, inscriptions for such monuments are not described with their specific features as the entry for the monument from Brescia makes clear; of course normally they can be found with the term honorific inscription, i.e. as *titulus honorarius*; but that does not really help, there are too many *tituli honorarii* in the database. The text for Publius Matienus Proculus one would not even find with the word *titulus honorarius*, because it is categorised as *sepulcralis*.⁴⁵ To single out the different types, one has to describe in the data bases the special singularities, which identify the particular functionality of such monuments. Here one example.

EDR073154 (also described as *mensa*).

⁴² For an exception see the preceding note.

⁴³ In EDR077116 an inscription with the text: *L(ucius) Ansius Quintill[i]anus me[nsam] – J* is called trapezophorus, although in reality it is a *mensa*, as the text itself tells us and as the photo in EDCS-10700899 clearly shows. The inscription is engraved on the frame of the tabula for a *mensa*.

⁴⁴ CIL V 4441 = Inscr. Italiae X 5, 232.

⁴⁵ EDR090232. The precise terminus would be: *titulus honorarius postumus*.

In Sirmione (ancient Sirmio), at the Lago di Garda, an inscription was found in 1960. It once belonged to an honorific monument for the young senator C. Herennius Caecilianus. The following text was published by Alberto Albertini in 1973 (fig. 4):⁴⁶

*C(aio) Herennio
C(ai) f(ilio) Pob(lilia)
Caeciliano,
adlect(o) in senat(um)
ab imp(eratore) Hadriano
Aug(usto), q(uaestori) prov(inciae) Narb(onensis),
trib(uno) pleb(is), IIIviro i(ure) d(icundo)
Veronae,
patrono
d(ecreto) d(ecurionum).*

The text is not particularly interesting with regard to its content. It only records the beginning of a senatorial career in the Hadrianic period. The young senator came apparently from Verona where he was also *IIIvir iure dicundo* and patron of the city. For this very reason the city wanted to honour him, naturally with a statue. This was also assumed by Albertini, who suggested a bronze statue. The text also appears in the EDR and EDH.⁴⁷

The inscribed support consists of a slab, 100 cm high, 59 cm wide and 29 cm deep. The text is surrounded with a frame on the front side. The same frame surrounds also both laterals and, above all, the backside, which is crucial (fig. 5 and 6). For this shows that the backside was elaborated with the intention to be exposed, a detail also observed by Albertini as he accordingly commented that the base (with the statue directly standing on it, in his view) was not *adossata a una parete, ma eretta in uno spazio*.⁴⁸ It is correct that the inscription could not have been *adossata a una parete*. However, both the first editor and all the others who dealt with the inscription thereafter have simply not wondered how, then, could the statue stand on a slab which is only 29 cm deep (fig. 7). Furthermore, the three holes for the corresponding dowel on the top side of the slab show that no statue

⁴⁶ Albertini 1973, 439ff. = Alföldy, *Römische Statuen* (n. 28) 253; R. Bertolazzi - V. Guidorizzi, *Supplementa Italiae* 28, nr. 7.

⁴⁷ EDR093835 and HD033596.

⁴⁸ Albertini (n. 46).

was fixed there, but rather, something completely different, another horizontal slab. If one compares the evidence concerning this inscribed support with the equestrian statue of Matienus Proculus in the Museum of Brescia, shown before, which also had the backside of the front pillar elaborated with the intention to be seen from both sides like also the second uninscribed pillar – the following result becomes immediately clear: Herennius Caecilianus was not simply honoured with a statue by the people of Verona, but with an equestrian monument standing on an cover plate, which was resting on two pillars, whose front side with the inscription was 29 cm deep (the second pillar is lost). This “lighter” version of an equestrian statue was perhaps chosen by Verona because the monument should probably be set up in the estate of the senator. The fact that this type of monuments was not unusual in this region is shown not only by the posthumous monument of Matienus Proculus in the Museum of Brescia, but also by two other pillars in the same museum, which are very similar to the monument of Herennius Caecilianus; these too are elaborated on the backside with the intention to be exposed. One of the pillars bore once an inscription that was later erased,⁴⁹ which makes it impossible to know who was honoured in such a way (fig. 8-10).

What are the consequences of these observations? Databases are by now indispensable in the epigraphic work. They speed up not only the work but allow, above all, to recognise evolutions through the possibility of examining texts systematically: e.g. formulae or forms of abbreviations. Previously, this was only possible through the arduous and time-consuming examination of endless volumes. Therefore very often this systematic search was not be done or the result was supported only by a slim documentary basis. This is now much easier especially when it is possible – like now in EAGLE – to access many databases at the same time. In order to achieve an even more effective and extensive access, it appears to me, that a stricter coordination between the different databases is necessary, a harmonization that should also concern the question, which search terms are necessary and possible. If the same phenomena, i.e. inscriptions, which had the same function, are shown with different terms, a uniform search becomes necessarily difficult, if not completely impossible. I referred to the already examined terms *trapezophoron* and *mensa*.

⁴⁹ A more detailed argumentation in Eck, *Wie ehrt man*.

Under the same term, phenomena and documents with very different functions should not appear together. A *mensa* should not refer both to a *mensa ponderaria* and, at the same time, to the pillars of an equestrian statue of the type described above, as somehow occurred in Cosa with the *trapezophoron* for Drusus Caesar.

The honours for Herennius Caecilianus introduce another further possibility to make the utilization of databases for the users even more diverse. In EDR093835, a photograph of the monument of Herennius Caecilianus was published, naturally of the front face with the inscription. Yet a photograph of the backside would be equally necessary to recognise the specific function of the stone and to make it immediately clear that the slab was elaborated with the intention to be exposed. In this way the essential evidence for its function would be provided. Of course such photographs are not always available. However, during the preparation of entries one should always check whether more pictures are available and not only those of the side with the text. The text remains essential, but it must be completed with exact observations about the support of the inscription. Often the meaning of the monument can only be reached in this way. This was the central theme of the 14th Congress of Epigraphy. Databases have the capacity to provide all those details which are necessary for the complete interpretation of an epigraphic monument.⁵⁰ The high costs that the inclusion of many pictures in previous publications entailed are not a crucial problem any longer.

At the end of my presentation let me once more demonstrate the necessity to describe clearly the monumental features of an inscription and the photographic documentation now with an example that comes from the material of the *Corpus Inscriptionum Iudaeae/Palaestinae*.⁵¹ A short time ago one could find the inscription only in the database Clauss-Slaby and only the text.⁵² Avi Yonah, who greatly contributed to the collection and publication of epigraphic monuments during the time of the British mandate in Palestine, published in 1946

⁵⁰ For the acts of the Congress see note 7 above.

⁵¹ This monument will be included in volume V of the *Corpus Inscriptionum Iudaeae/Palaestinae*.

⁵² EDCS-15200169; now there are also photos connected to the text. Under the address: http://www.antiquities.org.il/t/item_en.aspx?CurrentPageKey=33&rock=0. The monument can be seen on the homepage of the Rockefeller museum in Jerusalem; there is only mentioned that an inscription is written on the monument; but the text is not given.

an inscription found near the legionary camp of the *legio VI Ferrata*, near Caparcotna = Legio.⁵³ It is a round monument, 1.05 m high, which he – like many epigraphists later – presented as an altar.⁵⁴ The monument shows three perfectly elaborated relieves on three sides: a Victoria standing on a globe with a tropaion as well as a victory crown in the hands, and two eagles that carry a thunderbolt in the crawls and a crown in the beak. The inscription on the front face reads (fig. 11-14):⁵⁵

Pro salute et incolumitate / domini nostri [[Imp(eratoris) Caes(aris) M(arci) Aur(eli) Antonini Aug(usti)]] / praesentissimum deum Mag(num) Sarapidem / leg(io) VI Ferrat(a) F(idelis) C(onstans) [[Antoniniana]] / Iulius Isidorianus p(rimus) p(ilus).

In the scholarly discussion, the monument was almost universally presented as an altar and logically considered as a dedication to the god Sarapis. Nevertheless, this understanding did not take into consideration the clear testimony of the inscription, in which it is written: *praesentissimum deum Mag(num) Sarapidem*.⁵⁶ This evidently means that Sarapis is not mentioned here as the one to which something was dedicated but rather that his figurative representation is the dedicated object. There is no doubt that a representation of Sarapis was set up as a votive gift, probably in a shrine, perhaps for Egyptian gods near the camp of the legio. The fact that a representation of Sarapis was dedicated means, consequently, that we are not dealing with an altar but with a base on which the representation found its place. Above all, it should not have been omitted from the beginning that there is a remarkable peculiarity on the upper side of the base, namely a completely rounded hollow with a diameter of 29 cm and a depth of 9 cm (fig. 15). It is an almost half sphere that was perfectly chiselled and smoothed from the marble. Sometimes earlier scholars noticed this hollow, as already Avi Yonah, but concluded that over

⁵³ Avi-Yonan 1946, 89 = AE 1948, 145.

⁵⁴ For example. Vidman 1969, 182f. no. 361; Mora 1990, 243 Nr. 577; Belayche 2001, 59 ff.; Bricault 2005, 508f. no. 403/0201; Belayche 2007, 451f.; Eck 2007, 186f.; Figures 2013, 78. 96.

⁵⁵ The text of the inscription is corrected by Eck 2016.

⁵⁶ One exception: Stoll 2001, 280, who saw the consequences of the accusative for the interpretation of the monument.

the “altar” a focus would have stood in the hollow, on which the offerings could be given. However, a shallow cavity can be seen in such cases at the most, but not the half spherical hollow found here. As this half sphere can only be carved with a considerable amount of work, it must have a specific meaning, which should be connected, as the entire monument, with the depiction of the god Sarapis.

The representation of the god is not preserved, only the basis with the inscription like in most other dedications. Nevertheless, if one checks the forms in which Sarapis is figuratively represented, one immediately comes upon busts of the god which sits on a globe. With this observation, we also have immediately an explanation for the spherical form of the hollow carved on the upper part of the base. Here the lower part of a globe would sink, on which the bust of the god would likewise rest. This entire monument, the basis and the bust of the god was set up in a shrine and probably took an important place there (fig. 16).⁵⁷

As already mentioned, this extra-unusual object appeared until a short time ago only as a text in the database Clauss-Slaby. The way in which it should be presented, so that users of databases can decipher its complete meaning, follows with necessity after the previous discussions: not only must all the sides be depicted but even more important is the upper surface for which also the dimensions should be given in this case. At least several photos of the monument are now visible in the database Clauss-Slaby. Indeed, only all this information together can reveal as much of the context as possible.

These observations in one way or another are valid for all of our epigraphic texts. The text alone is not enough, but needs – as far as possible – all the other concrete details and photos not only of the text, but of the monument itself. In such a way the access to ancient reality becomes easier, as, for example, in the villa of Herennius Caecilianus in the area of Sirmione or at the shrine near Caparcotna/Legio in northern Galilee. It is clear that we cannot completely reconstruct ancient reality, but we should come as close as possible to the former reality. The digital presentation is a crucial premise for this purpose.

⁵⁷ Drawing of the reconstruction by Gisela Michel.

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Infrastructures for Digital Research: New opportunities and challenges

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Introduction: understanding the use of digital content

The past twenty years has seen a very visible expansion of the digitization of Europe's Cultural Heritage. However, to put the scale of this investment in perspective, the ENUMERATE¹ project has produced data about the volume of digital cultural heritage available across Europe. The results of their analysis published in 2014² shows that over 10% of the collections of European museums, archives and libraries has been digitized, over 300 million items. At the present scale of progress, it will take over 30 years to digitize the rest: a task that will be more complex taking into consideration that a large amount of material remaining to be digitized is 20th and 21st century material, either moving image, audio, or born-digital. A growing number of organisations have developed digital strategies to address this: 36% of the institutions surveyed by ENNUMERATE in 2014 have a written digitisation strategy.

Of the content that has been digitized, though, only 34% is available online, and of that only 3% is available for open re-use, though Creative Commons and unrestricted licensing. However, more than half of the organisations surveyed do not implement measures to quantify how their digital content is used. This lack of analysis of use isn't just an issue in cultural heritage digitization: in 2008, the UK's Arts and Humanities Research Council carried out an analysis of sustainability

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¹ <http://www.enumerate.eu/>

² ENUMERATE 2014, 6.

planning for projects funded through its Resource Enhancement Scheme, 173 projects, an investment of approximately £40 million¹. Of these projects, only just over half were collecting usage statistics². A lack of enquiry into the use and impact of digital content is not a new issue: indeed, there has been a disproportionate investment in creation, management and curation of digital resources versus *use* of digital content for scholarship (in the UK from 1999-2009, the AHRC invested approximately £1.5 million into research that addressed the *use* of digital content, tools, and methods for research, but during this period they invested significantly more in digital content creation and curation). The lack of investigation in this area raises some serious questions about the value of the significant international investment in digital cultural heritage.

What are we doing with all this digital stuff?

It is perplexing that more institutions don't try to develop a better understanding of what their users do with digital content, because methodologies exist for gathering and analyzing this information. Using analytic tools including Google Analytics³ as a baseline, it is possible to augment numeric data with other qualitative and quantitative measures for assessing users, including structured surveys, interviews, and content analysis tools (looking at citations of digital content, and its embedding in blogs and other resources). These approaches have been refined in a tried and tested approach developed by the Oxford Internet Institute (OII), called Tools for the Impact of Digitised Scholarly Resources (TIDSR)⁴. This has been used successfully to measure the impact of a range of resources in the arts and humanities⁵. Similarly, methods developed by the CIBER initiative⁶, originally based at University College London, enable an understanding of the 'digital footprint' of users of heritage content.⁷

¹ Robey 2008.

² Robey 2011, 153

³ <https://www.google.co.uk/analytics/>

⁴ <http://microsites.oii.ox.ac.uk/tidsr/>

⁵ For an overview of the use of this method on a collection of Northern Irish Parliamentary Papers, see Hughes et al. 2015.

⁶ <http://ciber-research.eu/>

⁷ <https://www.ucl.ac.uk/news/news-articles/1001/10010802>, and see also Nicholas 2014.

These approaches are an interesting way to build a narrative around data: using statistics about use to build a picture of engagement with digital cultural heritage. Overall a striking finding is the change in information seeking behaviours: users will multitask, and do many things lightly rather than one thing deeply: they have become what David Nicholas of CIBER referred to as ‘web foxes’⁸ as people bounce around the digital domain using fast and abbreviated searches. Visitors to sites will frequently only access one page, then move on. This is even more noticeable when users access heritage data using mobile phones devices on the go: searching is shorter, and less engaged.

In order to investigate these questions in more detail, from 2011-14 I undertook some analysis of the use of the collections of the National Library of Wales, specifically *Welsh Journals Online* (<http://welshjournals.llgc.org.uk/>) and *Rhyfel Byd 1914-1918 a'r profiad Cymreig / Welsh experience of the First World War 1914-1918* (www.cymru1914.org)⁹. This analysis showed several interesting things. Google analytic data for both sites showed that users mostly come from search engines, not the library website or interface, which is interesting in terms of the investment in presenting content. Similarly, many users were referred through family history websites, or media stories about the resource, rather than academic or subject-specific resources that linked to it: the highest number of referrals to *Rhyfel Byd 1914-1918 a'r profiad Cymreig / Welsh experience of the First World War 1914-1918* came from a story on the BBC Wales News Website about the launch of the resource¹⁰. The most popular search results are location based: people are looking for historic information about places they know. Interviews with selected groups of users of both resources expanded on these findings, establishing that the search box enabled most searches: that the ‘googlization’ of information seeking had not affected the quality of information they were able to find. In fact, the only limitation that users reported was that there was not enough digital content in each resource. This is a consistent finding when surveying users of digital cultural heritage: as fast as digital content is launched, the demand increases for more

⁸ Nichols 2015, 23.

⁹ Welsh Journals Online: <http://welshjournals.llgc.org.uk/>. The study into the use of Welsh Journals Online was written about in Hughes 2012; the research into the use of [Cymru1914.org](http://www.cymru1914.org) was presented at the Sheffield Digital Humanities Conference, 2014: <http://www.hrionline.ac.uk/dhc/paper/19>.

¹⁰ <http://www.bbc.co.uk/news/uk-wales-25126781>.

material: 'we have too many digital collections' said no survey respondent, ever. The benefits of unlimited access to information are so great that they compensate for problems that arise from irrelevant data, poor metadata, or digital dead ends.

"We are all digital humanists now"

Humanities research also exemplifies this enthusiastic embrace of the digital: In many respects, we are all digital humanists now: we all use digital data for research by default (at the very least, electronic catalogues that point to analogue resources). Scholars rely on a steady consumption of digital source materials for scholarship and pedagogy, mostly created through large-scale digitisation initiatives in universities, libraries, museums and archives and as well as by commercial entities¹¹. And humanists do not just use data: many scholars now create and manage these resources; we communicate via blogs and twitter, and use digital dissemination methods for sharing and challenging research results. For many, this represents a sea change in research practice within the recognizable lifetime of a career.

But digital humanities is more than just the use of digital content for searching and browsing. If I was to attempt a definition of '*digital humanities*' as an emerging field of research, I would suggest that it is combination of using digital content; with digital methods for the analysis and interpretation of this content; tools for specific scholarly tasks; and communicating research to the widest possible audience using traditional and non-traditional publishing methods. At its most effective, digitally enabled research in the humanities can facilitate and enhance existing research, making research processes easier via the use of computational tools and methods. More interestingly, it can enable research that would be impossible to undertake without digital resources and methods, allowing the formulation of new research questions that are driven by insights only achievable through the use of new tools and methods.

At the core of this sort of approach is collaboration: with researchers from scientific and other humanities disciplines, computational and technical fields, as well as cultural heritage organizations.

¹¹ Ell and Hughes 2013, 24.

Another important collaboration is with the audiences for our work, as user-led design, and participation via mechanisms like crowdsourcing, informs the development of many initiatives. It also relies on underlying technical infrastructures.

I like this characterization of digital humanities as about *content, tools and methods*, because it creates a working environment with raw materials, tools for working with the raw material, and expertise in digital methods. This may seem a reduction of humanities practice, one that confirms Gary Hall's view of the digital humanities as a use of tools and technologies that does not rely on a theoretical framework¹²: the sort of model that one can see as the basis for a DH research infrastructure, putting the maker's perspective at the centre. However, another school of thought in the digital humanities, exemplified by Alan Liu, sees the emphasis on building and making as a space for exploring and critique of culture¹³. I would argue that the maker and theorist perspectives are not incompatible: in fact, it is through developing and building digital projects in the humanities *through practice* that we can conduct cultural and critical analysis, by questioning many of the assumptions on which digital resources are built and communicated, and developing a better framework for understanding the ways that working with digital content, tools and methods is transforming our consumption and production of knowledge. By subsequently analyzing use of the digital collections and content that have been built, we can also develop a better understanding of their role in the humanities research lifecycle, and start to address questions about how digital content in particular is not just helping us to do research more effectively, but a disruptive, transformative intervention in the research lifecycle.

To address some of these questions, from 2011-15 the European Science Foundation funded the Research Network in Digital Methods in the Arts and Humanities (NeDiMAH.eu), to look at the practice of digital humanities across Europe, and to understand what researchers need in order to do digitally enabled research in the future. From a detailed programme of methodologically focused activities, several conclusions can be drawn about what can

¹² Hall 2012.

¹³ Liu 2012.

make digital resources and collections more valuable for scholarship¹⁴. These conclusions sit alongside the user analysis described above to suggest three core observations about what the research community needs from digital content, and the infrastructures that deliver this content: access to, and ‘knowability’ of digital content; opening up content for use and re-use; and creating better environments for drawing together multimedia content from a variety of sources for analysis and publication. These are described in more detail in the sections that follow.

Access to, and ‘knowability’ of digital content

Much of what is classified as ‘digital humanities’ is consumption: scholarly use of digital resources and born-digital material, working in what Roy Rosenzweig called a culture of abundance.¹⁵

While this presents new possibilities it also raises significant challenges, and there is a need for a deeper understanding of the digital resources scholars rely on. As Tim Hitchcock has described in his article *‘confronting the digital: or how academic history writing lost the plot’*¹⁶, researchers often work with data that is what we would charitably call ‘limited’ in its potential for re-use, thanks to problems with OCR, markup, and description and provenance information. Similarly, limitations in metadata often mean that while keyword searching gives the satisfying ‘quick hit’ of a result, the user frequently misses important contextual information that enables more mindful engagement with sources, especially archival content: the scale of the original sources, their condition and their environment are often hidden when using digital surrogates that often appear as disembodied objects, separated from their context. Ryan Cordell, who has theorized a “network-author” function in antebellum newspapers from research based on digital newspaper archives, has said that “most digital archives hide more

¹⁴ Full reports of all NeDiMAH activities are available at the Network’s website, nedimah.eu. These activities were structured around Working Groups, each addressing a specific area of Digital Humanities methods: Space and Time; Information Visualization; Linked Data and Ontological Methods; Developing Digital Data; Large-Scale Text Collections; and Scholarly Digital Editions.

¹⁵ Rosenzweig 2010, 22.

¹⁶ Hitchcock 2013.

than they reveal, as keyword searches require prior knowledge of the texts to be discovered and can lead to evidentiary excess.”¹⁷

Another issue is the selection of content for digitization. Due to limitations of funding, availability of analogue sources, and copyright and licensing issues, many digital archives are not ‘complete’. The National Library of Wales received funding from the Welsh Government and European Regional Development Fund (ERDF) to digitize 1 million pages of Welsh Newspapers Online (<http://newspapers.library.wales/>) from its holdings. These date from 1800-1919, in Welsh and English. As a selection of the newspaper coverage of the time, this is an important resource for research and teaching: however, it is by no means a full representation of all newspapers of the period.

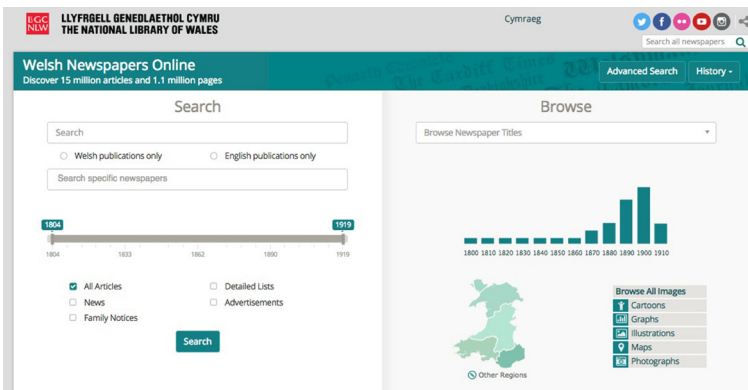


Fig. 1. Home page: Welsh Newspapers Online.

Figure 1 shows a chart on the home page of the resource showing the materials selected for digitization: many are missing from the 1909-19 period as a smaller, separate funding source was used for this. From the earlier period, many of the newspaper runs held by the library are incomplete. However, for the user, it’s too easy to assume that the resource is a complete representation of *all* Welsh Newspapers, ever: the chart only shows the proportion of the newspapers in the resource, not as a proportion of those published. As we know, users (especially students) frequently turn to digital content by

¹⁷ Cordell 2015.

default when looking for historical sources, and as a free resource, this newspaper archive is very likely to be used, leading to the likelihood of research being conducted from an incomplete dataset.

Opening up content for use and re-use

A second requirement for researchers is the need for better, and more open, solutions for analysis and linking of digital content, which is all too frequently locked in digital silos, unable to be easily re-used and linked with other data from other providers and collections. Evaluation of users of digital content, and assessment of a range of European Digital Humanities projects, shows that scholars frequently have very simple questions or ideas that they want to test with data at the desktop, and they do not want the technology to be a barrier. When data is locked in 'silos', it can be difficult for the end user to integrate the tools they need analysis and linking with content held remotely. There needs to be greater disassociation of text and data from platform and delivery mechanisms, liberating digital resources for purposes unanticipated by the creators of digital resources¹⁸.

For example, users often want to be able to use simple, pattern-finding tools, like nGram, with a range of data sets to quickly test hypotheses – the example in Figure 2 shows a visualization, using nGram, of the term 'Belgian Refugees' in newspapers in Welsh Newspapers Online from 1914-1919. The graph shows a spike of heightened interest in the almost fashionable cause of Belgian refugees in late 1914, which tailed off as the war continued. A similar pattern can be seen in newspapers from around the British Isles¹⁹. For questions like this, requiring simple pattern finding, this sort of tool can be a compelling and timesaving aid for researchers. However, as the tool is not part of the resource, using it with this collection required liaison with the National Library of Wales developer team to extract and work with the core data in this way.

One of the huge advantages of digital access is making the invisible visible in archives. We lose this when we can't easily re-use and re-purpose this content.

¹⁸ Robinson 2014, 251.

¹⁹ Hughes 2016.

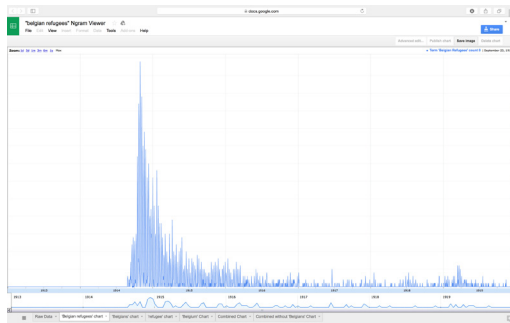


Fig. 2. nGram of the term 'Belgian refugees' in Welsh Newspapers Online.

Creating better environments for drawing together multimedia content from a variety of sources for analysis and publication

The attraction of working in a digital environment is the ability to integrate sources in a variety of formats, and to use them for new and unforeseen purposes. An example of working with hybrid, multimedia content can be seen in an AHRC funded project, *The Snows of Yesteryear: Narrating Extreme Weather*.²⁰ The project was a creative collaboration to uncover archives in the collections of the National Library of Wales that contain information about the impact of extreme weather in Wales during the period from about 1700 (the pre-weather instrument period) to the 1960s. This included manuscripts (literary works, diaries, letters); printed materials, including Welsh ballads; and other material, including art works and manuscripts. These were digitized and made accessible to a team of climate scientists from the ACRE Project at the UK Met Office who used the data to fill gaps in the global picture of extreme weather in this period, and to use digital tools and methods to 'map' and visualize incidents of extreme weather: floods, storms, freezing conditions, and incidents including the 'year without a summer', in 1816 (after the Tambora volcano eruption caused severe climate abnormalities).

²⁰ Eira.llgc.org.uk. The partners in the project were the Centre for Advanced Welsh and Celtic Studies at the University of Wales, the ACRE Project at the UK Met Office, the department of performance at Aberystwyth University, and Welsh performance artist, Eddie Ladd.

The project also carried out community engagement, gathering interviews with local communities to share their experiences of extreme weather events within living memory: floods, storms, and snowfall. From these two strands of evidence, we were able to construct two types of interpretation and analysis: the scientific visualisations; and also a public performance piece, *Ghost Dance*, by Eddie Ladd: this drew on disparate narratives describing events of the winter of 1963 in an allegorical, not didactic way.

The project required sustaining a complex, hybrid archive of materials related to extreme weather impact in Wales, their analysis through performance and scientific visualization, and the communities that contribute this data. As such, it exemplifies the possibilities of digitally integrated research as set out in the Digital Humanities Manifesto: the ability to combine research, curation, and archive management to re-imagine the creation of digital content as a process of creative making, bringing together scholars and curators in ways that recast the role of each, driven by a shared goal of using historical sources for new purposes. These approaches effect collaboration of disciplines and data types as an act of curation as much as a piece of scholarship, one in which scholars will not just create not just a collection of sources, but also effect a convergence of practices: artistic, scientific, and humanistic, and the ability to work with connected communities around the content²¹. Documenting and publishing this sort of practice over the long term will also create a range of interesting issues – how do we replicate the relationships between archives, scientific visualization, and performance? How is provenance of archives retained when embedded in a scientific visualization, or a performance? How will the convergence of digital and born digital be preserved and replicated over the long term? This form of knowledge production is an exciting means of determining the interface to information, data, and knowledge. It also raises significant information management research challenges associated with managing and sustaining complex collections over time, pushing the boundaries of what is currently known about stewardship and curation of humanities and cultural heritage content and data.

²¹ <http://manifesto.humanities.ucla.edu/>.

Working in a culture of abundance: Europeana.eu

There are, therefore, a number of opportunities and challenges for researchers working in digital culture of abundance. And when it comes to abundance, Europeana.eu is the largest, and best known aggregator of European cultural heritage resources. So it may be that Europeana can offer some solutions to these identified challenges: helping researchers to select and understand content; supporting the creative use and re-use of content, and working with multimedia content in different disciplines and formats.

Europeana.eu is an online platform that acts as an interface to over 50 million items: books, paintings, films, museum objects and archival records that have been digitised throughout Europe, with the objective of making the 10% of digitised cultural heritage more usable for research, teaching, and public engagement, focusing especially on making it available for creative re-use releasing its impact for society and the economy. More than 2,000 institutions across Europe make their collections available through European, including the Rijksmuseum in Amsterdam, the British Library and the Louvre to regional archives and local museums from every member of the European Union, including the National Library of Wales. In terms of full-text content, The Europeana Newspapers project is an interface to several million pages of text and images available in the public domain. Together, their assembled collections let users explore Europe's cultural and scientific heritage from prehistory to the modern day. Europeana has been aggregating metadata of digital heritage content, and making data (both content and metadata) openly available, for nearly 10 years. It recently produced a new portal for searching across this collection, offering new functionality and a greater degree of interactivity through services that are part of the 'platform', rather than a 'portal': Pro, Labs, and End User Services, making much of Europeana's dataset available for reuse via its API, portal and linked data sets.

For an example of how these tools can integrate content from disparate locations, WUD (What's Up Doc) is a customised search engine helping pull, link and organise data from two major cultural heritage repositories: Europeana.eu and the Digital Public Library of America (DPLA). It was developed as part of the research and outreach activities of the Medicine and Society chair at University of Fribourg. Initially intended for researchers: it stems from an effort to hand pick

images and documents for the *Medicine and food virtual exhibition*. Using online tools and APIS, the project team were able to streamline and make more efficient the curation process.

The Europeana Aggregation flow

Figure 3 shows the Europeana aggregation flow. The Europeana ecosystem depends on a network of national, thematic and domain aggregators which bring together, manage and provide access to data about Europe's cultural heritage. The concept of aggregation partners has been the cornerstone of Europeana's business model from the very beginning: Europeana does not currently have the resources to ingest metadata directly from the large number of organisations that already supply, or wish to supply, metadata to Europeana. The aggregator model makes it possible to obtain metadata from thousands of cultural heritage and scientific institutions while directly ingesting metadata from fewer than 150 organisations.



Fig. 3.

Europeana: Understanding researcher needs

The digitised content of Europe's galleries, museums, libraries and archives has huge potential for research, and Europeana has identified several ways it can do more to focus on researchers. From a technical and collections perspective, it is building focused aggregations of content, particularly full-text, and exploring how the content can

be re-used by the research community and highlighting collections in the Europeana dataset of specific interest to researchers based on some successful examples with Europeana Newspapers. Also ongoing is the exposure of Europeana's aggregations of text and metadata to allow research teams and infrastructures to build specific tools and services to fulfill particular research tasks, like looking for links between types of data, or doing the kind of nGram modeling described above. One of the biggest areas of potential is linking disparate collections and tools in different institutions and building workflows between them, although of course, issues of licensing, interoperability and access can often impede the re-use of that data in research.

Working with researcher communities of practice is also an important way of optimizing Europeana for scholarship, and understanding what specific communities need. EAGLE (the Europeana Network of Ancient Greek and Latin Epigraphy,) is an excellent example of this sort of liaison. EAGLE provides a single, user-friendly portal to the vast majority of the surviving inscriptions of the Greco-Roman World, as well as explanatory information and translations for the most important: a massive resource for researchers as well as the public. As part of Europeana, the EAGLE dataset includes over 1.5 million items, currently held across 25 EU countries as well as the east and south Mediterranean. EAGLE has supported the development of services such as a mobile application, allowing tourists to understand the inscriptions they find in situ by taking snapshots with smartphones, and a storytelling application that will allow teachers and experts to assemble epigraphy-based narratives.

A recent project to investigate optimizing Europeana Content for research, Europeana Cloud, conducted detailed analysis of the digital scholarship life cycle. Looking at a variety of user communities, the projects identified a number of key challenges to research use and potential of Europeana:²²

- Different research disciplines use different types of data in different ways, and there is no one size fits all solution
- Data aggregation should be aimed at horizontal rather than vertical solutions: rather than enabling deep down investigation of a topic, the access to aggregate data offered by Europeana is useful for comparison, sampling, and annotation of a variety of data from different locations.

²² <http://pro.europeana.eu/europeana-cloud>.

The value is in bringing together material, rather than exploring a complete collection in detail

- In order to encourage access to, and better discovery and knowability of collections, there is a need for enhanced collection-level descriptions
- There is a greater need for user-friendly tools and services which will enable re-use of Europeana data
- Digital humanities research requires access to greater amounts of data at the API level than is currently the case

In many respects, these reinforce the findings outlined above. The best way to address these in the Europeana ecosystem is developing a better understanding of how content and metadata is actually used, and their relationship with digital methods and tools. There is also a need for greater engagement with research communities, but ultimately, the least surprising finding is that there is a need for increased content of use to potential stakeholders. Once again, the requirement for more data is paramount.

Europeana Research

These findings have made development of Europeana Research a priority from 2016-8. Resources have been allocated to this initiative through the Europeana DSI funding strand to explore these issues, as it is seen as an important mechanism for connecting digital heritage with the research community. It has established a research Advisory Board to direct a series of funded activities to enhance the use of Europeana for Research, and to better document some of the innovation that can be achieved in re-using digital cultural heritage content, expressed in its mission statement:

“Europeana Research will help open up cultural heritage content for use in cutting-edge research. It will run a series of activities to enhance and increase the use of Europeana data for research, and develop the content, capacity and impact of Europeana, by fostering collaborations between Europeana and the cultural heritage and research sector. It will provide an important focus for the emerging communities of

practice who rely on Europeana for their research, and support the European investment in digital cultural heritage.”²³

The workplan for Europeana Research has several areas of focus, which will be overseen by the Europeana Research Advisory Board. There will be a *grants programme*, offering funds to researchers working with digitised content from the cultural sector that is part of the Europeana ecosystem, exploring how content can be re-used by the research community. The Europeana Research platform will highlight various *featured collections* available for re-use. These collections will be expanded and have extra descriptive metadata for discovery and use. There will be a focus on researching enhanced ways to describe *case studies* of successful use of Europeana content with DH tools and methods, developed through user engagement and dialogue with groups working in specific disciplinary areas.

Conclusion: Impact of Europeana Research on European Research Infrastructures

Europeana Research will work with research infrastructures such as CLARIN²⁴ and DARIAH²⁵ to help address strategic issues, and to encourage a flow of information on understanding engagement with digital content, tools, and methods. The grants programme especially will be a unique opportunity to engage with researchers directly and develop a better understanding of how they can work with digital content and metadata, developing a better awareness and understanding of available tools for analyzing data through the Europeana platform. This will provide an important layer of evidence that will help shape the development of research infrastructures in the humanities. Despite a significant, there is still concern that what Joris Van Zundert has called ‘big, all encompassing all serving digital infrastructures²⁶’ have little value for digital humanities technology development. He argues that what is needed for the humanities is flexible, small-scale research focused development practices, and highly specific distributed web services.

²³ <http://research.europeana.eu/>.

²⁴ clain.eu.

²⁵ daraih.eu.

²⁶ Zundert 2012.

In order to deliver the services that researchers in the humanities say they want: trusted, open content that is 'pre-knowable' from the perspective of quality control; the ability to liberate content from its mode of production and dissemination for reinterpretation and analysis by open tools; and working with multimedia content in an integrated way, liberating data from silos of content type, we need to try and find scalable solutions to defined problems. The specific ways that the development of Europeana Research can inform developments in Research Infrastructures are by providing the sort of 'agile' development mentioned above, especially testing the integration of data with tools and methods for analysis, through understanding the use of digital content at all stages in the research life-cycle, and in fostering better connections with GLAM organisations who provide access to their content. If research infrastructures are to have value for scholarship, there needs to be a clear role for scholars to contribute to a greater scholarly investigation and critique of the digital content life cycle, to create a more theoretical reflection concerning the role of the digital in humanities research. Europeana Research is an important opportunity for a praxis-based critical engagement that is the key to understanding the ways that the digital is affecting knowledge production. Hopefully lessons can be drawn from this programme of activities that will inform the future development of research infrastructures so they can support these agendas: drawing us into new collaborations, leading us to encounter new methods for engaging with content, and assisting in developing new insights into our cultural heritage.

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PART I

DIGITAL EDITION OF INSCRIPTIONS:
METHODS, PROBLEMS, APPROACHES

1. AXON. A Database for Greek Historical Inscriptions

*Stefania De Vido**, *Ivan Matijašić***, *Silvia Palazzo****

Abstract

The AXON Project has developed a database of Greek historical inscriptions, from the birth of the *polis* in the Archaic Age to 31 BC. Each entry is provided with the object's description, a complete lemma, Greek text with critical apparatus, Italian translation and commentary with keywords and indexes, and updated bibliography. New insights for data-inclusion have been developed. The database supports enlargement and offers a high degree of searchability. Our aim is to illustrate the structure, the contents and the solutions we have come up with in the development of the AXON Project. We will also offer some suggestions for teaching and academic research purposes.

Keywords: Online epigraphic editions; interoperability of digital editions of Greek historical inscriptions; images of Greekhistorical inscriptions; digital epigraphy in teaching and research

1.1. The AXON Project

AXON. A Selection of Greek Historical Inscriptions is a project conceived within the Greek Epigraphy (Director, Prof. Claudia Antonetti), and has been brought into existence with the financial support of the University Ca' Foscari of Venice (University Project 2013, Project Coordinator, Prof. Stefania De Vido; Scientific Team: Ivan Matijašić, Silvia Palazzo, Michela Socal, Luigi Tessarolo [IT Project]). Since October 2014 the members of the AXON Project have been developing a

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database which includes a great variety of Greek inscriptions of different chronology, typology, and territory of origin. The most recent advances of traditional epigraphy as well as the scientific acquisitions in the Digital Humanities have been taken into account.

The selection of texts has been made according to a broader notion of 'historical' inscription, including not only significant military, political, and institutional texts, but also those inscriptions which are essential for the social and cultural understanding of the Greek world.

AXON includes texts from the birth of the Greek *polis* in the Archaic Age¹ to 31 BC, a chronological frame traditionally related to Greek History (though a future extension of this chronological limit is not excluded). The epigraphic entries have been prearranged in order to allow a wide and well-structured description of each document. At the same time, a common and coherent lexicon has been produced, which will permit an easier indexing of significant words and will make future searches much quicker.

1.2. A unique model-entry for a great diversity of inscriptions: taxonomy and categorisation

1.2.1. Entry description

1.2.1.1. Object's description

The model-entry has been created with an eye on the object's thorough description. Here is the object's categorisation:

1. Object type
2. Material
3. Object's dimensions
4. State of preservation
5. Further descriptive elements
6. Date and context of finding
7. Finding site (modern nation, ancient region, ancient and modern name of the city, if known)
8. Actual location (modern nation, city, museum/archaeological context, inventory number)

¹ Hansen 2004, 16-22; Hansen 2006.

The great majority of these categories can be selected from a given number of options from a pull-down menu. Some categories – such as Object type, Material, or State of preservation – are directly linked with the corresponding sections in the EAGLE Vocabularies (see <http://www.eagle-network.eu/resources/vocabularies/>). Furthermore, a hyperlink has been created between the AXON-entries and Pleiades website (<http://pleiades.stoa.org>): where the finding site is known, each entry offers the geographic coordinates and a Googlemaps visualisation. This gives the possibility of rapidly gathering the information for any single ancient location and allows for searches directly from an interactive map.

1.2.1.2. Chronology

The chronological delimitation of each text is supported by many options, as you can see in Fig. 1:

1.2.1.3. Alphabet & language

The screenshot shows a web form for entering chronological data. The form is organized into three main sections: 'CRONOLOGIA' at the top, 'DATAZIONE' in the middle, and 'EVENTUALE DATAZIONE ALTERNATIVA' at the bottom. The 'DATAZIONE' section is divided into two columns: 'inizio intervallo' and 'Fine intervallo'. Each column contains a header, a radio button for 'a.C.' (selected) and 'd.C.', a dropdown menu for 'Secolo' (set to '-- secolo --'), a dropdown menu for 'Parte' (set to '-- porzione --'), and an 'Anno' input field with 'Post' and 'Circa' checkboxes. A red question mark icon is present below the 'Anno' field in both sections. At the bottom, there is a field for 'EVENTUALE DATAZIONE ALTERNATIVA'.

Fig. 1.1. Window for the input of data, section Text/Chronology.

Each entry provides all the necessary information on the alphabet and language of each inscription:

- Type of Inscription (with link to EAGLE's Vocabularies: <http://www.eagle-network.eu/resources/vocabularies/typeins/>). The categories are those used by Guarducci 1967-1980
- Text's structure

- c) Writing (Execution technique²; different types of epichoric alphabets according to Kirchhoff's colour-coded map; Local script³; Palaeographic features and letters' form⁴; letters' heights, description and layout of the text field; Direction of Text)
- d) Language (with an option for any dialect's peculiarities)

1.2.1.4. Genetic lemma & apparatus criticus

The text of each inscription is preceded by a hierarchically arranged lemma (the so called *genetic lemma*, according to Louis Robert's definition⁵) and is followed by the apparatus criticus.

1.2.1.5. Italian translation & commentary

Each entry corresponds to an Italian translation and commentary (in .pdf).

1.2.1.6. Abstract

The Abstract – with a WYSIWYG interface – includes all the keywords for indexing and lemmatisation:

The Keywords are divided into the following categories (these categories are based on EpiDoc Community Guidelines as well as on the indexes of the Supplementum Epigraphicum Graecum, SEG):

1. Persons and names (mainly for 'historical' characters)
2. Gods and heroes
3. Place names
4. Geographical names
5. Significant words regarding the history of politics and institutions
6. Other relevant keywords
7. Ancient sources

² With link to <http://www.eagle-network.eu/resources/vocabularies/writing/>.

³ Following the categorisation in Jeffery 1990.

⁴ The letter-form and glyph-form are based on the symbols of the font Cardo (<http://scholarsfonts.net/cardofnt.html>), but many have been developed by the AXON Team on the examples of letter-form given in Jeffery 1990 (see also <http://poinikastas.csad.ox.ac.uk/browseGlyphs.shtml>).

⁵ Robert and Robert 1954.

Tra le tombe della **Necropoli di San Montano [Ischia]** (Isola d'**Ischia [antica Pitecusa]**, antica **Pitecusa [Isola di Ischia]**), la nr. 168 (fine VIII sec. a.C.) contiene i resti di un individuo di sesso maschile, di età compresa tra i 12 e i 14 anni, accompagnati da uno dei corredi più cospicui mai rinvenuti in una tomba pitecusana: 27 reperti ceramici in tutto, di cui (caso unico) 4 **crateri**, 2 **euboici** e 2 locali. Tra i materiali ceramici, spicca una **kytyle [vaso]** **rodia** (universalmente nota come **Coppa di Nestore**), risalente alla seconda metà dell'VIII sec. Su di essa, dopo la cottura, è stata incisa in **alfabeto euboico** un'iscrizione metrica di tre versi, in **dialetto ionico**. Nel v. 1 (**trimetro giambico**) la coppa identifica se stessa come proprietà di **Nestore [proprietario della Coppa pitecusana]** (secondo il modello delle **iscrizioni di possesso**), mentre i vv. 2-3 (**esametri**) contengono la più antica declinazione di un topos costitutivo della **poesia simposiale** greca, vale a dire l'associazione del vino e della **pratica simporica** con l'elemento erotico. Sin dalla prima edizione del **graffito**, ha goduto di largo consenso l'ipotesi che il **Nestore [proprietario della Coppa pitecusana]** della coppa dovesse essere identificato con il **Nestore [re di Pilo]** re di Pilo, proprietario, secondo **Omero**, Iliade 11.632-637, di una sontuosa coppa, alla quale l'autore dei nostri versi avrebbe voluto in qualche modo alludere. Più recenti orientamenti critici escludono invece questa identificazione, e propongono di riconoscere in Nestore il reale proprietario della coppa, da identificarsi nel padre del fanciullo sepolto nella tomba, o forse nel fanciullo stesso, cui essa fu offerta come estremo simbolico dono delle gioie del **simposio** e dell'amore, che gli furono precluse da prematura morte.

Inserisci nel commento

- Personaggi
- Divinità ed eroi
- Luoghi, regioni, popoli
- Nomi geografici
- Lessico politico e istituzionale
- Parole importanti
- Fonti antiche

Modifica voci inserite

Ripulisci dopo incolla

Fig. 1.2. Example of Abstract in AXON. The different colours allow a selection of words from a drop-down menu.

1.2.1.7. Bibliography

Finally, an updated bibliography highlights any previous edition for each entry, as well as all the appropriate secondary sources. SEG abbreviations have been used for epigraphic *corpora* and other publications (the section “materiali” on the website gives access to a list of all abbreviations, useful for students, as well)⁶.

1.2.2. Internal & external interoperability of the AXON database

Each entry is related – whenever it seems appropriate – to other entries in the AXON database. A hyperlink connects the entry with other digital editions of the same text (if available), or with other useful websites, possibly containing images. Wherever possible, images and/or apographs and/or squeezes of inscriptions have been included. The creation of a digital archive of images as part of the AXON website is also desirable.

1.2.3. A simple website interface for the input of data

Since the contributors to the project (i.e. the authors of the entries) are experts from different Italian and European universities (and not all of them are familiar with the Digital Humanities), and given the

⁶ <http://virgo.unive.it/venicepigraphy/axon/public/axon/pagine/materiali> (still being processed).

great number of entries planned in the near future, the necessity of a simple and easily understandable interface for the input of data was an essential issue to the project from the very beginning. Guidelines to EpiDoc have been taken into account in order to produce a clear structure for the input of data.

Our aim is to establish a growing community of experts, students, and enthusiasts to increase the number of contributors through lists of inscriptions which have not yet been assigned. At the same time it will be possible to suggest other texts which are not included in the lists. To achieve these aims, the project follows an EpiDoc-friendly structure and is compatible with European EAGLE Project, especially in the use of a common terminology.

1.3. Searchability

The website is designed to allow for many search options. Beyond the “full text” search and another based on the number, title and author of the entry (see Fig. 3), three other search-possibilities will also be available:

Ricerca Cancella tutto

RICERCA FULL-TEXT

Cerca le schede che contengono

▼ DATI GENERALI

N° AXON Titolo Autore scheda

▶ BIBLIOGRAFIA

▶ PAROLE CHIAVE

▶ SUPPORTO

▶ CRONOLOGIA

▶ TESTO

Fig. 1.3. Search based on “Full text”, number, title, and author of the entry.

Ricerca Cancella tutto

RICERCA FULL-TEXT

Cerca le schede che contengono tutte le parole ?

► **DATI GENERALI**

► **BIBLIOGRAFIA**

► **PAROLE CHIAVE**

▼ **SUPPORTO**

Tipologia

Luogo antico di ritrovamento

Regione antica

Luogo moderno di ritrovamento

Luogo di conservazione

► **CRONOLOGIA**

► **TESTO**

Fig. 1.4. Different searching categories.

► **SUPPORTO**

► **CRONOLOGIA**

▼ **TESTO**

Cerca nel testo tutte le parole ?

α	β	γ	δ	ε	ϛ	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο	π	ρ	σ/ς	τ	υ	φ	χ	ψ	ω	
a	b	g	d	e	v	z	h	q	i	k	l	m	n	c	o	p	k	r	s	t	u	f	x	y	w

Tipologia

Struttura

Tecnica di scrittura

Colore alfabeto

Alfabeti regionali

Lettere particolari AND

Andamento

Dialecto

Ricerca

Fig. 1.5. Different searching categories.

1. browse all the entries according to the inscriptions' a) typology, b) chronology, and c) area of origin;
2. access the entries through an interactive map;
3. perform an advanced search based on different categories:
 - a) bibliography
 - b) keywords
 - c) object's description and preservation (see Fig. 4)
 - d) chronology
 - e) text (single words or phrases, typology, dialect, alphabet, letter-form, etc.) (see Fig. 5).

Other filters will be employed for each search result. A section entitled "tools" is also available, and it includes information on the entries' structure, tables with the contents of different categories, links to Vocabularies and websites, etc.

1.4. The AXON Project for teaching and academic research

1.4.1. Teaching

The AXON Project, as an example of a digital edition of inscriptions (see esp. genetic lemma and *apparatus*) with a high degree of clarity for contributors and users, is a useful tool for teaching Greek epigraphy as well as ancient history. Many contributors are university lecturers / professors of Greek Epigraphy, and the scientific committee includes high school teachers and instructors in classical languages, making AXON especially well-suited for educational purposes and for use by students: for engaging them, for example, in the composition of entries. The interoperability of the AXON website and the cross-references to other Digital Humanities projects are essential elements in the development of this discipline.

1.4.2. Significance for the academic community

Each entry is created by an expert contributor and is subject to double-blind peer review, thus assuring an important contribution to the scholarly community. At the same time, the hyperlinks to other websites and digital editions will make it easier for the user to check immediately all similar projects. Finally, the indexing allows for the easy discovery and use of specific information, and will be of fundamental

importance for gather together groups of documents according to particular research needs.

In conclusion, the AXON Project aims at a collaboration of expert scholars from different fields: epigraphy, ancient history, dialectology, archaeology, digital humanities. It can produce valuable results in the domain of the digital editing of inscriptions and, more generally, contribute to the advancement of classical studies, opening them up to a broader audience through the world-wide web.

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2. The Digital Edition of the Archaic Latin Inscriptions (7th-5th century B.C.)

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Abstract

The ILA project consists in the digital edition of the archaic Latin inscriptions (7th – 5th century B.C.) according to the EpiDoc Guidelines. The edition is the result of an autoptical examination of the epigraphic documents and of the text-bearing objects, together with the analysis of previous studies. In the particular case of the Forum inscription, this led to new discoveries and confirmed old hypotheses. Each text will be presented in an epigraphic chart, enriched by photos and illustrations.¹

Keywords: Archaic Latin Inscriptions, Latin Epigraphy, EpiDoc, Digital Humanities, Epigraphic Edition, Forum inscription

2.1. Generalia

The project *Iscrizioni Latine Arcaiche (ILA)* consists in the digital edition of the inscriptions found in old *Latium*² dating back to the period between the 7th and the 5th century B.C. Between the end of the 19th century and the first decades of the 20th century this *corpus* consisted of only four inscriptions of a certain length, that is the *Duenos* vase (1880), the *Fibula Praenestina* (1887), the *Forum* inscription (1899) and the *Tibur*

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¹ Giovanna Rocca is responsible for § 1 and 2; Giulia Sarullo is responsible for § 4 and Marta Muscariello for § 3.

² With the two exceptions of the *Vendia's* Urn, found in Cerveteri, and the Garigliano bowl.

pedestal inscription (1926), besides other shorter but still very interesting texts that offered important cultural information (such as the inscription from the *Regia*, REX, CIL I² 479). In the second half of the 20th century, the *corpus* grew significantly and reached the total of about eighty documents that have not been gathered in a comprehensive edition yet. The updated *corpus* includes new and crucial discoveries, some of which have already been published in a traditional way (in print), such as the inscriptions from *Satricum* and the fragments found at the *Palatinum*, whereas others are still unpublished, as in the case of the recent findings from the *Regia*. The quantitative and qualitative enrichment provided by recent new readings of the texts and the new data emerged justify and require a new publication.

Most of the inscriptions in the collection are *frustuli* or single letters: these texts, though not really relevant from the linguistic point of view, are important testimony of the use of writing in *Latium* since the 7th century B.C.

The website is then an absolute novelty in the field of digital epigraphy, since at the moment no online epigraphic collection specifically dedicated to these documents exists. It is well known that, for every kind of publication, a digital edition provides several advantages, for example: the possibility to update both the textual *corpus* and the bibliography continuously; the hypertextual structure, that allows the user to utilize the edition in different ways; the opening to a public that is heterogeneous and wider than the one a work addressed to specialists can reach. In which other ways can the web respond to the specific requirements of a peculiar *corpus* such as ours with distinguishing features, different from the later Latin epigraphy optimally reproduced in the *Epigraphic Database Rome* (EDR)?

First of all, by using the EpiDoc encoding standard, which is compatible with other encoding systems, it will be possible to transfer our data to EDR and to the EAGLE-Europeana Network (see Sec. 4).

The hypertextual structure of the edition is surely one of its assets, in that it enables the user to find information about each text (images, bibliographical references, etc.) immediately and consider the inscription in the context of its place of finding; at the same time, it encourages a direct 'in real time' comparison between texts. Moreover, this kind of structure allows us to obviate the inconvenience of an edition that presents only a specifically 'historical', 'archaeological'

or 'epigraphic' point of view, as sometimes happens in traditional editions. This is achieved thanks to cross-references to topics analyzed in depth by specialists, thus making our edition a useful research tool for various branches of learning.

Besides what has been illustrated so far, the presence of complex indexes, through which it will be possible to locate the inscription from different starting points, will allow the user to search the texts according to various parameters: dating, place of finding, object type, and textual type (see § 3).

The choice of the method to adopt as regards the interpretative transcription is problematic: it is clear that it is absolutely impossible to be completely neutral or objective. Unlike the diplomatic transcription, for which a critical apparatus can be constructed and be extremely useful, the same is not possible for the interpretative transcription: an exhaustive critical apparatus would imply a superabundance of information that could negatively influence the scientific nature and the usability of the edition, especially in the case of inscriptions that have been variously interpreted since their discovery. For longer inscriptions (e.g. *Forum* Inscription, *Duenos* vase, *Tivoli* inscription, *Garigliano* bowl), the numerous readings that have been proposed so far by scholars have been compared and verified in the light of linguistic criteria and of the new data in order to obtain an edition of the text that, although it cannot be considered the definitive interpretation and does not solve all the pending issues, poses itself as a new starting point for future research. A cross-reference to all the other interpretations will offer a complete source of information and a tool that intends to be useful and exhaustive.

The archaic Latin inscriptions play a fundamental role in the study of the first stages of the language, since they present particular features that allow us to investigate the various steps that led to "standard Latin". The language attested in our inscriptions can be considered a *Restsprache* insofar as it is not 'readable' through later Latin but it can be 'interpreted'. The linguistic commentary will be carried out, *in votis*, in the second phase of this project. Here the research focuses on the epigraphic features, that show a plurality of forms and of alphabets in such a limited *corpus*. The chronological and geographical distribution of the signs and of the variants in use in the inscriptions have been analyzed in order to offer valid elements to the study of the evolution of the alphabetic model between the 7th and the 5th century B.C.

2.2. Epigraphic news about the Forum Inscription

Thanks to the agreement and collaboration with public authorities, we were invited to take part in an extraordinary event (July 3rd 2015), that is the 3D laser scanning of the Forum Cippus (*CIL* I², 1).³ The autopsy, carried out with the help of a strong source of light, and the observation of the scanning in real time clarified, hopefully in a definite way, some controversial issues about the presence of dividing signs on face A and, at the same time, opened a new perspective on the reading of line 16 (face E).

One of the epigraphic problems concerning this inscription consisted in the absence of punctuation on face A, in comparison with the other faces in which three vertical dots divide the syntactical units. This lack was particularly suspicious in a sequence in which there are no exegetical alternatives (SAKROSESED = *sakros esed*). As a consequence, scholars tried to find an explanation for this absence: the inscription was carved by different hands; the inscription was made up of different texts, each copied from different drafts; the antigraph was in *scriptio continua* and the inscriber was not familiar with this procedure; the punctuation was not accurately assigned.

As a matter of fact, face A seems to conform to the others, showing three vertical dots after *sakros*⁴ (Fig. 1). This fact was highlighted by Gamurrini (1899) and the three dots appear in the apograph in Hülsen (1899, col. 1003), and they could also be guessed in the photograph Anderson 3192 (Archivio Alinari). Nevertheless, the *post* Goidanich (1943) *vulgata* and the difficulties in checking in person the stone, because of its almost unreachable and scarcely illuminated position that led to the publication of studies not supported by an autoptical check, perpetuated a reading influenced by the uncertainty in distinguishing between natural cavities or notches due to the nature of the stone and 'significant' holes caused by the tool used for writing.

³ Cippus of tuff found under the *Lapis Niger* by Giacomo Boni in 1899. The inscription is cut boustrophedon on the four faces of the pillar and on the edge sliced between face D and face A. The stone (late 6th B.C.) is badly damaged in the upper part so that the beginnings and the endings of the lines are lost. The text has been interpreted as a sacred law.

⁴ The details of significant portions of the inscriptions will be shown on the website with several photographs.

The most relevant news arrives from the analysis of line 16 (face E). This has been read up to now as *loiuquod()*qo (Wachter 1987), *loi{u}quiod* (Vine 1993), *LOIUQUIOD[QO]* (Baldi, 2002), *LOIUQUIOD,QO///* (Hartmann 2005),⁵ in order to explain the ‘unusual’ shape of *V* (letter no. 4) that has been recently read as *F* (Prosdocimi 2010). As the scanning showed, the first vertical stroke, read as an *I*, is much closer to the sign that looks like a *V* than it appears on the apographs and the photographs published so far; especially shots taken from an oblique and not a frontal point of view can be misleading.

This point can result fundamental in understanding how the inscriber worked on the stone and how he corrected the sign.⁶ Hypothesis no. 1 (which is also the simplest one): the sequence to write was *LOIVQVIOD* but, after he cut a first vertical stroke, the inscriber mistakenly started to cut the oblique stroke of a *V* instead of a second vertical stroke that would begin the *V*; he recognized the error and cut a vertical stroke next to the first one and finally another oblique stroke that reached the bottom of the second vertical stroke, completing the *V*. Hypothesis no. 2 presumes the same order in cutting the strokes, but for a different reason: the sequence to write was *LOVQVIOD*, the inscriber started cutting the first stroke but he found an obstacle (*i.e.* a hole in the stone), so he continued with the oblique stroke on the right (thinner than the others) but he changed his mind and cut a second vertical stroke close to the first one and joined it with a new oblique stroke. The short inner stroke has been considered as a correction, *i.e.* a deletion, and caused the expunction of the whole letter or its reading as an *F*; as a matter of fact, it is nothing else but the result of a first try to cut the oblique stroke. Of course, we could be more precise after we receive the outcomes of the scanning, that will be ready soon. The following sign (nr. 4 or 5, depending on the reading), instead, is surely a *koppa* and not an *O*.

Our reading proposal has the advantage of illustrating the sequence of the inscribing but does not solve the interpretative problems: a *louquiod* instead of a *loiquiod* / *loiquiod* (for which *lucus*, *eloquium*, *licium* and *liquidus* have been proposed) still needs to be explained and both still await a solution.

⁵ The final *QO* is based only on Goidanich 1943.

⁶ Other corrections can be found on the last line of face C (*kapia* on *kapa*) and on the second line of face D where a *V* was corrected into a *koppa*.

2.3. The Epigraphic chart

In the website, each text of the ancient Latin *corpus* is presented by an *ad hoc* designed chart in order to meet the peculiar requirements of this kind of *corpus*. The chart is organized in items that concern every important aspect regarding the material and cultural contextualization of the inscription, from the archaeological support to the epigraphic features. Such a detailed scheme contributes to making our project a research tool both as a complete source for information retrieval and as an updated starting point for the study of the texts and of the language.

In this initial phase of Latin literacy, the linguistic data are not sufficient to establish the linguistic features of this language – the *corpus* chiefly consists of *hapax*. As a consequence, the contextual data of the inscribed object results being of great help to comprehend the text. For example, the new archaeological data found during the recent excavation campaign in the *Comitium* carried on under the direction of P. Fortini are providing helpful information for the study of the Forum Inscription; in the past, the collection of all the fragmentary instrumental Latin inscriptions up to the 4th century B.C. published by G. Colonna in 1980⁷ supplied, at least partially, the extent of the alphabetization developing in *Latium Vetus*, subtracting the major inscriptions from a sort of “documental isolation”; moreover, the data concerning the interaction with other inscriptions of ancient Italy are fundamental, since these are different in languages and alphabets: besides the Etruscan examples in Rome, we can remember the case of *Satricum*, where both Latin and Volscan are attested,⁸ or the Garigliano bowl which bears, together with the Latin inscription engraved inside, an inscription in Italic alphabet and language on the external body of the vase,⁹ that has also given a hint for a particular interpretation of the Latin text.

The first item of the chart contains the ID tag assigned to the inscription in the ILA project, that identifies the text with the find-spot (using the ancient place name whenever possible) followed by a progressive number: for example, the *Tibur* pedestal inscription (*CIL* I², 2658) is denominated “Tibur 1”, the inscription on the Garigliano bowl is called “Garigliano 1”.

⁷ In Stibbe et al. 1980.

⁸ See Rocca 1995, 189-198.

⁹ On the relationship between the two inscriptions, see Antonini 2012.

Given the small number of find-spots, we decided to use the full name of the place, instead of abbreviations; possible new findings that could emerge in the future from the same site will be easily added to the *corpus* simply by increasing the number. Beside the ID tag attributed to the inscription we quote the most common names attributed to the object, stratified in time in literature and well known to the scholars (for example “*Duenos vase*” / “*Vase of the Quirinal*”). We then indicate here, in the item ‘Present collocation’, where the inscription is preserved with, when possible, the inventory number.

The chart continues with a group of three items that form the section dedicated to the ‘Archaeological data’: the ‘Description of the object’ (with the general type, the possible peculiar features, the function and the dimensions of the inscribed object); the ‘Provenance’ (that is the place where the object was found and its exact archaeological context);¹⁰ the ‘Date’, which quotes the hypotheses given by scholars about the chronological coordinates of the inscription. Concerning this item, we must keep in mind that the dating of the *antiquissimae* is often approximate, and it is based on different criteria (at times archaeological, at others epigraphic or linguistic or with convergences of two or of all these factors); in some cases, the gap is so wide to almost seem fluctuant depending on which criterion is considered. Without doubt this long-standing problem must be held in consideration, also remembering that for some inscriptions a chronological lowering to the 4th or even the 3rd century B.C. has been proposed. The difficulty in dating the objects and the rarity of the findings is surely connected to the difficulty in defining the specific features of the language testified by these inscriptions.¹¹

The charts present several photographs of the inscriptions, taken during the photographic campaign carried out by the project’s team. Enlargements of some useful or problematic details of the inscription

¹⁰ In the case of mobile objects a different place of fabrication can be presumed, as in the case of the *Vendia*’s Urn, found in Cerveteri, but considered by some to have been fabricated somewhere else in *Latium*.

¹¹ On the periodization of Latin, P. Cuzzolin and G. Haverling state: “The division of the history of a language into different periods implies that we have a rather clear picture of what language we have dealing with. At two points in the history of Latin we are not quite sure of this: the exact moments in which Latin is born and in which it is transformed into Romance are not easily determined. The problem is to determine what is Latin and what is not: unfortunately there is no overall agreement on whether all of the early inscriptions considered to provide us with early examples of Latin actually do that.” (Cuzzolin and Haverling 2009, 20).

have been added: the richness in images is related to the participation of the project in the Europeana network, a database of images of the European cultural heritage. Although the images illustrate the inscription in an optimal way, fac-similes of each text will also be provided, clearly related with the transcription elaborated by the editor. We offer two kinds of transcription, the 'Diplomatic transcription' and the 'Interpretative transcription', which provides the edition of the text. The need for a diplomatic transcription is due to the problematic nature of archaic texts: in the case of the *Duenos* vase, as it is well known, the second section of the text is almost always given by scholars in diplomatic transcription because of the difficulties in segmenting the phrases into words (but with attempts of interpretations of small portions).

In the item 'Textual typology' inscriptions are classified according to the nature of the text, taking into due consideration the peculiarities of this *corpus*. In the chronological span between the 7th and the 5th century B.C. the codification of formularies both of possession and of gift/dedication is still *in fieri* in the various linguistic branches spoken in ancient Italy (with the exception of Greek); for this reason, from a classificatory point of view an inscription can be 'anomalous' in two ways: on the one hand, it can lack the typical elements of a formulaic scheme that will be fixed later on, thus requiring a further interpretative effort in order to assign it to a specific textual category; or, on the other hand, it can result more complex than the standard formula and present elements that can be related to more than one textual typology: in this case, the object type and the archaeological context are determinant for the overall classification.¹²

A further group of items composes the 'Epigraphic data' section: the analysis begins from the 'Position of the inscription' on the object, which indicates the relationship between the text and the inscribed object, an aspect that has important consequences on the function and the fruition of the inscription.¹³ We then have 'Scriptura', where the execution technique is described; 'Direction of writing', *i.e.* right-to-left, left-to-right, *boustrophedon*, etc.; 'Dividing signs', in which the presence of punctuation and its possible function is signaled; 'Dimensions of the letters', which is important as regards the visibility of the inscription

¹² On this subject, see two recent publications, Poccetti 2009 and Maras 2015.

¹³ An important methodological point was established by Susini 1982.

in relation with the object and the observer. This section ends with the ‘Epigraphic commentary’, containing the description and analysis of the letters one by one both from the formal (shape-model of the letter) and the factual point of view (possible particular features in the execution of the inscription) and some general observations.

The ‘Notes and issues’ item gathers historical-bibliographical notes, observations and discussions on the most problematic points of each inscription: the insertion of the discussion at the end of the chart offers the advantage of having all the basic information on the object and on the inscription immediately available, while the study in depth of the issues that deserve a thorough analysis is treated in a separate section.

The chart is closed by the ‘Bibliography’ section. The ‘*Editio princeps*’ and the possible ‘First notice’ (if the inscribed object had been mentioned in a publication preceding the first edition of the text) are indicated in two separate items. Then the complete bibliography of the inscription follows in chronological order, from the most dated to the most recent publications; the chronological order, in comparison with the alphabetical one, allows us to find more easily the latest works on the inscriptions or those published in a certain period in the history of the studies.

2.4. Technical notes

An epigraphic *corpus* can be digitalized in different ways, according to the specific issues that each project intends to tackle. Unlike EDR that, as the other projects constituting the *Electronic Archive of Greek and Latin Epigraphy* (EAGLE),¹⁴ is a database, the archaic Latin inscriptions have been digitalized according to the EpiDoc Guidelines.¹⁵ This is a set of specifications and encoding tools in XML (*eXtensible Markup Language*) for the scientific edition of ancient texts based on the *Text Encoding Initiative* (TEI), a set of XML specifications designed for the digital publication of texts and manuscripts for research purposes.¹⁶

¹⁴ <http://www.eagle-eagle.it/>. The other databases related to EAGLE are the Epigraphic Database Bari (EDB), <http://www.edb.uniba.it/>, the Epigraphische Datenbank Heidelberg (EDH), <http://edh-www.adw.uni-heidelberg.de> and Hispania Epigraphica (HE), <http://www.eda-bea.es>.

¹⁵ For further information on EpiDoc and its history, see Elliot et al. 2006-2016. The guidelines are available at <http://www.stoa.org/epidoc/gl/latest/>.

¹⁶ <http://www.tei-c.org/index.xml>. See also Burnard 2016 (About these Guidelines): “The TEI encoding scheme is of particular usefulness in facilitating the loss-free

EpiDoc is becoming more and more a point of reference for digital epigraphic projects¹⁷ and it is also the standard chosen for the aggregation of the archives' data in the recently constituted network, again called EAGLE (*Europeana Network of Ancient Greek and Latin Epigraphy*),¹⁸ in which, besides the data of the EAGLE archives, the archaic Latin inscriptions *corpus* will also converge. As a matter of fact, inscriptions encoded with EpiDoc are not only compatible with other projects created according to these Guidelines, but they can also be transferred from a system into another without losing any information; actually, since XML consists in a semantic markup, that is related to the content of the information and not to its appearance, it is possible to modify the look of the final result by simply operating on the style sheet,¹⁹ not having to revise the single files. This will facilitate the integration of the archaic Latin inscriptions into wider digital collections such as EDR and EAGLE-Europeana. Moreover, since the file thus encoded can also be translated into another markup language, their survival despite any future technical evolution is guaranteed.²⁰

Furthermore, the XML edition of an inscription (or of an entire *corpus*) created according to the EpiDoc Guidelines will produce a digital edition of the text that complies to Leiden Conventions²¹ that will show the same typographical marks a printed edition following the Leiden system would have, thus being immediately comprehensible to any epigraphist.

The archaic Latin inscriptions pose various epigraphic problems, related to their antiquity, that require specific solutions also with regard to the markup. Since the EpiDoc Guidelines were originally conceived to encode in XML later epigraphic documents, it has been

interchange of data amongst individuals and research groups using different programs, computer systems, or application software".

¹⁷ On the relationship between EAGLE projects and EpiDoc see Felle 2012.

¹⁸ <http://www.eagle-network.eu>. About the new *Best Practice Network*, co-founded by the European Commission, see <http://www.europeana.eu>.

¹⁹ In XML, all information related to the formatting of the text are registered on a separate file called style sheet, see Bodard 2009, 104, 110-111.

²⁰ Tissoni 2008, 37-38 and Bodard 2009, 104-105.

²¹ On Leiden Conventions; the standard used to annotate epigraphic documents and papyri in printed editions, see Krummrey and Panciera 1980; Panciera 2006b; Panciera 2006a. About their use in EpiDoc's files see Elliot 2007; Mahoney 2006, 229; Bodard 2009, 105.

necessary to adapt these Guidelines to respond to the peculiar issues of this *corpus*.²² For this reason, some elements have been adapted and others have been specially designed, and this was possible thanks to the fact that XML is an extensible system.

The major encoding issues concern the rendering of the direction of writing and of reversed and upside-down letters. Unlike later texts, predominantly left-to-right, the inscriptions of the ILA *corpus* show a certain degree of fluctuation in the direction of writing. Besides left-to-right, right-to-left and boustrophedonic inscriptions, there are also some particular cases, such as the lamina from Lavinium (*CIL* I², 2833) and the Tibur pedestal inscription (*CIL* I², 2658), that requires a specific treatment. For these texts, it was necessary to create several new specific elements in order to render the peculiar directions in which the text was cut.²³ Reversed and upside-down letters are usually left unmarked in traditional epigraphic editions and we decided to comply to this practice. Nevertheless, the <hi> element has been used to mark up these letters, with two different values of @rend. For reversed letters, the <hi rend="reversed"> was used, a tag that in the EpiDoc Guidelines is used to encode the *litterae inversae*, enclosed in double round parentheses, such as in ((C)) for *mulier*.²⁴ For upside-down letters, a new value was provided, <hi rend="upside-down">, since none of the allowed values of @rend for the <hi> element is suitable for this issue.

XML also allows us to encode the semantic structure of the texts. This kind of markup does not influence how the text is displayed but it is essential to generate the *Index verborum* and to allow a word-based search within the *corpus*. The antiquity of the documents compelled to index the words as they appear in the inscription, because in most of the cases a lemmatization would be forcing; for the same reason, some sequences that remain difficult to interpret were not segmented and the search for a portion of text will be possible.

²² See Sarullo 2011, 162-167, where a few examples of markup are quoted.

²³ The issue of the direction of writing was the subject of much debate at the 6th EAGLE International Event *Off the beaten track. Epigraphy at the borders* (Bari, September 24th-25th, 2015). The discussion highlighted how this is a matter of great relevance both for the archaic inscriptions and the testimonies from late antiquity and the necessity to establish a common standard to encode the instances of "non-standard" directions of writing emerged. This issue is discussed in Sarullo 2016, where the newly created elements are presented.

²⁴ See Panciera 2006a, 1722.

Finally, the EpiDoc file contains all information about the text-bearing object (description, dating) and the text (critical apparatus, commentary); the encoding of these data allows us to generate the indexes that, together with the bibliographical references and the images, enrich the digital edition and make the utilization of the text more complete.

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3. I.Sicily. An EpiDoc Corpus for Ancient Sicily

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Abstract

This paper introduces the EpiDoc corpus of inscriptions on stone for ancient Sicily, I.Sicily. The project is one of the first attempts to generate a substantial regional corpus in EpiDoc. The project is confronting a number of challenges that may be of wider interest to the digital epigraphy community, including those of unique identifiers, linked data, museum collections, mapping, and data conversion and integration, and these are briefly outlined in the paper.

Keywords: Sicily, Epigraphy, Epidoc, Greek, Latin, Pleiades, multilingualism

3.1. Introduction: what is *I.Sicily*

I.Sicily is an online, open access, digital corpus of the inscriptions on stone from ancient Sicily.¹ The corpus aims to include all texts inscribed on stone, in any language, between approximately the seventh century BC and the seventh century AD. The corpus currently contains records for over 2,500 texts, and when complete is likely to contain c.4,000. The corpus is built upon a conversion from a legacy dataset of metadata in MS Access to EpiDoc TEI XML.² The XML records are held in an eXist database for xQuery access, and additionally

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¹ The corpus will be mounted at www.sicily.classics.ox.ac.uk. A public face is currently maintained via a blog at <http://isicily.wordpress.com/>, as well as on Facebook at www.facebook.com/ISicily and on Twitter via [@ISicily@Sicilyepigraphy](https://twitter.com/ISicily).

² <http://sourceforge.net/p/epidoc/wiki/Home/> [accessed 26.09.2015].

indexed for full-text search using SOLR/Lucene. The corpus and related information (museum list, bibliography) are published as Linked Data, and are manipulated through a RESTful API. The records are queried and viewed through a web interface built with AngularJS and jQuery javascript components. Mapping is provided in the browser by the Google Maps API, and ZPR (Zoom, Pan, Rotate) image-viewing is provided by the IIP image server and the OpenSeadragon javascript library.

At the time of writing (September 2015), the main conversion routine is being refined and the epigraphic texts are being collated for incorporation into the records. An ancillary database of museum collections and archaeological sites in Sicily has been constructed and bibliography is held in a Zotero library. Extensive search facilities will be provided, including map-based and bibliographic searching. Individual inscriptions and individual museums will both be provided with URIs, as will personal names and individuals; places will be referenced using *Pleiades*; epigraphic types, materials, and supports using the EAGLE vocabularies.

3.2. The motivations for and origins of *I.Sicily*

The existing epigraphic landscape in Sicily is extremely diverse in two primary regards: on the one hand, the island has a very mixed cultural and linguistic make-up, meaning that the epigraphic material is itself extremely varied, with extensive use throughout antiquity of both Greek and Latin, as well as Oscan, Punic, Sikel, and Hebrew;³ on the other hand, the publication of this material has a very uneven record and despite an excellent pre-twentieth-century tradition, the existing *corpora* are far from complete and the ability of key journals such as *SEG* or *AE* to keep pace with local publication has been limited.⁴ A limited number of museum-based *corpora* have been published in recent decades (for Catania, Palermo, Messina, and Termini Imerese, as well as the material from Lipari), but this has not greatly improved the overall situation.

³ Recent overview of much of the linguistic tradition in Tribulato 2012; and of the epigraphic material in Gulletta 1999.

⁴ For an overview of the *corpora* tradition up to the twentieth century, see De Vido 1999.

The combination of these two factors already means that locating, identifying, or working with a Sicilian inscription, or its publication record, is extremely challenging for anyone without extensive experience of the material. The situation is compounded by the universal and familiar challenges of the recording and accessibility of archaeological collections, whether held in museums, in archaeological stores, or elsewhere, and the lack of consistency in the publication of new material.

As noted in the introduction, some of the impetus for *I.Sicily* comes from a desire to exploit a substantial legacy dataset in MS Access. This consists of a single table originally constructed in MS Access 2000, and maintained erratically from the year 2000 onwards. The original purpose of this table was to gather data to assess the ‘epigraphic habit’ of ancient Sicily, and consequently the texts themselves were not the primary focus. However, the extent to which the dataset facilitated further study made increasingly clear its potential value for the study of Sicilian epigraphy.⁵

In its final form the table holds data across 39 different fields, for 2575 records. 17 of these fields detail publication history (*corpora* references and other bibliography); the other fields record information on the language, date, provenance, current location, epigraphic type, form and material of the inscriptions, together with a free-text field recording further information about the inscription and fields to record any autopsy undertaken. Almost all of this data is derived from existing publications.

The conversion from the original MS Access dataset was developed through a pipeline of known conversions going from MS Access to CSV to TEI P5 XML. The XSLT transformation of the table of data from TEI P5 XML to EpiDoc XML is the point in the process where further up-conversions of the data were made. These include the creation of the hierarchical EpiDoc XML as well as normalisation of dating and bibliographic records. This conversion is not meant to be repeated as the dataset, once converted to EpiDoc XML, will be edited in the *I.Sicily* website. While the conversion preserves the data from the MS Access dataset, it restructures and where possible improves or normalises it.

By virtue of the fact that *I.Sicily* begins from such rich metadata, to which texts, images, and further data will be added over time,

⁵ The principal results were published in Prag 2002, revised in Prag 2004, 159-188; cf. Prag 2003, 2007, 2008, 2010.

and because this is in turn being supplemented by an on-going programme of autopsy, the form and content of *I.Sicily* is intended to be more akin to that of a true corpus than simply a text-database, seeking to combine a full record of past publication and study with a fully revised edition, and potential for multiple individuals to contribute to a process of on-going revision (see Fig. 1 for a draft edition of one inscription (*AE* 1962.314 = *I.Sicily* 820)).

3.3. The aims of *I.Sicily*

We outline briefly five areas in which *I.Sicily* aims to develop, facilitate and improve the study of epigraphic material from ancient Sicily.

3.3.1. Multilingualism

Sicily is traditionally described as a ‘melting pot’, the ‘crossroads of the Mediterranean’. The negative consequences of the separation of epigraphic material according to linguistic traditions have recently been highlighted and directly confronted by the *Corpus Inscriptionum Iudaeae/Palaestinae* (CIIP), edited by H. Cotton *et al.* *I.Sicily* sets out to follow in that mould, since the different linguistic traditions of Sicily not only exist side-by-side but interact constantly throughout the island’s history, and no study of the epigraphic material can afford to ignore contemporary and parallel material in the other languages.⁷ The situation created by basic technologies such as Unicode and EpiDoc XML mean that there is now no reason not to be language agnostic in the inclusion of material (the point may be obvious, but the tendency towards language-specific *corpora* is still marked). The opportunities and possibilities offered by these technologies are considerable, even at the most basic level, since, for example, searching can be made language specific or language neutral. One obvious area where Sicilian studies are currently hampered by this partitioning is in the study of onomastics. The *Lexicon of Greek Personal Names* records most instances of Greek names for the island, but Sicily is no less rich in non-Greek names (Latin and others), and at present there is no *onomasticon* for the island.⁸ Simply by the marking-up and indexing of all names

⁶ Original notice in Cotton *et al.* 1999; presentation in Cotton and Price 2007.

⁷ See e.g. Manganaro 1993, Prag 2002, Salmeri 2004, Korhonen 2011, Tribulato 2012.

⁸ www.lgpn.ox.ac.uk/ [accessed 26.09.2015].

in the island's inscriptions, *I.Sicily* will generate a powerful tool for future study. Although *I.Sicily* in its first phase is not undertaking morphological or syntactical mark-up, the encoding of all these texts in XML constitutes the necessary first stage in such a development, and we see this as a highly desirable future project, and the possibilities for the field of historical linguistics are considerable. The incorporation of a full range of metadata on the epigraphic support, geographical location, chronology, etc. will likewise allow detailed analysis of cultural patterns and their relationship to language-use over time.⁹

3.3.2. Identification and bibliography

Sicily presents a particularly extreme version of the common problem of identifying a text and its publication record. No existing *corpus* in either Greek or Latin comes close to full coverage (*CIL X* and *IG XIV* are the largest individual traditional *corpora* for the region, but both are over 125 years old and cover less than 30% of the material now known).¹⁰ Existing online databases improve on this situation, but the results obtainable are of very varied value. The most comprehensive, in terms of the range of data recorded, is *EDR* (with which *I.Sicily* is collaborating), which currently reports 1,906 records for 'Sicilia'; but this reduces to 833 when limited to texts on stone ('lapis' or 'marmor'); contrast *I.Sicily*, with 2,563 records at the time of writing.¹¹ *Clauss Slaby* reports 4,374 records for 'Sicilia' (including Christian inscriptions, excluding 'sigilla impressa'), but the return is inclusive of all kinds of epigraphic material, without indication or discrimination, contains some duplication, is much harder to reconcile to existing records, and records only text.¹² The *PHI* database of Greek inscriptions has a rich record of published Greek texts, but is text only and limited in outputs.¹³ *SEG* references are available for 733 inscriptions on stone and *AE* references for 328 (data taken from the *I.Sicily* database and based upon comprehensive manual trawls of *SEG* and *AE*).

One major aim of *I.Sicily*, therefore, is to generate unique identifiers for each inscription – the *I.Sicily* number, in the form *ISic* 1234.

⁹ See Prag 2002 for a first effort in this direction.

¹⁰ Mommsen 1883; Kaibel 1890.

¹¹ www.edr-edr.it/ [accessed 26.09.2015]

¹² www.manfredclaus.de/ [accessed 26.09.2015].

¹³ <http://noapplet.epigraphy.packhum.org/regions/1156> [accessed 26.09.2015].

These will be maintained as URIs, of the form: <http://sicily.classics.ox.ac.uk/isicily/inscriptions/1234>

I.Sicily is well placed to do this since its initial dataset is primarily a bibliographic concordance of the lapidary inscriptions of Sicily. One of the associated outputs of the project will therefore be an online bibliography for Sicilian epigraphy, and an online Zotero library has already been created with over 700 records which are referenced in the EpiDoc files.¹⁴ A locally cached version of the bibliography will be presented at the *I.Sicily* site to facilitate detailed bibliographic searching (including the identification of inscriptions by publication) and to allow the generation of customised concordances.

A further element of bibliographic information which *I.Sicily* will include is the cross-referencing and linking to online editions of major antiquarian *corpora* of Sicilian inscriptions. A growing number of these are already available in digital format and several are already mounted in the Arachne archive, making direct page-citation possible.¹⁵

The richness of *I.Sicily's* records in this area means that *I.Sicily* is currently collaborating with both *Trismegistos* and *IDES* ('Integrating Digital Epigraphies').¹⁶ The former aims to generate *TM* numbers for all the Sicilian material (which *I.Sicily* will include); the latter is to assist *IDES* in the refining of links between, e.g., *PHI* and *SEG* records, and to improve *I.Sicily's* own recording of *PHI* numbers.

3.3.3. Identification and collections

The traditional focus of epigraphic study upon the text, rather than the epigraphic support, means that epigraphic publication in the past has frequently been relatively limited in the information which it has recorded about the object on which the inscription is inscribed. This is a familiar complaint, and one which *I.Sicily* will address wherever possible through full object description and a rich photographic record. However, a corollary of this general problem is a very low level of information regarding current location and in particular the infrequent recording of museum inventory numbers or similar information. This situation is inevitably exacerbated by the substantial

¹⁴ <http://www.zotero.org/isicily> [accessed 26.09.2015].

¹⁵ E.g. Castelli 1784, at <http://arachne.uni-koeln.de/books/Castelli1784> [accessed 26.09.2015].

¹⁶ www.trismegistos.org/ [accessed 26.09.2015] and <http://ides.io/> [accessed 26.09.2015].

(and very positive) reorganisation and redevelopment of museum collections in Sicily recent decades – including a significant increase in the number of museums and public collections.

I.Sicily is making use of the TEI <msIdentifier> element, with its associated sub-elements in order to record details of institutional collections and inventory numbers wherever possible.¹⁷ In order to maximise the value of this, we have adopted two further courses of action. In the first place, as part of the larger ambition of undertaking autopsy of every stone contained within the corpus, we are working in close collaboration with museums on the island to improve our records of individual museum holdings. Where possible we aim to include associated archival information, such as copies of inventory records. This work currently includes a major sub-project to catalogue the epigraphic collection of the Museo Archeologico Regionale Paolo Orsi at Siracusa, and we are also currently working with collections at Adrano, Halaesa (Tusa, ME), and Catania.¹⁸ It is hoped that this work will be of considerable value to the museums themselves, since access to the *I.Sicily* records should facilitate the curation, display and accessibility of the inscriptions (see below also on translations), and we welcome future collaboration with other museums on the island.

Secondly, in collaboration with Dr Michael Metcalfe, *I.Sicily* has developed a database of Sicilian archaeological collections (130 at the time of writing). This database is mounted online alongside the epigraphic corpus, in a searchable format, including map-based searching. In order to facilitate the generation of linked data, the individual museum records will be maintained with URIs, of the form: <http://sicily.classics.ox.ac.uk/isicily/museums/123>.

The linking of the epigraphic and museum databases will enable the searching and reporting of inscriptions by museum collection as well as the easy locating of the appropriate collection.

¹⁷ www.tei-c.org/release/doc/tei-p5-doc/en/html/ref-msIdentifier.html [accessed 26.09.2015].

¹⁸ We gratefully acknowledge the ongoing support of dott.ssa G. Lamagna and dott.ssa A.M. Manenti at Siracusa, as well as previous directors of the Museo Archeologico at Siracusa, dott.ssa C. Ciurcina and dott.ssa B. Basile; of dott.ssa A. Merendino at Adrano; of dott.ssa G. Tigano and dott. R. Burgio at Messina; and of dott.ssa M.G. Branciforte at Catania.

3.3.4. Location, location, location

I.Sicily is actively generating rich geo-data for the individual inscriptions, both for the original findspot/provenance and the current location (whether museum-based, on-site, or elsewhere), and we aim to provide map-based searching for inscriptions, as well as text-based searching by ancient and modern place-names. In addition to full listing wherever possible of both ancient and modern place names for epigraphic provenance, we are working to provide detailed location information for each find-spot and the inscription's current location, through a combination of library and map-based research and the use of autopsys and *GIS* recording. At present geo-data is being recorded in two forms, both through the use of explicit geographical locations in the form of longitude and latitude records in decimal degree form (using <geo> elements), and through the use of Pleiades URI references wherever possible.¹⁹ We are committed to the long-term use of Pleiades as our primary reference for ancient places, and to that end we aim to update and improve the Pleiades data for Sicilian locations, in particular name data and sub-locations, in conjunction with the editing of the *I.Sicily* records.²⁰

3.3.5. Searching

In order to support the aims outlined above, *I.Sicily* has taken a different approach to search and browse. Although standard form-based search with paged results, like that of Google, makes sense for very large result sets, the comparatively small number of records in *I.Sicily* (thousands versus the estimated 30 trillion web pages indexed in Google) lends itself to a more direct and interactive approach – a spreadsheet/grid model (similar to Microsoft Excel) that runs directly in the browser. Although it is tempting to repeat the standard web-form model, following the argument that that's what users expect, the spreadsheet approach will be much easier to use, narrowing quickly and accurately to more easily interpreted results. Further, any subset of the spreadsheet, generated from interactive filtering, can, with a single button push, be exported to CSV (comma separated values) for use outside *I.Sicily*.

¹⁹ <http://pleiades.stoa.org/> [accessed 26.09.2015].

²⁰ See e.g. Wilson et al. 2015. Valeria Vitale (KCL) is currently undertaking a significant programme of data improvement in Pleiades on behalf of *I.Sicily*; we are grateful to Tom Elliott and Jeffrey Becker for their support.

The spreadsheet interacts particularly well with maps: all findspots or museums in a filtered subset of the grid can be simultaneously shown on the map (see Fig. 2). The spreadsheet model also provides a very quick and intuitive (since so many people are familiar with spreadsheets) means for editing records (in this case, inscriptions and museums) online. This web-based spreadsheet model has only recently become feasible for the web, as web browsers have added more functionality and new javascript libraries have been developed.

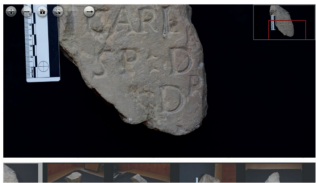
3.3.6. Translations

As was extensively discussed at the first EAGLE conference (Paris 2014), the creation and availability of translations is a major goal of the EAGLE project and its collaborators, and *I.Sicily* is no less committed to that ambition.²¹ Translations are rarely available for any of the published Sicilian inscriptions.²² It is obvious that the inclusion of translations will make the material much more accessible to a wider audience both of students and the general public. Equally, provision of translations will add to the value of the database as a resource for museums and others curating the inscriptions recorded in the database. To that end, a long-term ambition of *I.Sicily* is to include translations wherever possible in both English and Italian. We see this as one obvious area where public contribution ('crowd-sourcing') will be invaluable (see below).

²¹ See Orlandi et al. 2014, Part II.

²² French translations appear in Dubois 1989 and Dubois 2008.

ISIC0820. Fragment of a base or altar, which mentions an aedes
Adriano, C2 AD, Latin



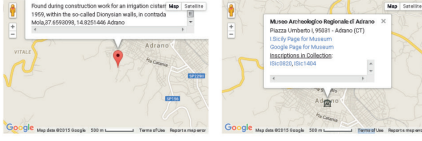
Location

Provenance: Found during construction work for an irrigation system in 1959, within the so-called Dionysian walls, in contrada Mola, 37 6592098, 14.8251448 Adriano

Original Location: Adriano

Last Accessed Location: Adriano, Italy, Museo Archeologico Regionale di Adriano, 11701

Autopsy: Autopsy: 2019.07.03



Physical Description

An irregular fragment of stone, broken on all sides, with only parts of the front and rear faces preserved. The rear presents a regular surface, picked rather than smooth. The front has the remains of a recessed panel, with part of the left margin preserved proud of the surface. The surface of the panel is lightly curved, in convex fashion along the horizontal plane, suggesting a cylindrical shape for the original block/monument from which the fragment derives. The inscribed panel is 0.115 m high at the left margin and has a maximum preserved height of 0.14 m, reducing to c. 0.095 m on the right margin; the maximum preserved width of the panel is 0.12 m.

Material: limestone

Type: part of a large circular altar or base

Dimensions: H = 27 cm, W = 19 cm, D = 21 cm

Epigraphic Description

The inscribed panel is 0.115 m high at the left margin and has a maximum preserved height of 0.14 m, reducing to c. 0.095 m on the right margin; the maximum preserved width of the panel is 0.12 m. The inscription, of which blocks of lines are visible, is set out in the recessed panel. Part of the left margin of the text is preserved, but the full extent of the text is unknown, probably continuing above, right and below.

Letter Heights

Line 1: incomplete mm
Line 2: 21 mm
Line 3: 23-25 mm
Line 4: 25 mm
Line 5: 26 mm
Line 6: incomplete mm

Letter Forms The letters are engraved with a deep V-cut, and are of regular and squarish form, with small serifs. There is a single instance of ligature at the start of line 2: an unusual double interposed is employed in line 4 (double interposed are rare in Latin epigraphy, although not interposed is visible between the S and P of line 4, there is otherwise no point in the rest of the surviving text where one would expect an interposed to be deployed), so it is difficult to speculate as to whether the double interposed is used for a particular reason at this point in the text. Lines 4 and 5 both employ a superscript letter R to create what appears to be an unparalleled abbreviation both in form and letters: the superscript R on line 4 extends up into line 2, the superscript R on line 5 extends up to the base of line 4.

Text

AE: C2 AD

Interpreted	Dipomatic	Epigraphic
1. A[—]		
2. AED[EM—]		
3. CA[RE—]		
4. S[ua]P[ro]cur[us] D[omi]ni [—]		
5. [re]c[us]u[m] [—]		
6. [—]		

Apparatus

Line 3 Mangano (1961: 131) asserted that 'nella linea 3 la quarta lettera è sicuramente I, mentre la sett. successiva poteva essere R, in margine alla quale si sia verticale la rotula a[ed]e[m] p[ro]cur[us]', and went on to propose the name Curvus. The fourth letter is quite clearly an E: the curvature and erosion of the stone mean that the upper and middle bars of the E are very faint, but the lower bar is absolutely clear. The traces which Mangano suggested were compatible with it at the end of the same line appear rather to belong to a letter R, in a superscript position following the D in line 4, as is more clearly visible at the end of line 5.

Line 4 Mangano did not comment on the traces of one or more letters visible below line 5. The remaining traces are most readily compatible with M or R.

Translation

Commentary

The physical form of the fragment is compatible with some sort of curved or cylindrical monument, whether a cylindrical altar (as suggested by Mangano (1961: 131) or a tablet base, or something else. The reference to an aedes ('temple' or 'shrine') suggests that the text may be linked to an act of building/inauguration (sua procurus), whether restoration or building ex novo. Mangano suggested a link to either Apollis or Adriano, since both are attested locally as nodes by Mangano (1961: 132); this remains the only instance, to date, of a Latin inscription from the environs of Adriano. As Mangano notes (1961: 131), repeated by the editors of *L'Année Epigraphique*, there is no obvious parallel for the form DR, although it is certainly tempting, in the context, to treat it as an unusual form of abbreviation of the usual Divertet (Divortium), i.e. Divortium (Divortionum). There is little reason to think that the letters were added later (as suggested by Mangano), since this is already an atypical form of abbreviation, and there is nothing about the engraving to suggest they are by a different hand: if the letters DR are to be expanded as diverte divortium, then this text seems to be the last status of Mangano in the imperial period as being a Latin inscription, but it certainly is possible that the problem of municipal status in imperial period Sicily, see (other sites) Vera, D.: 1996, Augusto, Povo e Vecchio a la Sicilia in età imperiale. A proposito di recente scoperte epigrafiche in archeologia del'Antiquità. *Isis* 67, 21-26. (http://dx.doi.org/10.1017/S0022278X00000000) There is also a note in *La Sicilia romana. Atti della XIe Rencontre sur l'Épigraphie* (Bari 8-10 ottobre 2009). Bari: Edipuglia: 305-311.

Bibliography

AE: 1962.0314
Mangano (1961a): 130-132 fig 2

Fig. 3.1. Sample edition.



Showing 340 of 2413 inscriptions. Filtered to limestone only

Id	Date	Date Range		Place		Material	Object Type	Inscription Type	Museum
		After	Bef...	Ancient	Modern				
ISic0824	Second half of C...	250 BC	200 BC	Syracusae	Syracuse	limestone		honorific	Siracusa,
ISic0822	First half C6 BC	600 BC	550 BC	Syracusae	Syracuse	limestone		dedication / building	Siracusa,
ISic0820	C2 AD	100 AD	200 AD	Adranon	Adrano	limestone	part of a large ci...	dedication building	Museo Ar
ISic0819	C1 AD - C2 AD	0	100 AD	Netum	Noto Vecchia	limestone	altar	funerary	Noto, bit

Fig. 3.2. Screenshot of map-based searching (museum locations) and of part of the spreadsheet/grid search interface employed in I.Sicily.

3.4. Limitations and future ambitions

The scale of the enterprise, and the available resources, mean that in its current form the project has limited itself to inscriptions engraved on stone (the coverage of rupestral inscriptions/graffiti and of inscriptions painted on stone/plaster is regrettably uneven). However, there is no reason in principle not to extend coverage in future to include inscriptions on other materials. Similarly, although as noted above the current project does not include a programme to mark up linguistic features of the texts, the commitment to the long-term maintenance of the corpus and the open availability of the underlying XML records means that such a project would be entirely possible in the future. A core principal of the project is that wherever possible an inscription record should be supported by recent autopsy and not simply derived from the existing literature. Necessarily, this process is a slow one, and the majority of records at this stage consist of information derived from secondary sources (earlier editions and other publications). Individual inscription records will contain a clear indication of the editorial state

of the record (from unchecked through to fully edited) and additionally whether the record is underpinned by autopsy. In both cases, clear records will be kept of editorial responsibility, autopsy and authorship as appropriate. In order to speed up the development of the corpus, and to encourage those working on the material to take ownership of it for themselves, we aim to enable individuals to submit new records and emendations or additions to existing records (such as translations, images, location information), both in the Epigraphic database and the Museums database. To this end, we welcome collaboration with those undertaking epigraphic projects in Sicily, and aim to offer the ability for other projects to publish their editions through I.Sicily. We are also exploring the potential of the corpus as a teaching resource both for epigraphy in general and for the teaching of EpiDoc. This latter aspect has already been initiated through a Teaching Project Award (2014-2015) from the Humanities Division of the University of Oxford, and we aim to develop this further in the coming year, as part of the work of incorporation and conversion of texts into the existing dataset.

It is our long-term ambition that I.Sicily might become the default location for the publication and dissemination of Sicilian inscriptions; in the shorter term, we hope that it will serve as valuable portal in the world of Sicilian epigraphy and of ancient world open linked data, greatly improving the accessibility of Sicilian epigraphy and so enriching the study of the ‘crossroads of the Mediterranean’.

Acknowledgments

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4. Towards the Publication of ICI Siracusa: General Data and Previews

*Mariarita Sgarlata**

Abstract

This paper refers to the general track “Epigraphic edition on paper and on line”. Some researchers who has been working on the editing of the *Inscriptiones Christianae Italiae*, published from the University of Bari, contributed also to the EDR project, that collect on line the epigraphic documents of Roman Christian Period. I propose a preview of the work currently in progress, with a specific reference to the inscriptions that provide us the chronological and topographic data to study the cemetery as well as formularies linked to the society structure and to the identity-making characteristics.

Keywords: Sicily, Syracuse, Epigraphy, Topography, Society, Onomastic and Identity

4.1. General data about epigraphs

We are far from a complete and thorough research about palaeochristian epigraphs in Sicily. This catalogue represents the first step of a systematic study focused on the inscriptions discovered in the christian cemeteries of Siracusa.

The epigraphic research related to San Giovanni catacomb can count on certain informations about the discovery place thanks to Paolo Orsi archeological campaigns. However, looking to previous publications, sometimes it's necessary a review of the presentations made by Mommsen and Kaibel. In this perspective the main sources of the CIL and IG authors were verified so we had a deeper vision

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of the relationship between Mommsen and Kaibel and the main sources used, sometimes reevaluating the contribution of these sources. The renovated interest about funerary epigraphy generated new studies about new criteria of dating. The inscriptions dated by the indications of the “consular couple” represent an exception in the issues about chronological datings (Ferrua 1946-1947, nn. 191-208; 1989, nn. 191-208): two were discovered during the excavation conducted by Paolo Orsi (1985) and to them is associated the Latin epigraph “Sporus” (356).

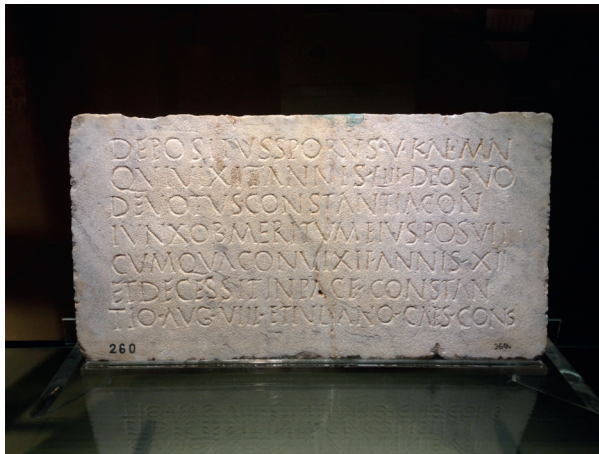


Fig. 4.1. The Sporus's inscription.

The bigger one is entitled to San Giovanni and gave back almost 800 inscriptions, now located for the most part in the Archeological and Regional Museum “Paolo Orsi” of Siracusa.; alongside will be placed the 40 headstones recovered in the adjacent hypogea of Villa Landolina, that report compatible datings and formularies.

4.2. Historical aspects of the catacomb of S. Giovanni at Syracuse

The systematic studies of collective cemeteries in Syracuse started many years ago and, beyond the archaeological surveys, the late antique funerary settlements of Syracuse proposed multiple research cues and paths, as the historical-religious, economic and social nature. Suburban cemeteries, fanned out from the area of Fusco, in the quarter of Neapolis, to the Santa Lucia area, in the southern part of Acradina,

this indicates unequivocally what the perimeter of the city must have already been in the early and mid Roman Empire. The History of the area, which was going to hold the catacombs (San Giovanni, Vigna Cassia and Santa Lucia), spanned the centuries between the classical Greek and late antique ages, gradually giving evidence of quarries (Latomie), water supply systems to the city, characterized by cisterns and aqueducts (Collin-Bouffier 1987, 682), handcraft workshops from the beginning of the 4th/3rd century BCE and burials datable to the early and mid Roman Empire. The analysis of the funerary system certifies one hand the dependence on the Roman model, and other the debt in respect of local traditions.

Several interest will be given to structural aspect of the catacomb of S. Giovanni, practice of funeral rituals, ethnic and cultural fruition's characters, transformation in the use, transformation in the way of using spaces for graves, to complete a general point of view about the phenomena of continuity and innovation as to previous sepulchral arrangements and, in the analysed periods, the facies belonging to the different settling, variegated in the committees' ideological and religious themes, in choosing monumental types (like the *rotundae*) and decorations, in self-representative aspects, in burial uses. In this perspective we will give particular importance to the study of funerary epigraphy aimed at the writing of ICI Siracusa and the overall interpretation of the monument.

Between 1893 and 1909 the archaeologist Paolo Orsi carried out a series of campaigns in the catacomb of San Giovanni. Detailed reports of those campaigns are recorded at various times in *Notizie degli Scavi*, which constitute an indefeasible starting point. The first incisive studies on Christian subterranean Sicily pertain to Joseph Führer, who dedicates many pages to the catacomb of San Giovanni, whose study is also epigraphic, is based on the previous literature, especially on Paolo Orsi's discoveries (Führer, 1897, 13-39; Führer and Schultze, 1907, 22-26; see also Orsi 1893, 276, n. 2) . In the study of Syracuse cemeteries Orsi (1900, 189) was the first to see the mixed nature of the burials and their materials (mostly gravestones), openly attesting a kind of pagan-Christian and orthodox-heterodox symbioses . Both Antonio Ferrua and Santi Luigi Agnello within the space of a few years tried to solve the problems relating to the sarcophagus of Adelfia and the more general problem, strictly correlated with the ones just mentioned, of the cemetery genesis and development.

It is necessary to record that numerous hypotheses on the genesis and development of the various sectors of the cemetery are ascribable to the account given by inscriptions. Syracuse, thanks to its prolific underground cemeteries, has the larger Christian epigraphic heritage after Rome, kept in the storage of the Soprintendenza di Siracusa.

4.3. Topographic and epigraphic data to study the cemetery

Walking across the main gallery, one can retrace the stages of Paolo Orsi's interventions, being at the entrance of the Catacomb second northern gallery, before the so-called "tomb of the Saint". This *arcosolium* is considered a privileged burial on the basis of the following reasons: most of all because of its position, but also because it is a *mensa*-type burial closed by a sole slab (Orsi 1893, 292-294). The signs of an ancient rite are easily traceable on the slab, a rite that preceded the coming of Christianity and persisted for centuries up to the present day: the rite of *refrigerium*, which literally means refreshment, cooling (Giuntella et al. 1985). In the Christian ceremony the purpose of a funeral banquet is to benefit the soul of the departed on the anniversary of death, a painful event celebrated as *dies natalis* of the soul to eternal life.

Who was buried in this sepulchre? The question is destined to remain unanswered and only an inscription found nearby could be a clue in this sense. The text says that the owners purchased the sepulchre close to the one of the bishop *Cheperion's* (Orsi 1895, 507-508; Rizzone 2011, 55-58), of whom the scanty written sources never make mention. In any case this constructed sarcophagus represent one of the most eminent burials of the catacomb. In the same gallery one cannot ignore the finding of an inscription in many fragments, which is a singular phenomenon of religious contamination.

This inscription, with a Christological monogram at the top, records *Nassiana* "Christian, who competed with Penelope in moral virtue". This inscription can only be compared with three examples in the Roman sepulchral *carmina*. The circular support of this inscription found close to the "tomb of the Saint" has been regarded as a *mensa* (table) for *refrigerium* rite (Giuntella et al. 1985, 47), whose circular form would derive in any case from an evident reuse of a marble disk of classical craftsmanship, with a laurel wreath and berries sculpted on one side (Orsi 1895, n. 234). A wall inscription painted on the extrados

of an *arcosolium* in the third northern gallery of the catacomb could be connected with Nassiana's text. Two lines of the inscription say that "Sossa outdid (other women) in conjugal love; as for handiworks, without being taught by anyone, Athena herself had taught her how to do marvelous things" (Ferrua 1940, n. 3). Both inscriptions unequivocally make use of female figures from the classical world, interpreted as a model also for Christian women either for a deep-rooted usage or making up for the absence of assimilable figures in the Church. This allows one to notice in a 4th century large community cemetery, such as San Giovanni, some phenomena of religious contamination in a period in which Christian epigraphic praxis consolidated itself by then (Sgarlata 1999, 484).

The rotunda derives its name from the deceased Antiochia recorded in the sarcophagus, set inside the ring of tombs, made of blocks and bearing an engraved and rubricated inscription. Whom did this private space belong to? To answer the question, one can rely on a suggestion provided once more by epigraphic testimonies. The grave-stones found – on which they put as a rule the deceased's name, lifespan, date of death and deposition – according to the first excavators' reports (Carini 1873, 23-45), attest that the rotunda of Antiochia could have housed women only and this would give credence to the idea that the mausoleum had been used for a female monastic community. The hypothesis needs to be verified, but it is very seductive.

It is evident that the catacomb of San Giovanni was originally a community cemetery, planned for only one type of burial: the *arcosolium* with multiple depositions, which does not require great care for decoration, only transennae. In the topographical and architectural development of the catacomb it appears clear that creating the rotundas breaks up the common burials series, destined to a socially homogeneous Christian community. These changes to the original plan – of the creation of subterranean mausolea both to the north and south of the cemetery – spring from the necessity to create appropriate spaces for the members of the Church and above all of the Empire, bringing into question the initial egalitarian choice of the *arcosolium* burials (Griesheimer 1989, 767). In the terminal part of the pious Giovanni's gallery a monumental sarcophagus, once more hewn out of the rock, can be perceived. Close to the closing wall of the same gallery an inscription was found: it bears the notification of both the consuls of the year 349; (Agnello 1953, 89).

As a rule this date marks the end of the dig works in this sector of the catacomb (Ferrua 1952, 75-76). A *arcosolium* extradados, in the eastern region, shows traces of a *palinsesto*, an overlap of paintings and epigraphs that obstruct the identification of the first person buried in this sepulchre, even if recently Vittorio Rizzone proposed the interpretation *Philadelphiea*¹. In one of the fossa tombs at the terminal stretch of the main gallery the inscription of Euterpe (IG XIV, 112) has been found, reused to cover the bottom of the tomb, which traditionally marks the end of the dig works of the catacomb (Ferrua 1952, 75-76; Agnello 1958, 79; Griesheimer 1989, 781). Beyond the deceased's biometric data, recorded as "companion of the Muses", the epigraph in the last three lines mentions the consuls' iteration, which allow us to date back to the consulate of the Emperor Constantius, consul for the tenth time, and Julian- Caesar, consul for the third time. So Euterpe died on November 27th 360 A.D. at the age of 22 years and 3 months.

In the southern region, more than in other ones, that you can note the transformations that have profoundly undermined its community spirit, which had originally inspired the creation of the catacomb. In the first rotunda of the southern region, is a private space, which was given the name of Marina due to an inscription scratched upon the extradados of the *arcosolium*, on the right of the entrance to the short gallery of the bishop Siracosio. The *arcosolium* seems to be enframed by a painted prothyrum, as the still visible column and capital attest, confirming the generalized use of architectural elements in this catacomb, already seen in the rotunda of Antiochia. According to the interpretation of the text, Marina could have been the wife of the patricius et magister militum Sabinianus, sent by the Emperor Honorius to Spain at the time of barbarian invasions presumably between 409 and 423 (Ferrua 1989, 21-22, 40).

This date would agree with the numerous testimonies given by the inscriptions that have been dated thanks to the notification of the two consuls in office in the year of their death. These testimonies are ascribable to the years of the Emperors Arcadius and Honorius in the first quarter of the 5th century and seem to suggest a link between a few burials of the southern region and the aristocrats' diaspora from Rome after Alaricus' advance in 410, who took refuge in Sicily and Africa as they did in other provinces of the Empire (Sirago 1989, 715).

¹ Rizzone 2012, 260-265.

It is necessary to have a look at the slab of the presumed *arcosolium* of the bishop Siracosiso, recorded in one inscription found in an adjacent fossa tomb, which says that the deceased intentionally purchased the sepulchre close to the one of the bishop just mentioned (IG XIV, 123: Ἐνθάδε κίτε Πολυχ/ρόνιος καὶ Σεραπία. / Ἦγόρασεν τῶπτότ/ε καιρῶ / Πολυχρονίου /αί Σεραπία ἐπὶ τῶ κυρί/ω μου ἐπισκόπω Συρα/κοσίω). It is just a hypothesis seeing in the *arcosolium* with the engraved slab, still in situ, a noble burial for a member of the ecclesiastical hierarchy, for whom, in the absence of other data, according to a letter of pope Gelasius I, an episcopate between 492 and 496 has been proposed (Narciso 1952, 223; Carletti 2008). One can clearly distinguish a Christogram with the apocalyptic letters *alpha* and *omega* and two ships in the shape of fish, regarded as making reference to the sacrament of the Eucharist, this is also suggested by the diskettes next to the fishes' mouths, assimilable to loaves of bread (Sgarlata 2013).

After reading the text of the inscription upon the sarcophagus lid (CIL X, 7123: *lc Adelfia c(larissima) f(emina) / posita conpar / Baleri comitis*), one can become aware that it refers only to the woman, not to both husband and wife: here lies *Adelfia, clarissima femina*, wife of the count *Valerius*. Who were therefore *Valerius* and *Adelfia*? The unsolved enigmas of the catacomb of San Giovanni deal with their names and most of all their identification. In reality it is possible to distinguish more than two phases of intervention, which have preceded the creation of the hole for the sarcophagus. At the beginning the internal space of the large niche was scenographically arranged in a terrace pattern with a forceful ascensional effect, not exempt from comparisons (Nestori 1993, 13-15, plate VII). The intact Latin inscription of Sporus, dated to 356, which sealed a forma in the main gallery among the ones that join the rotunda of Marina to the one of Adelfia (Cavallari 1872, 24; Agnello 1953, 90), would attest that the exploitation of the soil in the area gravitating to the rotunda of Adelfia was already underway after the first half of the 4th century, so confirming the evident anteriority of the six graves cut in the floor to the phase of monumentalization. Both the internal and the external organizations of the large niche (nicchione) would correspond to the first and second phases of intervention respectively, according to the current reconstruction. The problems related to the reconstruction of the third phase seem to be more complicated: the monumentalization phase started with the interment

of the sarcophagus and concluded with the acquisition of an aspect comparable to the privileged burials of Roman crypts.

The monument seems to have a less wild internal dynamics of development; the new data (archaeological, historical, epigraphical) (Sgarlata 1996, 101-108) allow the scholars to widen the syncopated weave of temporal sequences, to which the analysis of the monument has been pinned by the constant reference to *Valerius Proculus'* chronology. A new chronology and a different identification of the comes Valerius can be proposed, considering: 1) the evident reuse of the sarcophagus; 2) the topographical development of the catacomb in the area where the sarcophagus has been discovered; 3) the type of monumental intervention, which followed the Roman counterparts, datable to the second half of the 4th century (Fiocchi Nicolai 1997, 132-134). If Valerius were given a different identity, one could postpone him from the age of Constantine to that of Augustine (Sgarlata 1998, 15-51), on the basis of several accounts about the friendship between the saint from Hippo and a *comes Valerius*, whose physiognomy, is somewhat vague. This friendship, confirmed by the epistles (AUG., Ep. 200, 206, 207; Retr. II, 79 and 88) and the dedication, in 419, of the treatise *De nuptiis et concupiscentia*, is fed on the fight against Pelagianism, which in eastern Sicily had found a fertile soil. The presence of Pelagians in Sicily is attested for certain, according to *Hilarius'* account under the pontificate of Innocent (Pietri et al. 1999, 429-452) and *Honoreficentia's* letter, where a *clarissima* based at Syracuse is mentioned. On the island the spread of Pelagian movement looks like a direct consequence of the 410 sacking of Rome and the diaspora of the Roman nobility, of which Pelagius and Celestius were spiritual leaders; the short period they both spent in Sicily was not painless for Christian orthodoxy and particularly in Syracuse, as the cemeteries in the area overhanging the Greek theater, intended to serve the communities of the so-called heretics throughout the 5th century. All the data gathered seems to lead to a different identification of *Valerius* – who, even if he was not Augustine's correspondent, would be sought in the list of *Valerii* reported in the sources of the first quarter of the 5th century (PLRE II, 1143-44) – and a later chronology of the large niche monumental transformation compared to the one traditionally accepted.

Certainly it is not the case that in this catacomb the traces of the members of ecclesiastical hierarchy are so rare: where are the martyrs? Why is the evidence of bishops, presbyters and deacons so scant?

Why is this Christianized elite – to which the will to betray the communal matrix of the original project for a new particularistic conception of funerary space can be attributed – so copious?

To answer the questions will take time, which will assure a greater credibility to what so far seems just a series of suggestions, most of all fed by the re-reading of epigraphic testimonies: the episodic character of the references to burials of bishops, presbyters, deacons and noting that the most significant percentage of evidences pertains to the members of the Church, buried in Syracuse away from their own countries and recorded in wall inscriptions written in Latin – *Auxentius Hispanus episcopus* and *Superianus clerecus de Aquileia* (Ferrua 1940, 1 and 6) – as a demonstration that the official language is used by foreigners, who were high clients (the remainder of inscriptions is in Greek), these and many other clues lead to thinking of a less incisive control of the Church in the 5th century than one can commonly believe.

In the rotunda of sarcophagi is surprising the concentration of monumental burials, so that one can think members of the Church commissioned the works here too. What clues are the that could support the hypothesis that the clients belonged to a religious community? To tell the truth, they are scant and among them the epigraph of the blessed virgins Fotina and Filomena deserves to be recorded: the former lived 80 years, the latter 84 (*IG XIV*, 187; Ferrua 1989, 180). The sole dated inscription found within this chamber, which is related to the name of Eucarpio, bearing the notification of both the consuls between 339 and 360, cannot be used for dating; the discovery data, insisting on the fact that the gravestone was found overturned in a *forma* tomb (Agnello 1960, 30-31), suggest that the gravestone was reused.

The *cubiculum* of Eusebio has a structure different than other private spaces of the southern region of the catacomb. The name Eusebio derives, once more, from an inscription found on a three level monumental tomb, in the shape of exedra, visible to the left of the *cubiculum* (*IG XIV*, 111). The position and monumentality of the grand *arcosolium*, the formula “of blessed memory”, the paleographical characters, the identity of pope Eusebius month of death (exiled to Sicily by Maxentius, Eusebius died on 17 August 309 or 310) have suggested to Isidoro Carini that this *arcosolium* could be the pontiff’s temporary sepulchre, whose bones were transferred to Rome and deposited in the catacomb of Callisto. Despite the scholar’s efforts to sustain this

theory (Carini 1873, 134), the physiognomic contours of Eusebius recorded in the inscription remain hazy.

The cubiculum of Eusebio also deserves to be recorded for another testimony, which has a special value for Syracusans: an inscription found in a *forma* tomb, which testifies the worship of Saint Lucy, the patron of Syracuse..No decoration, no distinctive signs characterize the modest burial of Euskia (Orsi 1895, 299-308), one of the many graves cut in the soil of the cubiculum (Guarducci 1978, 526-528, fig. 164).

Εὐσκία ἡ ἄμενπτος, ζήσα<σα>
 χρηστῶς καὶ σεμνῶς ἔτη
 πλίο<ν> ἔλαττον κε', ἀνε-
 παύσετο τῇ ἑορτῇ τῆς κυ-
 ρίας μοθ Λουκίας, εἰς ἣν
 οὐκ ἔστιν ἐν κώμειον
 εἰπεῖν, Χρηστειανή, πισ-
 τή, τέλιος οὖσα, εὐχα-
 ριστοῦ^Ρ τῷ εἰδίῳ ἀν-
 δρὶ πολλάς εὐχαρισ-
 τίας α ω εὐομε[ίλητος]

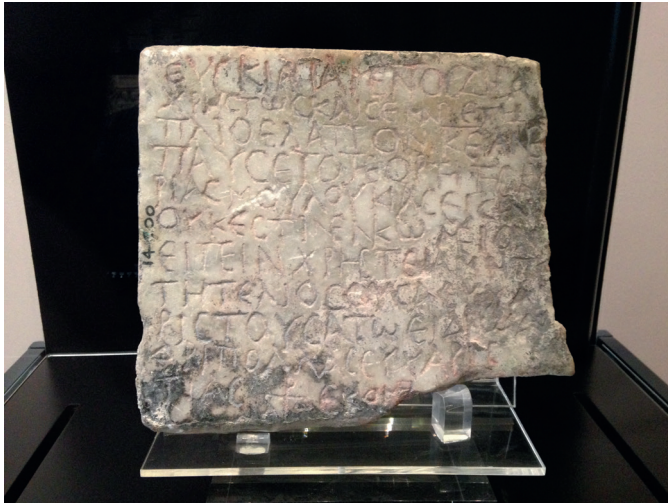


Fig. 4.2. The Euskia's inscription.

Euskia, the irreproachable one, who lived her life in good and pure ways for more or less twenty-five years, died on the feast of our lady Lucia, for whom no praise is adequate. She was Christian, faithful (and) perfect, well pleasing to her husband, endued with much grace, affable.

This is the text of the most important Christian epigraph in Syracuse. The formulae present the typical *elogium*, the retrospective data of the life of the deceased and the Christological monogram flanked by the apocalyptic letters, which are common elements in the inscriptions of the catacombs; it is important since Euskia had been privileged to die on the same day that was sacred to Lucia, patron of Syracusans, a martyr during Diocletian persecutions on the 13th of December 304. The sole doubt of this reconstruction lurks in the term *kyria*, which is referred to Lucia in the epigraph; does one have to interpret it as synonym of *haghia* (saint), which would assure the official character of the worship, or a simple honorary title? Whatever answer one can give, the importance of Euskia's inscription survives intact, because it testifies if not already the sanctity of Lucia, the local devotion and worship of which the woman was subject in the 5th century in Syracuse.

So this is the first attestation of the cult of Saint Lucia, which confirms the historicity of the Martyrologium Hieronymianum's account on popular devotion to the Saint, which came through the celebration of a feast from the outset. All of the other evidence refers to successive periods. It is the Greek *martyrion* dated to the end of the 5th century, whose reliability has been debated for a long time and to this day never evidently established (Milazzo and Rizzo Nervo 1988, 95-135). The inscription, ascribable to the beginning of the 5th century, so would precede the questioned *passio* and would confirm the antiquity of the cult of Saint Lucia, whose bones were presumably kept in the homonymous catacomb in Syracuse, before George Maniakes, in 1039, transported them to Constantinople. Along with the inscription of *Iulia Florentina* from Catania (Rizza 1964, 608-610), the epigraph of Euskia is the most ancient Sicilian document that one could relate to the experience of martyrdom.

4.4. Epigraphic population: formularies and identity-making characteristics

The 800 inscriptions found in the San Giovanni catacomb give us an idea about the epigraphic approach and the society of that time. One single epigraph can mention more than one person so the number

of remembered deceased is superior than the number of inscriptions; starting from this number it's possible to launch a demographic investigation to determine the expectation of life.

In Syracuse all the social classes were affected with inexorable mortality; high percentage among young people (under 20) and extremely low percentage among old people (over 60). The demographic data follow standard hypothesis: male mortality between 15 and 34 years and female mortality between 20 and 24 years (reproductive period). The life expectancy for both genders was around 29 years.



Fig. 4.3. The Fotina and Filomena's inscription.

We focus on the deceased eulogistic formulae that help to increase the study about social aspects. In our research there are few examples of nuptial terminology, all referred to female deceased: *compar*, *coniunx*, σύμβιος, συμφη. It marks a common characteristic: the priority in honoring the wives more than the husbands. Linked to this is the importance given to the sexual integrity of the dead person, in fact the concept of virginity in the nuptial context is particularly marked through the adjective *virginus*-a ο παρθενικός-ή.

² V. cat. n. XX-XXI.

The word *παρθένος* appears seven times and always referred to women. Women who chose monastic life leave behind them all the duties of nuptial life so probably they had a much longer life expectancy than married women. One impressive example is the one of "Fotina e Filomena", consecrate virgins (80 and 84 years old, as stated above). Such a long lifespan, for the centuries under examination, finds a justification only in considering that both the women chose a monastic-type life, avoiding the slow attrition due to diverse factors: precocious age weddings, consecutive childbirths since their early adolescence, abortive practices by makeshift means and, lastly, even after the dangerous age of 25/30, the overwork that household management and hygienic-sanitary conditions involve. The biometric data recorded in the inscriptions confirmed in Syracusan sample as well (Sgarlata 1991), testify that life expectancy at birth, considering the high rates of infant mortality, was not over 30 years on average, both for men and women; this datum is not surprising, if one bears in mind that the average span life was about 45 years still in the first half of the nineteenth century.

4.5. Conclusions

The new approach to the catacomb of San Giovanni brings many things into question, such as the fideistic attitude of those, who have studied this monument and have looked at the epigraphic evidence for chronological purpose. Rereading Orsi's excavations data unequivocally shows how itinerant are the dated inscriptions within the cemetery – with the exception of three, whose discovery data attest their permanence in the original position (Orsi 1896a, 43-50, 352-353; Agnello 1953, 90, 97) – which advises the scholars against using them to seal chronologically the diverse sectors. It would be profitable to draw a map of reuse, which is certainly the most striking phenomenon detected thus far in Orsi's accounts, more than continuing to date the works in the galleries on the basis of dated inscriptions found in their terminal part. But, even underestimating this phenomenon, the inscriptions datable to the years around 350 and the ones, more considerable numerically, that bear the notifications of both the consuls between the end of the 4th century and the first half of the 5th century, have been seen both in the northern region and the southern one, as well as the main gallery (Sgarlata 1996, 109, n. 62), which excludes drawing conclusions on the internal development of the catacomb.

A datum, however, is worth considering: epigraphic evidence and intense exploitation of funerary space attest the vitality of the area that gravitates around the three southern rotundas after the end of the great works of excavations. What appears episodic in the other sectors of the catacomb – for example the so-called sepulchre of the Saint – becomes constant in the southern region, where diverse types of intervention on pre-existent structures and high percentage of dated inscriptions demonstrate, still in the first half of the 5th century, a special concentration of interest. During the work on the editing of ICI, the first certain fact we acquire studying the inscriptions is that the dated ones are almost always reemployed and itinerant within the catacomb, with the exceptions just mentioned. We have to make also another consideration that will allow us, once ended the work of cataloguing and copying the epigraphs, to deal with the language question in a deeper and more articulated way. Also the linguistic choice recorded in epigraphic evidence is worth considering: the inscriptions in Greek surpass by far, with a rate of about 90%, the ones in Latin. About motivations of language choice not all the researchers agree, discerning between the language example provided by the christian graveyards inscriptions and the one expressed by the whole citizenry. It is worth to mention what Kalle Korhonen affirms: “moreover, it must be painted out that even if 90% of ca. 1.100 inscriptions from the catacombs of Syracuse are in Greek, we are not allowed to conclude that 90% of the population of Syracuse was Greek from the 3rd to the 5th. It is likely that the non-Christian parts of the population, which was notable until the 4th century, were not buried in catacombs and their epithaphs have mostly perished” (Korhonen 2011, 124- 125).

Assuming this, one could state that in Sicily religious conversion is not a linguistic conversion, proving wrong the theory according to which in urban centers Christianization would bring along an early diffusion of Latin, whereas the pagus, keeping the use of Greek, would keep its distance from Christianity, at least until the early 5th century, during which signs of both linguistic and religious conversion would become a little more evident (Manganaro 1993, 545). Epigraphic documentation records, for Syracuse and its territory, as for Catania, a marked preponderance of the use of Greek still in the 5th century; so in urban centers Christianization does not bring an early diffusion of Latin, which was prerogative of high and foreign clients, as only the use

of Greek in the *pagus* does not prove the extraneousness to the process of diffusion of the new creed still at the beginning of the 5th century. The idea according to which “several signs of religious dissidence, in the 5th and 6th centuries, can be recognized only in peripheral rural areas, where the level of ecclesiastical control was slack. In these centuries conventional superstitions were slowly relegated to periphery” (Cracco Ruggini 1997-1998) needs to be dampened.

The cemetery of San Giovanni has subtly given back, even if in a more hidden way, several testimonies of ideological commixture, which do not distinguish it from other communal cemeteries in Syracuse, where phenomena of “religious dissidence” are more readable (Sgarlata 2003). The catacomb was created in different cultural and religious contexts (after the Peace of the Church). The cemeteries distribution (both of private and community law) and topography of funerary monuments in the suburban area of Acradina, between the 3rd and 5th centuries, reflect well a diversified situation within a few hundred meters radius. To understand that, one needs to take account of the relationship between paganism and Christianity, orthodoxy and heterodoxy (most of all for the 5th century) (MacMullen 1999), which is not only a Sicilian problem, even if it is strongly sensed in the island (Greco 1999, 59).

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5. EDB 2.0. How Eagle Europeana project improved the Epigraphic Database Bari

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Abstract

This paper is dedicated to the evolution of the Epigraphic Database Bari (EDB) from the minimalistic design of its origins to its current status. Although EDB, the database of inscriptions by Christians from Rome, dates back to the late 1980s, involvement in the EAGLE – Europeana project has had a significantly positive impact on its development. In fact, maintaining its peculiar character, dictated by its own history and, mostly, by the characteristics of its documentary base, it has taken advantage of the solutions adopted to integrate different archives and purpose-built best practices.

Keywords: Epigraphic database, EDB, EAGLE Europeana, Christian inscriptions, Late antique inscriptions

5.1. Introduction

The Epigraphic Database Bari (EDB) is an ‘old’ database, it dates back to the late 1980s, when Carlo Carletti¹, inspired by Jory’s experience indexing CIL VI², started a project of digitization of the inscriptions commissioned by Christians from Rome between the third and eighth

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² CIL VI, pars VII, *Indices Vocabulorum*, I-VI; Jory 1975. The six volumes of the computerized KeyWord-In-Context index to all the approximately 40,000 texts collected in the sixth volume of the *Corpus Inscriptionum Latinarum* (CIL) are the outcome of a trailblazing work of arrangement and organization of the inscriptions in a *database*, even if limited to their textual part.

centuries, collected and edited in the 27,688 lemmas of the ICVR³. The data were stored in a data processing program, called ICVR, running under MS-DOS, later converted to a database for Microsoft Access. It was originally intended for internal use only.

Since its very beginnings the database has been designed on the basis of a conceptual model, which conveys the complexity of epigraphs even in the frame of a very simple and basic IT structure.



Fig. 5.1. The record of a bilingual inscription (ICVR V, 15147) as it appeared in data processing program ICVR in MS-DOS in 1988 and as it appears now in EDB, with the acronyms expanded, the image and the text displayed in Greek characters.

In addition to the text, the data processing program recorded for each inscription⁴: bibliographic data (Progressivo = ICVR Number), origin (Provenienza), type of support and technique of execution (Supp. e tecn.), function (Funzione), the presence or absence of Christograms (*Signa Christi*), and dating (Datazione). All this information was expressed by alphanumeric codes of few characters, according to a limitation imposed by the program. (Fig. 1)

Adding metadata to the text, even if in the minimalistic form of alphanumeric codes, accomplished the goal of describing the epigraphic

³ The *Corpus of Inscriptiones christianae urbis Romae* started in 1922 by A. Silvagni, was published, mostly, by A. Ferrua, later supported by D. Mazzoleni and C. Carletti, between 1956 and 1992. Pursuing the work of G.B. de Rossi of the mid-1800s (IC), ICVR registers the inscriptions by Christians found in the suburban area of Rome, sorted in topographic order by consular road, then by catacomb. Inscriptions found inside the urban walls or the recently discovered suburban ones aren't yet included in the ICVR volumes.

⁴ The program didn't allow the use of Greek fonts; in order to add texts in the Greek alphabet it was necessary to type Latin equivalent letters in the MS Word *Symbol* font, as you can see in Fig. 1.

object in its widest sense as an inscribed artifact. This feature, in particular relating to geographical information, was even more meaningful according to the characteristics of a large part of the inscriptions recorded in EDB. In fact, the original pertinence to a monument/container (catacomb) or to a particular area of it, allows, with reasonable certainty, to determine the patronage by a member of the Christian community and moreover to determine the chronology, even without specific references inside the text⁵. Likewise reporting the presence of Christological monograms allows us to identify them as explicit symbols of Christian faith and as chronological indicators⁶.

In the early 2000s, the ICVR database, containing more than 20,000 records, became part of the EAGLE federation of databases (Electronic Archive of Greek and Latin Epigraphy), under the patronage of the Association Internationale d'Épigraphie Grecque et Latine (AIEGL), as EDB (Epigraphic Database Bari) and extended its competencies to the epigraphic documentation of Christian patronage of the city of Rome, published after the volumes of ICVR. (Fig. 2)



Fig. 5.2. The EDB homepage in 2004 and 2009.

As a member of the federation, the database became available online through its own website and finally, thanks to the EAGLE European project, through a common portal. Obviously this step has resulted in a series of changes and adjustments that led from the original basic structure of the database to the present one.

⁵ Carletti 1994; *Id.* 1997, viii-ix.

⁶ The monogram consisting of the first two letters of the name $\chi\rho\iota\sigma\tau\acute{o}\varsigma$ can be considered the archetype of these signs. They first appear in inscriptions at the beginning of the fourth century.

5.2. The EDB structure

The current structure of EDB consists of a relational database, based on the open-source program My-SQL, with a complex scheme drafted according to the most recent advances in epigraphic methodology: reestablishing historical and material value of the object, identifying each epigraph as a complex and polysemic product consisting partially but not only of text. (Fig. 3)

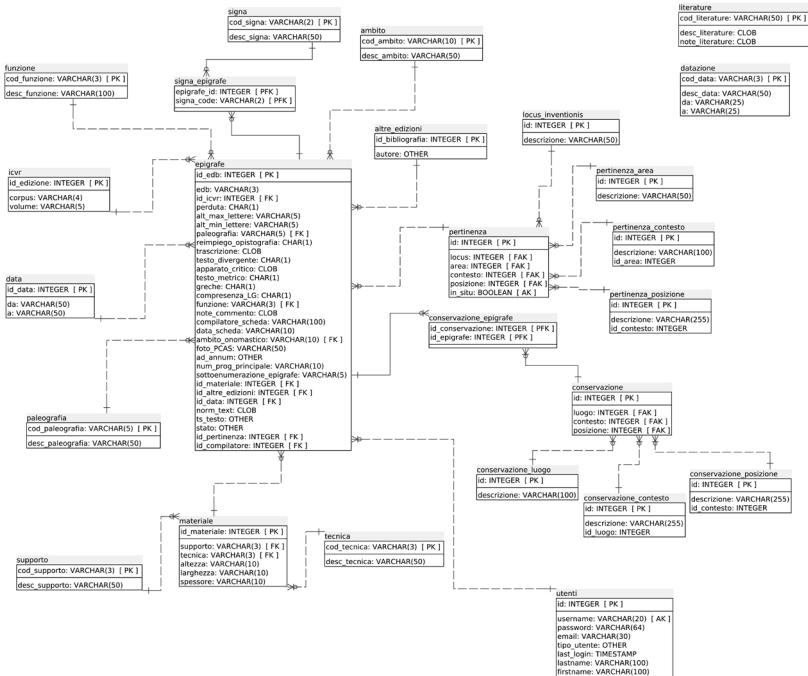


Fig. 5.3. The EDB database schema.

5.2.1. Bibliographic data

As in the past version, the first pieces of information recorded for each epigraphic document are bibliographic data.

Besides data related to the ICVR publication – volume and edition number of the inscription – now EDB is able to record other bibliographic references as well as concordances with other Corpora (CIL, IG, IGUR, IGC). (Fig. 4)

The screenshot displays the 'Bibliography' form in the EDB 2.0 interface. It is divided into several sections:

- ICR# Issue:** Fields for 'Number' (containing '15414') and 'Sub Number'.
- Bibliographic References:** A table with columns for 'Resource', 'Reference ID', and 'Relationship'. It contains one entry: 'EDB' with '20769' and 'Identity'. Below this table are 'Add', 'Remove', and 'New' buttons. A red arrow points from the 'New' button to the 'New Bibliographic Reference' header.
- References to Online Resources:** A table with columns for 'Resource', 'Reference ID', and 'Relationship'. It contains one entry: 'EDB' with '20769' and 'Identity'. Below this table are 'Add', 'Remove', and 'New' buttons.
- New Bibliographic Reference:** A form with fields for 'Type' (set to 'Journal'), 'Author's Name', 'Author's Surname', 'Name', 'Surname', 'Action', 'Contribute Title', 'Journal Title' (set to 'Analecta Romana Institutii Dacor'), 'Number', 'Year of Edition', 'Pages - From', 'Pages - To', 'File', 'URL', and 'DOI'. A 'Submit' button is at the bottom.

Fig. 5.4. Bibliographic data fields.

The whole bibliography is structured in metadata and is available both on the EDB website, and on the EAGLE BPN group of Zotero⁷, a tool for managing bibliographic data that makes it easy to export entries and to cite them. An additional field allows the user to record references and links to other online databases.

It's even possible to define the relationship between the epigraph and the cited bibliography (printed or digital): *identity*, when it is an edition; *integration*, if it's the edition of another fragment of the same inscription; *opisthographic*, if it's the edition of the inscription on the back side; *reuse*, if it's the edition of another inscription on the same support; *comment*, if it's a study on a related topic.

5.2.2. Geographic data

One key element of differentiation of EDB from other similar projects is the structuring of the topographic data.

This is due to the fact that the inscriptions of interest of EDB pertain only to the city of Rome, an area far more limited than the large geographic ones managed by other epigraphic databases, but also and above all considering that, as has been said previously, a large number of inscriptions of the Christians of Rome are still preserved in the place for which they were created, sealing a tomb of an underground cemetery. Moreover, even if a given inscription isn't still in its place on the grave, it is often still attributable to a specific area of the funerary complex.

⁷ www.zotero.org/groups/eagleepigraphicbibliography/items.

Original context

Area	Location	Position	In Situ	Add
via Ardeatina	sm. Domitillae pars inferior	F	<input checked="" type="checkbox"/>	
n.d.	Area subdiale della cataomba di Domitilla			
regio V	Basilica ss. Nerei et Achillei in coem. Domitillae			
regio VI	Coem. anonymum ad viam Ardeatinam		<input type="checkbox"/>	Action
via Appia	Coem. Domitillae pars inferior			
via Ardeatina	Coem. Domitillae pars superior			
via Aurelia	Incertum locum in coem. Domitillae			
via Cornelia	Inter vias Appiam et Ardeatinam			
via Flaminia	Tituli qui in coem. Callisti reperti traduntur			
via Labicana	Add New			
via Latina				
via Nomentana				
via Ostiense				
via Portuense				
via Prenestina				
via Salaria Nova				
via Salaria Vetus				
via Tiburtina				
Add New				

Fig. 5.5. Original context input fields.

Consequently in EDB, geographic indications require a more detailed articulation than in other databases, in which the maximum level of definition is just the city of provenance, often lacking detailed information about the inscription's discovery.

Data on the *original context* are therefore organized hierarchically in three related fields containing controlled lists. (Fig. 5)

After selecting the area of the suburb identified by the name of the consular road – or by the number of the Augustan *regio* for urban inscriptions – it's possible to select the monument from a list: a catacomb or part of it, if it is a large and multi-layered one; a church; a public building or an urban area. The third field allows access to a further associated list where the position of the epigraph inside the monument can be selected. For the catacombs in particular, it's possible to use these fields to annotate the gallery or the cubicle, named with the alphanumeric code used in the maps published in ICVR.

Is worth noting that this set of associated fields refers to the original position of the inscriptions and not to the place where they have been found, unless the two data coincide, that is in the case of inscriptions *in situ* or *suo loco adplicitae*, in accordance with the definitions of the ICVR.

To complete information on spatial data, all cemeterial contexts have been georeferenced, so that clicking on their name opens a new window in *Google Map* that shows the modern entrance to the cemetery, with the address and its coordinates.

As a case of study, for the inscriptions *in situ* pertaining to the Domitilla catacomb (Via Ardeatina) – the only cemeterial complex with a geo-referenced plan of almost its entire extension⁸ – clicking on the alphanumeric code⁹ associated to the precise position of the inscriptions, gallery or cubiculum (F04, in Fig. 6), opens the plan of the specific area (*regio*) in which the inscription is found. In every plan, the inscriptions preserved *in situ* are placed and marked by ICVR and EDB number¹⁰. (Fig. 6)

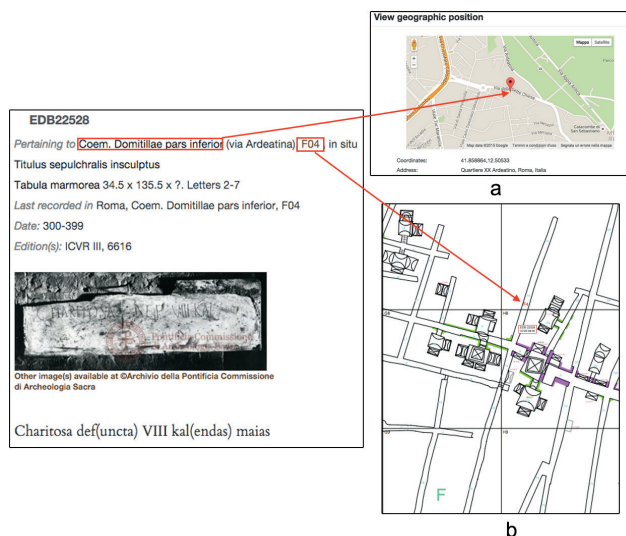


Fig. 5.6. The original context maps.

Even the geographic data relating to the place of conservation of the inscriptions are managed with a similar structure. Since not a few inscriptions, produced in Rome have been taken away and carried to other places in Italy or abroad, the information have been organized

⁸ *START-Projekt: Die Domitilla-Katakombe in Rome (Institut für Kulturgeschichte der Antike - Österreichische Akademie der Wissenschaften)*. Felle and Zimmermann 2014.

⁹ The codes are made up of a majuscule letter relating to a region of the catacomb and by another element, digit or minuscule letter, relating to a precise internal position, respectively a gallery or a *cubiculum*.

¹⁰ The plans are available on START-Projektwebsite: <http://www.oeaw.ac.at/en/ancient/research/monumenta-antiqua/early-christianity/the-domitilla-catacomb-in-rome/>. Clicking on EDB number opens a window with the EDB record.

in three related fields reporting respectively the list of the cities, the list of associated structures, such as museums, churches or catacombs; and the specific positions in the context where the object is actually preserved. (Fig. 7)

Conservation

City/Town: Catania

Location: Museo Civico

Position: magazzino del cortile

Buttons: Add New, Add

Height: [] Width: [] Thickness: [] Letters Height: Minimum [] Maximum [] Paleographic Notes: []

Onomastic Notes: []

Fig. 5.7. Conservation input fields.

Adopting the best practice suggested by the EAGLE consortium, georeferencing is guaranteed even for the Conservation data, linking every City/Town to GeoNames site¹¹, which allows the user to pinpoint the location and to avoid ambiguity between homonyms. A link to the Trismegistos Collection¹², a database of papyrological and epigraphic collections, if available, also helps to identify uniquely the place of conservation, as well as to obtain additional information, included the geographic positioning¹³. (Fig. 8)

EDB29146

Partening to Coem. Cyrillace ad s. Laurentium (via Tiburtina)

Tabula marmorea 24 x 32 x 2,2. Letters 2-4

Last recorded in Napoli, Museo Archeologico Nazionale

Date: 285-425

Edizione: ICN VII, 1866; Carrozzini et al. 2006, 187, n. 528 con foto

[[clavis] domine coisgi [...]
Candide qu[ae] visit as]-
nis biginti t[ri]bus mense un]-
o dies un[us] [...]
mari[us] [...]

Napoli, Museo Archeologico Nazionale

Fig. 5.8. Conservation maps and links.

¹¹ www.geonames.org.

¹² www.trismegistos.org.

¹³ https://www.eagle-network.eu/wp-content/uploads/2013/06/EAGLE_D2.2.2_Content-harmonisation-guidelines-including-GIS-and-terminologies-Second-Release.pdf.

5.2.3. The description of the epigraphic object

The nature of the inscription as material objects carrying textual information is represented by a series of attributes, responding to the questions “What?” and “How?”: type of support and measures, technique of execution, height of letters and paleographical features, and cases of reuse.

A survey of terminologies intended for description of epigraphic objects in the ICVR volumes has been carried out and has generated lists of controlled terms for some of the fields. *Type of support*, *Executing technique* and *Function* vocabularies are aimed at classifying the specific and peculiar materials, methods and functions of the inscriptions encoded in EDB, as the traditional epigraphic taxonomies do not totally adhere to their features. (Fig. 9)

Type of support	Executing Technique	Function
Ara	carbone scriptus	Terminus
Architectonica pars	crustis scriptus	Titulus
Arenatum	ex forma	Titulus a viatore scriptus devotionis causa
Cinerarium	exaratus	Titulus acclamatorius
Cippus	in sculptus	Titulus apparatus
Instrumentum	non liquet	Titulus dedicatorius
Musivum	pictus	Titulus didascalicus
non liquet	pictus et carbone scriptus	Titulus honorarius
Opus latericium	pictus et insculptus	Titulus sepulchralis
ossum	pictus et scariphatus	Titulus votivus
Sarcophagus	punctim	Add New
Stela	reversus impressione scriptus	
Tabula marmorea	scariphatus	
Tectorium	scariphatus, dein carbone scriptus	
Tectorium induens sepulchrum	signaculo scriptus	
Tofus	tessellis scriptus	
Urna	typo scriptus	
Add New	Add New	

Fig. 5.9. Controlled vocabularies for Type of support, Executing technique and Function fields.

The controlled lists have been integrated in the vocabularies of the EAGLE community¹⁴, which align, harmonize, create relations and translate into various languages the terms used by the various partners, and returns them in a format that allows the user to get a stable and unique identifier for each term, accessible and reusable by other users. (Fig. 10).

¹⁴ <http://www.eagle-network.eu/resources/vocabularies/>.

The screenshot shows the EDB486 (Edit) interface. The central panel contains the following text:

EDB486 (Edit)
 Pertaining to Coem. Trebbi Iusti (via Latini)
Tabula sepulchralis incuscripta
 Tabula marmorea 15 x 86,5 x 1,8. Letters 3,2-4
 Last recorded in Roma, Pontificia Commissione Archeologia Sacra, Magazzini
 Date: 351-389
 Edition(s): ICVR VI, 15798; Felle 2008, 185, n. 10 con foto

Below the text is a photograph of the stone inscription with the text: **Martialis Candido co[n]iugi**

Three terms are highlighted and linked to external vocabularies:

- SEPOLCRALIS**: linked to a table on the left.
- Tabula sepulchralis incuscripta**: linked to a table on the right.
- TAFEL**: linked to another table on the right.

Fig. 5.10. The integration with EAGLE Vocabularies, that can be opened clicking on the highlighted terms.

5.2.4. The text

The nature of the inscription as a sequence of characters carried by a physical object is represented by a series of fields related to various features of texts: language and alphabet (Latin, Greek and the multiform combination of coexistence between them), and metrical structure.

The proper text of the inscription is stored in an apposite field, following the Krummrey - Panciera conventions¹⁵, with some adjustments to make it possible to describe specific and peculiar issues of the inscriptions encoded in EDB. In particular the so-called “aberrant” forms are not “normalized” to the “standard” model, if they are recognized as grapho-phonetic outcomes of linguistic modifications of Latin and Greek.

While the fidelity to what is written on the stone – or other type of support – respects and takes into due account the evolution of Greek and Latin languages, it compromises the comprehension of the text and greatly complicates the text-based search of terms. A standard query system, in fact, is not able to match a query with all the inscriptions containing different spellings of a word. To resolve this issue each inscription is stored 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 forms¹⁶.

¹⁵ Krummrey and Panciera 1980; Panciera 1991.

¹⁶ On the contrary, if the compiler recognizes aberrant forms as outcomes of misstatements and material mistakes of the stonecutters, he transcribes them with the appropriate corrections, following the Krummrey - Panciera conventions. Felle 2014 and Ceci, Pio and Rocco 2014.

In EDB, as in every epigraphic database, the transcription of the text provides a real pre-edition, with systematic expansion of abbreviations, hypothesis of integration, and, if possible, an update version of the text, according to recent publications. It includes, moreover, the description of non-alphabetic signs – in double round brackets – such as figurative elements (fishes, birds, anchors, etc.) and Christological monograms. Other fields record onomastic notes, *critical apparatus* and textual comments. (Fig. 11)

The screenshot shows a web form titled "Text". At the top left is a button labeled "Switch Latin/Greek". Below it is a large text area for "Transcription" with a rich text editor toolbar underneath. To the right of the transcription area is a "Chromatic Notes" field, which includes a "Signa Christi" sub-field and three buttons: "Add", "Remove", and "New". Below the transcription area are several checkboxes: "Transcription different from ICVR", "Critical Apparatus", "Reuse/Opiograph", "Metrical Text", "Greek language/alphabet", and "Coexistence of latin/greek".

Fig. 5.11. Text fields in the submission mask.

A series of fields responding to the questions “When?” allows to insert a specific date, if recorded in the text, a specific time span (such as the duration of the reign of a Bishop of Rome or of an emperor), or a generic interval.

5.2.5. The images

Another meaningful improvement of EDB 2.0 is represented by the inclusion of visual representation of inscriptions. It’s evident how images dramatically enhance analysis of epigraphic materials, showing them in their manifold aspects: reference with the context, form and quality of the support, graphic forms, peculiarities of technique, layout and relationship between the text and any figurative or decorative elements¹⁷.

In the frame of the collaborations with Europeana, the largest online collection of digitized items, EDB has been encouraged to enlarge the image repository, based on a cooperation agreement established between the EAGLE consortium and the Ministry of Culture (MI-BACT) and the Pontifical Commission for Sacred Archaeology (PCAS).

¹⁷ Panciera et al. 2006.

A new uploading process allowed tripling photos, squeezes and casts to be published online in low resolution and with a visible digital watermark, respecting the restrictive Italian rules. A large portion of the digital images stored in the EDB repository have been taken by collaborators during past years, and others have been scanned from publications, while a large number come from the Photographic Archive of PCAS¹⁸.

5.3. Users, interface, search engine

The system manages three kinds of users: editors, compilers and generic, anonymous ones.

The latter of these can navigate in the descriptive section of the website (About EDB, People) and in the list of cited Publications. They also have access to the entire database using two research masks: a *Quick search* allows the user to search in only one of the following fields: identifier EDB, bibliographic data and text; an *Advanced Search* provides the opportunity to explore the database through multiple search criteria variously combined. (Fig. 12)

The image displays two search masks. On the left is the 'Quick Search' mask, which includes a 'Switch to Advanced Search' button and three search options: 'ID EDB' (selected), 'ICVR Number', and 'Free Text'. Each option has a corresponding input field. There are also checkboxes for 'Only with Images' and 'Bibliography', and 'Reset' and 'Search' buttons at the bottom.

On the right is the 'Advanced Search' mask, which is more complex. It features a 'Switch to Quick Search' button at the top. The 'What and How' section includes a 'Text' input field, checkboxes for 'Case Sensitive', 'Consider Common Diacritical Marks', and 'Consider Greek Diacritical Marks', and a 'Switch Latin/Greek' button. Below this are three dropdown menus for 'Pausanias/Epigraphic', 'Metrical Text', and 'Greek language/Inphabet', each with an 'All' button. The 'Not' section includes checkboxes for 'Type of Support', 'Executing Technique', and 'Function', each with an 'All' dropdown. The 'Images' section has an 'Only with Images' checkbox. The 'Bibliography' section includes input fields for 'ICVR Volume', 'ICVR Number', and 'Reference'. The 'Where' section has dropdowns for 'Original Context' and 'In Situ', and checkboxes for 'Conservation' and 'Lost'. The 'When' section includes input fields for 'Dating Interval', 'Specific span', 'From', 'To', and 'Exact match', along with a 'Date in the text' dropdown. The 'Other' section includes dropdowns for 'Religion' and 'Compiler', and a 'Signa Christ' input field with 'Add' and 'Remove' buttons. 'Reset' and 'Search' buttons are at the bottom.

Fig. 5.12. Quick and Advanced Search masks.

Like today's web search engines, EDB provides an advanced text search in Latin and Greek – an integrated tool facilitates writing in the Greek alphabet¹⁹ – allowing users to obtain different results according to a default syntax, in the case of a search either for a single word or for a set of terms, in sequence or not. Additionally, it's possible to choose whether or not to consider epigraphic diacritical marks, Greek accents and spirits, and capitals. The textual search can be combined with other metadata related to bibliographic, geographic and material data, or to function, reuse, language and date, expressed in a single year or in defined intervals.

This wide range of possibilities has been designed to reach users with different needs: the occasional user looking for a particular inscription could just type one or more words that he is able to read and decipher, and the specialist user, who can access detailed information about a single epigraph or use the advanced search to query the database about groups of documents with common characteristics.

The search results are listed in a table showing the EDB identifier, bibliographic data, place of origin and place of conservation, text of the inscription and a link to the full record.

5.4. Conclusions

This paper briefly describes the growth of Epigraphic Database Bari in nearly the last thirty years, from the first experimental and minimalistic version, intended just for the use of a small group of researchers of Bari University, to the present one, open to a large public of curious individuals, students and, of course, specialists.

The involvement in the EAGLE – Europeana project, network of Ancient Greek and Latin Epigraphy, has had a significantly positive impact on the development of the database of inscriptions by Christians from Rome.

In fact, although EDB, like other partner databases, has maintained its character, dictated by its own history and, mostly, by the characteristics of its documentary base, it has taken advantage of the solutions adopted to integrate different archives and purpose-built best practices.

¹⁹ *Greek Inputter 2*, developed by J. Naughton, allows the user to write in Greek using his/her usual keyboard and to easily type various Greek diacritical marks (<http://babel.mml.ox.ac.uk/naughton/polytonic-greek-inputter.html>).

Among the improvements, it's worth mentioning

1. The inclusion of EDB bibliography, structured in metadata, in the Zotero Group, where it has been merged with those of other content providers and has been made directly and publicly available in the most reusable way, giving more exposition of the bibliographic database; allowing the integration and enrichment with other databases; allowing easy export of data in multiple formats (bibtex, bookmarks, mods, rdf, xml, etc).
2. Following EAGLE best practice suggestions, data about modern places have been enriched with links to reference resources, such as GeoNames and the Trismegistos Collection²⁰, extending the use of stable and unique identifier accessible and reusable by other users (URI).
3. With the same aim, the controlled lists of *Type of support*, *Executing technique* and *Function* have been integrated in the corresponding vocabularies of the EAGLE community. Among other benefits, such as alignment and relations between databases, clicking on specific terms opens an EAGLE vocabulary window with a translation into various languages. This feature is particularly useful in the case of EDB which, following ICVR, uses Latin for definitions, without modern language translations.
4. Encouraged by the collaborations with Europeana, EDB has tripled the number of images stored in its repository, including inedited images taken by collaborators over the years.

On the other hand, EDB, being inside Eagle since its origin, has been a bridgehead for the non standard epigraphies, proposing issues to the Eagle community and pushing to make the data model more flexible. For example, EDB asked to add more than one technique of execution for a single support and to add more than one language and / or alphabet for the same inscription, change that is indispensable to describe bilingual and/or bigraphic texts.

Other solutions adopted in EDB could be, in the future, suitable for other projects, such as the hierarchic and multi-step organization

²⁰ http://www.eagle-network.eu/wp-content/uploads/2013/06/EAGLE_D2.2.2_Content-harmonisation-guidelines-including-GIS-and-terminologies-Second-Release.pdf.

of topographic data, which could be applied to closed contexts of any age (houses, columbaria, and so on) as well as the treatment of aberrant forms and the lemmatization process, which could be applied to any non standard language.

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Corpora

CIL. *Corpus Inscriptionum Latinarum*, Berolini 1863 ss.

CIG. *Corpus Inscriptionum Greacarum*, I-IV, Berolini 1828-1877

IC. *Inscriptiones christiane urbis Romae septimo saeculo antiquiores*, I-II, G.B. de Rossi (ed), Romae 1857-1861; *Supplementum*, G. Gatti (ed), Romae 1915.

IG. *Inscriptiones Graecae*, Berolini 1873 ss.

ICVR. *Inscriptiones christianae urbis Romae septimo saeculo antiquiores. Nova series*, I-X, A. Silvagni, A. Ferrua, D. Mazzoleni, C. Carletti (edd.), Romae - In Civitate Vaticana 1922 ss.

IGVR. *Inscriptiones graecae urbis Romae*, I-IV, L. Moretti (ed.), Roma 1968-1990.

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6. Visual features of inscriptions. An issue for EDB (and EAGLE)

*Antonio Enrico Felle**

Abstract

In these last years the amount of digital images of inscriptions increased very quickly: we do not need accurate textual descriptions of the so-called *anaglyphs*, because we can directly see them. But we have to build a search-by-image, using photos and drawings but also tagging them with standardized – and shared – labels.

The issue of the “illustrated inscriptions” brings us to consider more broadly all the visual features of inscriptions, that were conceived as objects to see, not only to read.

Keywords: Early Christian Epigraphy, Byzantine Epigraphy, Middle Ages Epigraphy, Images, Symbols, Signs, Paleography, Stonecutters’ workshops

6.1. “Illustrated inscriptions” by the Christians of Rome

In 2012, during a conference in Rome about Late Antique plates decorated with engravings, I presented a paper about the potentially very useful contribute that the Epigraphic Database Bari (EDB) could offer to study and to interpret the notion and the use of images (signs, symbols, figures and so on) by the Christians of Rome in Late Antiquity, by analyzing the inscriptions stored in the database (Felle 2013).

Then, the first datum was that a quarter of these epigraphs displays images or generical non-alphabetical signs (Felle 2013, p. 101) (fig. 1).

After storing in EDB other 10000 inscriptions, since 2012 to the present day, the percentage of figured inscriptions is still the same: then,

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I think that we are able to consider this datum enough sure; so we are able to partially correct the common idea that using images in written monuments is a recurrent, typical and characteristic feature of almost all the Early Christian inscriptions.

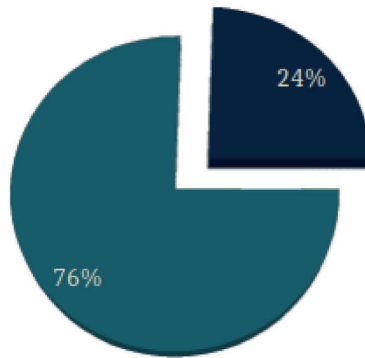


Fig. 6.1. Percentage in EDB of the “illustrated inscriptions” (chart by A. E. Felle).

The second datum defined by the 2012 survey was the proportional decreasing of the use of different kind of images from the first decades of the IV century (the age of Constantine), when a huge and pervasive use of the so-called *signa Christi* – first of all the Chi-Rho monogram, with all its variations – prevails on all the other signs and figures (Felle 2013, 101-102).

Carlo Carletti explained this phenomenon as the result of a will to display *explicit* signs of a religious identity, such the Chi-Rho monogram is (CARLETTI 2008, 68-72; FELLE 2007, 365-366). But we have to underline that the phenomenon is not exclusive of Christian patrons. We observe more and more recurrent similar “signs of identity” also among inscriptions commissioned by Jews, not only in Rome but also in other contexts in Late Antiquity world where they were (Felle 2007, *passim*; Felle).

Going back to the inscriptions by Christians, the use of *signa Christi* in form of monograms strongly reduces the use of other christological signs or figures, as for instance the anchor: this one, very recurrent during all III century, disappears completely and very quickly, already in the very first decades of IV century (Felle 2012, 103) (fig. 2).

Since its conception, EDB recorded the presence and the different kinds of various *signa Christi*, both by a checkbox and in the text field, with *standardized* descriptions, with the aim to easily retrieve them in the database and to get valuable results from structured queries about their recurrence.

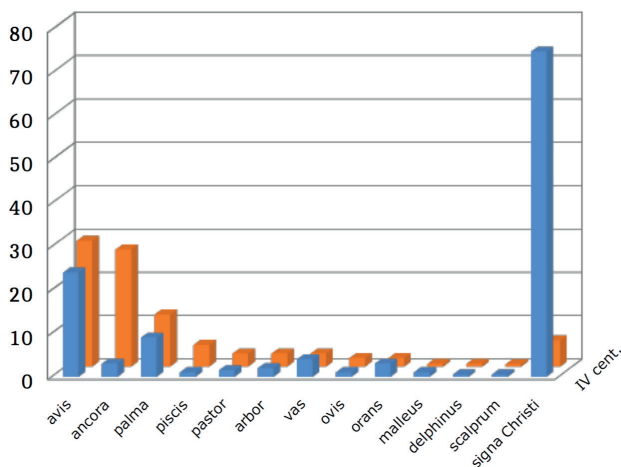


Fig. 6.2. Use of different images in inscriptions by Christians of Rome between III and IV cent. (chart by A. E. Felle).

The results of the 2012 study were mainly of *quantitative* nature; today, by the existing large repositories of images in EDB – as like in general in EAGLE and in other similar projects – we can improve the *qualitative* analysis of this and other features of Late Antique inscriptions.

First of all, we have to say that in EDB we faced huge difficulties about the treatment of images other than *signa Christi*, or generally other non-alphabetical signs, or also captions related to figures on the slabs, and so on. Indeed, at the moment we are still not able to automatically obtain by EDB a *structured* index of the repertoire of the images. As in other epigraphic databases, in EDB they are recorded directly reporting their descriptions as like they are in printed editions (sometimes very old, as the first volumes of ICVR, for instance); there, in absence of pictures, the so-called *anaglypha* are concisely described by simplified and repetitive *clichées* to suggest the depicted subjects to the readers (fig. 3) or by brief descriptions in Latin in transcriptions or also in the commentaries (fig. 4).

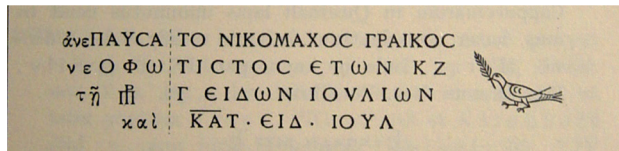
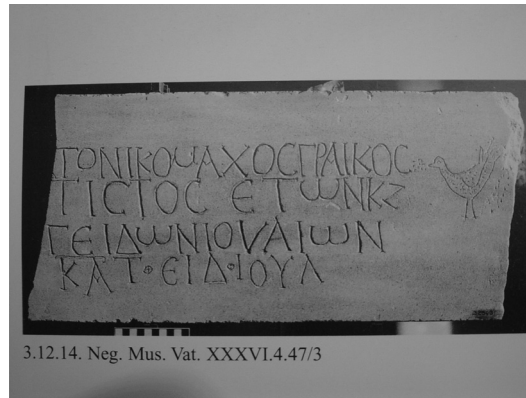


Fig. 6.3. Rome, *coemeterium Hippolyti*, now in the Vatican Museums. Photo (from *Iscrizioni* 1997, sch. 3.12.14) and edition in ICVR, VII 19820.

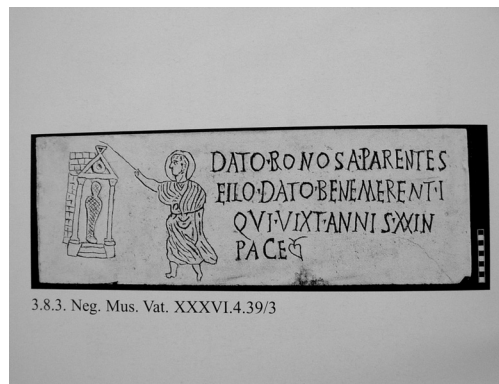


Fig. 6.4. Rome, *coemeterium Maius*, now in the Vatican Museums. Photo (from *Iscrizioni* 1997, sch. 3.8.3) and edition in ICVR, VIII 22407.

Often, these descriptions are different although indicating the same subjects: in the ICVR, the reason of this disomogeneity is not only the *longue durée* of the realization of the corpus (seventy years, since 1922 to 1992, when the last published volume, the tenth, appeared) but also a refined textual *variatio*. Surely it can be appreciated in printed editions but, for the aim of our digital archives, it produces real difficulties.

Some examples: in EDB different verbal descriptions about the same subject are recorded, such as *avis uvam pascitur* (e.g. ICVR, III 8114a, b, c, e), or *avis uvas pascitur* (ICVR, III 8004b); or also *avis racemum carpens* (ICVR, IX 24020), *avis racemum carpit* (ICVR V, 14157), *avis racemum pascitur* (ICVR, V 15194), *avis racemum rostro carpit* (ICVR, IV 10934): it is not easy to perceive some difference). However, this *variatio* prevents right results in retrieving data in our database.

Moreover, recording in EDB descriptions with different words for the same illustrated subject, such as “*avis, racemus*” (EDB 19827: ICVR, III 9311, see fig. 5.a) or “*avis cum racemo*” (EDB 24933: ICVR, III 8044, see fig. 5.b) we are not able to retrieve all the occurrences of this same subject, because they are recorded (both in ICVR and in EDB) in different ways.

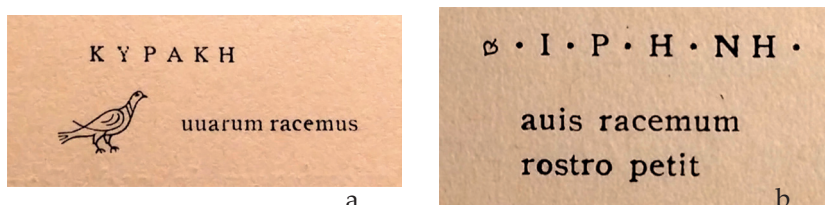


Fig. 6.5. Rome, catacomb of Domitilla. Edition of ICVR, III 9311 (a) and ICVR, III 8044 (b).

This ambiguity prevents to retrieve all the occurrences of the same illustrated subjects and then they adulterate the result of our queries: I think that we have to correct as soon as possible this ambiguity, in order to establish an unique way to describe the *anaglypha*.

One can say that the present ease to obtain and to use digital pictures of the inscriptions overtakes this issue: surely that's true. But, I do not entirely agree with this point of view.

In these last years – also with the kind help by the Photographic Archive of Papal Commission of Sacred Archaeology (<http://www.archeologiasacra.net/pcas-web/>) – the amount of images available in EDB increased very quickly: this is surely an advantage in respect to the situation of only three years ago. At the present day and more over in the future, we no longer need *accurate* textual descriptions of the *anaglypha*: we can directly *see* them. But, the possibility to easily view a photo or a drawing of an inscription does not solve the issues related to search and to retrieve inscriptions bearing given kinds of image, or specific signs, and so on.

The relative high occurrence of images in Christian inscriptions drives EDB team to try to build a search-by-image, using photos and drawings, but also tagging them with standardized labels. A “high definition” analysis of non-verbal language of the inscriptions by Christians of Rome in Late Antiquity surely needs photos, drawings, and so on, but mostly needs a logical, structured, hierarchically ordered taxonomy of all non-textual elements defined by controlled, firm and shared vocabulary: a *thesaurus imaginum*¹, that can be a suitable tool also to trail the activity of different stonecutters’ workshops that served – in the case of EDB inscriptions – the various users of the Roman Christian catacombs.

6.2. Visual features of the ‘written monuments’

The issue of the “illustrated inscriptions” brings us to consider more broadly the visual features of inscriptions overall. The ancient epigraphs are conceived not only as texts to be read (very few people were able to do it) but also – and, maybe, firstly – as objects to be seen. I think that we have to realize this perspective – common in Christian epigraphy studies after all – to understand the communication power of this communicative *medium*. Indeed, the topic has been assumed as main theme of the last International Congress of Greek and Latin Epigraphy in Berlin in 2012 (*Öffentlichkeit* 2014); very recently, a just published volume collects various essays about this same topic just about the Late Antique, Medieval (both Christian and Islamic) world,

¹ Surely the experiences of other projects can be useful to this aim: I think for instance to the solutions presented during the VIth EAGLE International Event in Bari by the lecture offered by Rebecca Benefiel and Holly Sypniewski about the *Ancient Graffiti of Herculaneum* project: see now Benefiel-Sypniewsky, 2016)

where this notion of the inscriptions as ‘written monuments’ stands out with strong evidence (see Eastmond 2015).

In our projects – we have to admit it – the notion that inscriptions are *essentially* texts is still largely prevailing: but now we can – consequently, we must – to increase our capability to represent, to record and so to investigate also other, visual features of inscriptions.

6.2.1. Positioning

First of all, I think to the positioning of the epigraphs in the contexts for which they were created. About EDB, we already presented in the EA-GLE Conference in Paris in 2014 a first attempt to record and to describe the exact positioning of the inscriptions still found in their original spot, by sharing data with the Domitilla-Projekt (by the Österreichische Akademie der Wissenschaften and the Deutsches Archäologisches Institut) focused to the frescoes of the catacomb of Domitilla along via Ardeatina, the largest one in Rome suburb (Felle - Zimmermann 2014). The positive collaboration between our two projects continued: now we are able to offer to EDB users to view on the updated map of the catacomb of Domitilla the distribution of the inscriptions still *in situ* in the four levels of the subterranean cemetery: one can use them as reliable documents to (re-) consider the history of the complex, to confirm or to deny the ideas about chronology of its excavation and of its frescoes and about the using of the different zones of the catacomb.

6.2.2. Materials and shape

Materials and shape of the written objects communicate immediately, *to all*, before the inscribed texts. Because now we can do it, we have to display to the users of our projects the real communicative power of the inscriptions, that assume much more meaningfulness when we can see them than when we can read their only texts in a library. By pictures and 3D rendering of the places where the epigraphs were arranged we should be able also to provide virtual images of inscriptions – also lost or incomplete – conceived to be seen and read exactly there. An effective example can be the dedication by pope Damasus (366-384) to the martyr *Ianuaris* in the catacomb of Praetextatus on the via Appia (fig. 6).

The bishop of Rome reaches his aim to capture the gaze also of *illiterate* faithfuls by placing a very large slab of white marble over the tomb of the martyr, well-lighted by a skylight made on purpose, in strong contrast to the darkness of the neighbouring galleries of the subterranean cemetery.

Also the text is aimed at the same goal: the dedication is brief and simple, inscribed using a special writing, very carefully carved by using a font specially elaborated for Damasus' inscriptions by the fashionable designer Furius Dionysius Philocalus. The contrast with the common inscriptions in the catacombs, often made by reused marble pieces or bricks, and very often (not always!) written with rough letters, is impressive.

The bishop's intervention is more meaningfully revealed to all by the visual features of his inscriptions than by their only (metrical or not) texts.

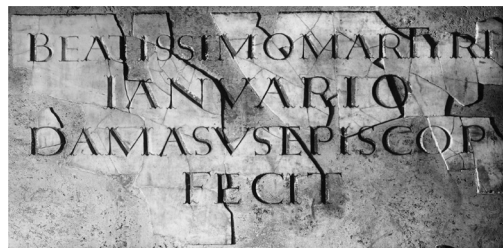


Fig. 6.6. Rome, catacomb of Praetextatus. Damasus' dedicatory inscription (ICVR, V 13871) for the martyr Ianuarius (photo: PCAS; 3D rendering: G. De Felice).



Fig. 6.7. Thessaloniki, city walls. Inscriptions in the masonry of a tower near Eptapyrgion (photo: A. E. Felle).



Fig. 6.8. Rome, basilica of the martyr Agnes on the via Nomentana. Apse mosaic with the image of the martyr with the “useless” caption *s(an)c(t)a Agnes* (photo: A. E. Felle).

This notion about written monuments is more and more diffused in Western Early Middle Ages and also in Byzantium: one has no need to read, to perceive the actual and effective messages displayed by inscriptions placed within the fabric of the walls of Byzantine cities, such as Constantinople or Thessaloniki (fig. 7).

There, the inscriptions are not carved in marble slabs or stone blocks, but they are realized with the same materials of the walls: simple bricks, but disposed to obtain letters *and* signs *and* symbols, visible also from afar. The inscriptions explain the walls; the walls speak its *raison d'être* by the inscriptions, that are in different cases rich of abbreviations, closed to the reading but open to the sight: writing appears *intrinsically* significant. In my opinion, this notion is clearly demonstrated by the unnecessary captions in the icons and in the images of martyrs (fig. 8), where – on closer view – the inscriptions are completely useless, if we continue to consider them only as texts to be read.

6.2.3. Relationship with the context

Indeed – more over in Late Antiquity and Middle Ages – readability of the texts is not the main property of inscriptions: rather, the main condition appears their relationship with their contexts. An incisive example can be offered by the Christian inscriptions bearing biblical quotations (cfr. FELLE 2006): in the middle of the bronze plating of the marble lintel over the Great Door of the Royal Gates of the Hagia Sophia in Constantinople, an empty throne is occupied by an open *codex*, according to the words by Kähler, “the only extant plastic composition dating from the founding period of the church” (Kähler 1967, pp. 29-30; 32 taff. 22; 62) (fig. 9).

On the open *codex* is inscribed a focused – but barely readable – quotation from John 10, verses 7 and 9, where Jesus indicates himself as *the gate*:

John 10.7: Εἶπεν οὖν πάλιν ὁ Ἰησοῦς, Ἀμὴν ἀμὴν λέγω ὑμῖν ὅτι ἐγὼ εἶμι ἡ θύρα τῶν προβάτων. (Therefore Jesus said again, ‘Very truly I tell you, I am the gate for the sheep);

John 10, 9: ἐγὼ εἰμι ἡ θύρα· διὰ ἐμοῦ ἐάν τις εἰσέλθῃ σωθήσεται καὶ εἰσελεύσεται καὶ ἐξελεύσεται καὶ νομὴν εὐρήσει (*°I am the gate; whoever enters through me will be saved. They will come in and go out, and find pasture*).

This the text of the inscription (Felle 2006, n. 505):

((crux)) εἶπεν ὁ κ(ύρι)ος | ἐγὼ εἰμι | ἡ θύρα τῶν | προβάτων· | δι' ἐμοῦ | | ἐάν τις | εἰσέλθῃ | εἰσελεύσετ(αι) | κ(αὶ) ἐξελεύσετ(αι) | κ(αὶ) νομὴν | εὐρήσει.

The archeological context and the mirate positioning make tangible, concrete, the sacred words; and the real presence (not necessarily the readability) of the sacred words give proper and strong sense to their material support and to entire context, the Royal Gates of the Great Church of Constantinople (Felle 2015, p. 320 and *passim*).

6.2.4. Writing

Scarce or null readability does not imply low quality of the appearance of writing: rather, the writing appears intrinsically meaningful such as visual element of the equipment of a simple or rich funerary monument or of a cultural building. Then, we have to face the issue of the description of the writing not only from the necessary point of view of paleography (we are still waiting for a shared and controlled vocabulary of paleographical definitions), but also in order to perceive and to understand its non-verbal significance: by its disposition, direction, shape. The notion of the inscriptions in the Islamic world, where often the letters are also – and maybe firstly – images (they are used as decorative friezes, architectural ornaments, figures) and their clarity and readability are not considered as necessary, can help us to evocate this feature of the writing (fig. 10).



Fig. 6.9. Istanbul, Hagia Sophia. On the left, the Royal Gates in the narthex. On the right, the particular of the image of the throne with open inscribed codex above the lintel of the central gate (from Kähler 1967).



Fig. 6.10. Granada, Alhambra. An example of the writing as decorative frieze and architectural ornaments (photo: A. E. Felle).

6.3. Conclusions

The ancient inscriptions actually belong to civilizations where the literacy – with very few exception – was very far from our standard: to see an inscription with the same point of view of the most part of the citizens in Roman Empire – and mostly in Late Antiquity – we have to become, in some way, illiterate.

In conclusion: we have to consider in digital descriptions of the inscriptions some their “visual features” that in our projects – first of all in EDB, of course – are not too considered, although they are very significant. We need, about encoding these non-verbal features, the same positive results that by Epidoc we reached in encoding the texts: a hard challenge.

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7. Working with Text and Images: The Graffiti of Herculaneum

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Abstract

We discuss several challenges encountered by our team as we digitize ancient graffiti, handwritten inscriptions scratched into wall-plaster, for the Epigraphic Database Roma and the Ancient Graffiti Project. Here, we focus on decisions we made in editing and digitizing not only textual graffiti but also the figural examples (hand-sketched drawings) that sometimes appear alongside them. We also discuss search capabilities that will allow users both to browse and search for figural graffiti.

Keywords: Ancient graffiti, figural images, contextualization, standards, Herculaneum

7.1. Introduction

Our project is working with informal, handwritten wall-inscriptions, or ancient graffiti, which were scratched into the wall-plaster of ancient towns. Several hundred of these handwritten inscriptions have been documented at Herculaneum and more than 6000 are known from Pompeii. We are contributing these inscriptions to the Epigraphic Database Roma (www.edr-edr.it), and are creating a linked resource, the Ancient Graffiti Project (ancientgraffiti.org), that will allow users to conduct location-specific searches for graffiti.

Among the many texts written on the walls of these two cities, there sometimes also appear graffiti drawings, or figural graffiti (Fig. 1).

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Fig. 7.1. Graffito from Pompeii (CIL 4, 5215).

This graffito depicts a pair of gladiators, where the two figures are identified with their names and the number of their victories. The inscription therefore includes both text and image. It was much more common in Pompeii for someone to write a message on a wall than to sketch a drawing: people wrote their names, greetings to friends, quotations of literature, and other types of messages. However, we do find a smaller, but not insignificant number of drawings also inscribed on the wall plaster throughout the town. It is very rare to find a large scene, like the illustration of a gladiatorial contest with athletes, musicians, and perhaps magistrates, sketched by hand on a funerary monument just outside the Porta Nocera of Pompeii (CIL 4, 10237; D31 in Cooley and Cooley 2014; cf. also CIL 4, 10236 and 10238 drawn nearby). More commonly, people made small sketches on the walls around them choosing from roughly a handful of popular designs: heads in profile, boats, gladiators, birds, and geometric designs (Langner 2001).

Figural graffiti have provided us with several challenges as we digitize them for the Epigraphic Database Roma and as we design a way to search for and retrieve such drawings via the Ancient Graffiti Project search engine. In this paper we will discuss the challenges we face and some of the strategies we have developed in response.

7.2. Our material

First, a little background on figural graffiti and our sources for this data. In Herculaneum, we are fortunate that a significant number of graffiti are still extant and *in situ*, as roofing has been reconstructed for many buildings to protect them from the elements. Due to the fragile nature of wall plaster, however, especially in Pompeii, many graffiti that were recorded previously and published in *CIL* 4, have now been lost. Much of our data, therefore, comes from verbal descriptions of graffiti that have since disappeared. Furthermore, the different editors of *CIL* 4 and its supplements used different methods to denote that a drawing was present, and their practices changed over time. Working with this legacy data, therefore, presents a range of difficulties.

7.2.1. Verbal descriptions of figural graffiti found with text

A drawing could, for example, be described in the text field of an entry in *CIL* 4. This occurs in the entries below, where three drawings of human heads (*CIL* 4, 2315-2316) and two drawings of gladiators (*CIL* 4, 2319) are described in small italics, placed where the images occur alongside the textual inscriptions (Fig. 2).

<p>2315. 2316 in faucium pariete dexteriore, in tectorio rubro, litteris cursivis, M alta est 0,003 m.</p>	<p>2319 ad sinistram capitum illorum (v. 2315) inferius.</p>																								
<table style="width: 100%; text-align: center;"> <tr> <td></td> <td>2315</td> <td>2316</td> <td></td> </tr> <tr> <td></td> <td colspan="2">SIMIVS</td> <td></td> </tr> <tr> <td><i>hominis</i></td> <td><i>hominis</i></td> <td><i>hominis</i></td> <td></td> </tr> <tr> <td><i>caput</i></td> <td><i>caput</i></td> <td><i>caput</i></td> <td></td> </tr> <tr> <td></td> <td colspan="2">SIICVNDVS</td> <td></td> </tr> <tr> <td></td> <td colspan="2">HFVN</td> <td></td> </tr> </table>		2315	2316			SIMIVS			<i>hominis</i>	<i>hominis</i>	<i>hominis</i>		<i>caput</i>	<i>caput</i>	<i>caput</i>			SIICVNDVS				HFVN			<p style="text-align: center;">IANOYA[ΠΙΟΥC] INPE PATVIRICS XI LX</p> <p style="text-align: center;"><i>gladi- gladi-</i> <i>ator ator</i></p> <p style="text-align: center;"><i>scuto et</i> <i>gladio brevi</i> <i>armatus</i></p>
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	SIMIVS																								
<i>hominis</i>	<i>hominis</i>	<i>hominis</i>																							
<i>caput</i>	<i>caput</i>	<i>caput</i>																							
	SIICVNDVS																								
	HFVN																								
<p>2316 dedi tab. XXXVII 9. Descripsi. 2316 v. 2 non expedio (nisi forte litterae sunt H, L, M, N sine ratione compositae), nec v. 1 lectionis est omnino certae, cum alienis lineis confusus sit.</p>	<p>Tab. XXXVII 8 ex meo apographo. 1 male scriptus ideoque lectionis ambiguae est, maxime in altera parte, quam uncis inclusi. — 2 VI parum clarae sunt.</p>																								

Fig. 7.2. The entries of *CIL* 4, 2315-2316 and 2319, representing figural graffiti via brief description.

The italics make clear that those descriptions are not part of the texts of the inscriptions themselves, which are represented in capital letters.

This practice is common in the original volume of *CIL* 4, when it seems that the editors documented textual and figural graffiti that were in close proximity, or that were in some way related to each other.

In later supplements, line-drawings for figural graffiti were sometimes included when the drawings and text were obviously understood as one inscription, as shown in Fig. 1 above. Perhaps due to the complications with preparing and printing such illustrations, however, it also remained common practice to represent figural graffiti with very brief description in italics (e.g. *CIL* 4, 4822, 4823, 5264, 5275, 6624, 6672, 6889).

7.2.2. Figural graffiti described in notes or apparatus

The most common strategy, however, for documenting figural graffiti in *CIL* 4 is by including brief mention of a drawing in the editorial note that introduces a graffito or in the apparatus that follows it (Fig. 3).

10711 In aedibus V · 35, in alae (B apud Maiuri I p. 378 fig. 308) pariete meridionali, iuxta novem galeas gladiatorias et parvum phallum graphio delineata

0,87

A B C D I I F G H I L M N O P Q

0,03

Della Corte p. 267 n. 321. Signa quaedam cernuntur, quae iam intellegi nequeunt.

Fig. 7.3. *CIL* entry for an alphabet near figural graffiti (*CIL* 4, 10711).

Note that the editorial comment above the entry mentions drawings nearby (*novem galeas gladiatorias et parvum phallum*), but the text is presented without illustration. This mode becomes more common in the fascicles of *CIL* 4 produced in the later twentieth century and so the figural graffiti from Herculaneum are usually represented this way (cf. *CIL* 4, 10532, 10568, 10586).

A fourth possibility exists as well, namely, when figural graffiti were not even mentioned in *CIL*. In each of the previous scenarios, the editors of *CIL* include a description of a figural graffito when it was close to a textual inscription. In contrast, figural graffiti found in isolation tended to be excluded altogether, due to the focus of the *Corpus* on text. Fortunately there is now a useful resource devoted to figural graffiti: Martin Langner's *Antike Graffitizeichnungen*, a monograph and accompanying database of figural graffiti from across the Mediterranean. His catalog includes some 600 graffiti drawings from Pompeii and 60 from Herculaneum, including 200 that are not mentioned in *CIL*.

In addition, whenever possible, Langner will provide a line-drawing of the graffito, either his own or one found in an earlier source; therefore, his database includes many line drawings that are not included in *CIL* even when a drawing is described. However, certain motifs are omitted from Langner's catalog. While he does catalog the more interesting *Phalluskopfen* examples, he generally omits simple drawings of *phalli*. He also leaves aside the decorative elements of *coronae* and *palmae*, which are sometimes mentioned in *CIL*. This means that an accurate total of all figural graffiti in Pompeii and Herculaneum can only be reached by working through the collections of both Langner and *CIL*. To create the most comprehensive resource possible for figural graffiti, we include *all* known drawings in the AGP search engine.

7.2.4. Documenting extant figural graffiti

Since the verbal descriptions of figural graffiti provided by legacy data are limited and vague or exceedingly general (e.g. *caput*), the best circumstance under which to digitize a graffito is when the drawing itself still remains extant. In such cases, we will use any published data as a starting point, but we are also able to make our own editorial decisions about the subject matter of the drawing, how to describe it, and its relation to any text that is nearby. The material with which we are working, therefore, includes a range of different information about the figural graffiti of Pompeii and Herculaneum: from brief verbal descriptions to line-drawings, to the best case scenario when an inscription is still extant.

7.3.1. Challenges in working with text and images

Several challenges, therefore, arise when making decisions about how to edit and digitize figural graffiti. These can depend on how a drawing may or may not relate to a textual graffito, whether or not a drawing is extant, and how to interpret and standardize legacy data.

Three of our main questions are:

1. How to define an entry? (Where for example does one entry stop and another begin? Do we catalog series or clusters of graffiti, or individual images? How do we account for or represent the larger context?)
2. How to describe a drawing? (Here, there arise issues both of standardization and of interpretation, or over interpretation.)

3. How can we make drawings searchable? (Ideally, we would like to make it possible for users both to browse and to locate specific images.)

7.3.2. How to define an epigraphic entry?

One of the first challenges we face in working with figural graffiti is deciding how to define an entry, that is, to consider whether or not multiple elements should be part of the same EDR record or should be given separate entries. First, we must ask: *can we be assured* that certain elements were meant to be understood together? There might be an issue of accretion or accumulation, where additional graffiti have been added subsequently. A related challenge is then, if we create individual entries for separate elements, how do we avoid losing information about the relationship among the graffiti? This collection of drawings including six textual graffiti illustrates our challenge (Fig. 4).

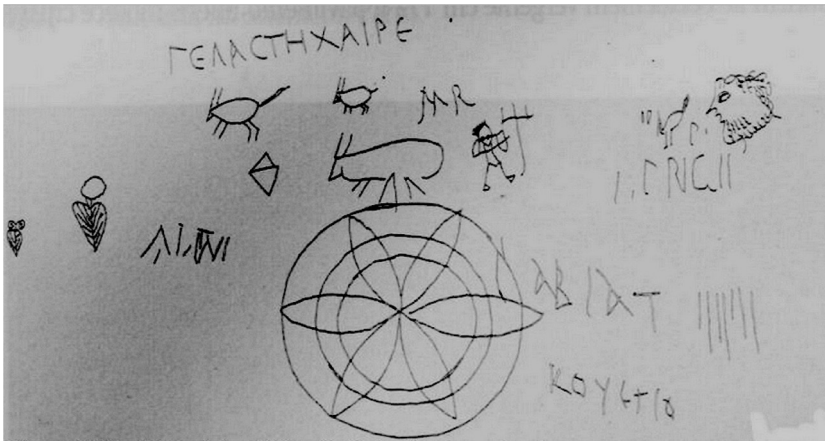


Fig. 7.4. Line-drawing displaying a collection of textual and figural graffiti (CIL 4, 8383-8386; EDR148730); unpublished sketch of Matteo Della Corte from the archives of the Corpus Inscriptionum Latinarum at the Berlin-Brandenburg Academy of Science and Humanities.

You can see a number of different images here including a small gladiator with trident, a face in profile, leaves, several animals, and geometric shapes as well as the name "Atini" and the greeting "Γελαστή χαιρε." Such a collection raises many interpretive questions. What is the relationship, if any, between the figural and the textual graffiti? How should that relationship be best represented? Fortunately,

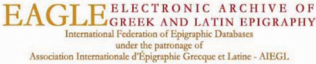
we have available with this sketch an overall view of the spatial relationships of this group of graffiti. Because the *CIL* entries are focused on text, the figural graffiti are associated with and described in the entry of nearby textual inscriptions. For this cluster, we have decided, instead, to give each element on the wall a unique identifier. First, it is not clear that the texts are clearly linked to any of the drawings. Secondly, if we create individual entries, the field for measurements in EDR permits us to give the measurements for each individual element. Thirdly, EDR has provided an additional solution to the issue of representing context with the use of hyperlinks to other nearby inscriptions, created by including EDR record numbers in the apparatus field. Additionally, we have decided to upload a series of images to EDR, including detail illustrations and the composite sketch of all graffiti, to give the context of the entire cluster and the relationship of the graffiti to each other.

In an example from Herculaneum (Fig. 3, above), the entry for *CIL* 4, 10711 notes that in addition to a graffito of the alphabet, a series of nine gladiator helmets and a small phallus were also drawn on the wall. During our field season in Herculaneum in 2014, we were not successful in finding the small phallus, but we did locate eight of the nine helmets. Here too we have devoted a separate database entry for each helmet. By making individual records, we have a unique identifier for each image, in the form of the EDR number, so that users can cite a *specific* parallel precisely. Again, we can record the precise measurements for each image. Yet, since separating each image can obscure how the images relate to one another in the group, as with the previous example, we also upload to EDR an overall image of the group of helmets together for every individual entry (cf. EDR143634).

In these two cases, we are fortunate to have contextual data that informs our understanding of how text and image may relate. More often, we are left with only legacy data, with brief mention of a figural graffito in the apparatus of a *CIL* entry and without illustration. Yet, proximity does not always indicate a relationship between the text and image. Indeed, there may be no relationship at all between the figural and textual graffiti; therefore, putting the two graffiti in the same EDR record may suggest a relationship where none exists. Given these circumstances, we prefer to create separate EDR entries for the text and the image and to use the EDR hyperlinks to note that each is found near the other.

7.3.3.1. How to describe drawings?

A second challenge occurs when we must decide how much interpretation to offer when we describe a graffito for a database entry. When *CIL* has included mention of a drawing, we generally incorporate that description directly into our entry. With figural graffiti documented by Martin Langner, we must create a summary in Latin and when doing so, we attempt to give as full as possible a description of the elements of the image. With this camel (Langner 2001, n. 1443), for instance, we offer a full description in Latin that accounts for all the features of the drawing: *camelus dromedarius cum cauda, lodicem gerens, ad dextram incedens* (Fig. 5).



Schedae numerus: EDR144514
 Regio antiqua: LaC
 Regio nostrae aetatis: I
 Urbs antiqua: Herculaneum
 Urbs nostrae aetatis: Ercolano (Napoli)
 Locus inventionis: Ercolano (Napoli), Insula V.1, Casa Sannitica
 Locus adseruentionis: Ercolano (Napoli), Insula V.1, Casa Sannitica
 Rerum inscriptarum distributio: aedificium
 Rei materia: tectorium
 Mensurae: alt.: 21.00 lat.: 25.80 Crass./Diam.: 0.00 lit. alt.: ?
 Status tituli: ix. ineger
 Scriptura: lit. scariph.
 Lingua:
 Titulorum distributio: cetera
 Virorum distributio:
 Editiones: M. Langner, *Antike Graffitizeichnungen: Motive, Gestaltung und Bedeutung*, Wiesbaden 2001, n. 1443 (Esel/camel) (1)
 Textus:
 ((camelus dromedarius cum cauda, lodicem gerens, ad dextram incedens))

Apparatus: Textus secundum (1), Contulerunt Beall, Bey IV, McCrooy, Opdenhoff, Tomasi, Zimmermann Damer a. 2014.
 Tempus: 1 d.C. / 79 d.C. (archaeologia)
 Schedae scriptor: Erika DAMER Tempus schedae: 25-11-2014 (16-11-2015)




Fig. 7.5. Example of an entry for a figural graffito not found in *CIL* (EDR144514).

7.3.3.2. Questions of interpretation through description

As one might imagine, issues of interpretation can arise even with simple descriptions of images. In truth, we have encountered more difficulties with interpretation in the case of drawings that have been described by *CIL*. The first example comes from a shop in Pompeii and represents text and a drawing (*CIL* 4, 8185). The plaster has clearly broken off, so we do not know if this was part of a larger scene. What remains are two lines of text and just one figure, which would seem to be a drawing of a person facing forward and rendered with head and shoulders. *CIL* describes it thus: *herma muliebris prospiciens* (Fig. 6).

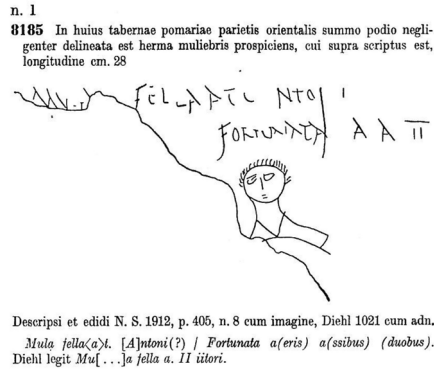


Fig. 7.6. CIL entry for textual and figural graffiti (CIL 4, 8185).

Is this drawing clearly depicting a female? It is difficult to argue from either the hairstyle or the clothing that the figure is female. Here, we can only assume that the editors of *CIL* identified the image as female because the text above mentions the female name Fortunata. But are we sure the image is meant to illustrate the text? Or that the image and text are meant to be read together? Since the figure is clearly not enacting the verb of the text, could this be either Fortunata or Antonius?

The head of a woman, described with a textual graffito from the Suburban Baths in Herculaneum (CIL 4, 10676), raises similar problems with verbal descriptions of figural graffiti. In this case, *CIL* does not reproduce an image of the sketch; it only notes that the four-line inscription of CIL 4, 10676 appears below a drawing of a female (*infra mulieris imaginem*). In this instance, too, the text nearby includes two names, one female and one male. The drawing has appeared in multiple publications (Della Corte 1960, Deiss 1989, Maulucci 1993) (Fig. 7).



Fig. 7.7. Apograph of figural graffito referred to in the note at CIL 4, 10676 (Langner 2001, n. 309).

Again, we might question whether this figure should be identified as female. In fact, we not certain that we had located the correct apograph for the drawing. There is considerable discrepancy between the description of the drawing in *CIL* 4, 10676 as female, with no mention of the long nose, and this line-drawing.

Another reason we suspected there might be a mistake was that Martin Langner had catalogued the drawing associated with *CIL* 4, 10676, describing it as a “Phalluskopf.” There was no mention of gender. And he categorized this drawing among several examples of drawings of heads with phallic features. The graffito is in a room that is sealed off, with no access, so we were unable to view it in person. Eventually, however, a photograph published by Antonio Varone in his recent two-volume work providing images of extant ancient graffiti (Varone 2012, 509) allowed us to confirm that this *is* indeed the correct graffito drawing – somewhat above but also drawn partly *through* the text of *CIL* 4, 10676.

Neither description offered by *CIL* or by Langner, however, seems altogether satisfactory. There are no obvious markers of female identity and even the description of *Phalluskopf* is less than transparent. Thus this one drawing has two published descriptions that vary greatly and that each lead to a very different understanding of the graffito. What should we then do in such situations? Do we repeat the identification of *CIL*? Or do we offer a less specific description, merely labeling this a *hominis figura*? In the end, our solution is to offer our own description, which is detailed but less interpretative, with an emphasis on specific features of the image that are readily identifiable. We also document Langner’s description and *CIL*’s earlier identification in our entry for EDR, but we note our hesitation with such identification by labeling the image: *gryllus?* (“caricature?”). We are aware, however, that we also introduce an interpretation with the tentative suggestion this drawing might be a caricature.

The issue of interpretation arises most often in relation to identification. Other examples concern identifying the particular *types* of gladiators or the species of animals, who are assuredly quadrupeds but in some drawings could be any type of animal with four legs (stags, boars, dogs). In such cases, our solution is to describe a drawing with more generic, yet accurate, terms such as “gladiator,” without further specification, or “animal” rather than *cervus*, *aper*, or *canis*. Similarly, if we cannot determine male or female, we prefer to describe the drawing as “*facies hominis*.”

In the AGP search engine we can then indicate possible but not certain identification with a descriptor, or tag, that comes with a question mark: e.g. “stag?”

7.4. How to search for drawings?

The third challenge that we face is how to search efficiently for inscriptions that are not just text but either are images or include images. In the AGP search engine, we aim to complement the capabilities of EDR by providing another way to search for these non-textual, figural graffiti. Since we describe the content of the figural graffiti in the Textus field of EDR, it is possible for a user to locate a graffiti drawing. However, with text-based searching, a user would need to know the vocabulary used to describe the drawing. Would someone ever think to search for “*camelus*” without prior knowledge that there is a figural graffiti of a camel in Herculaneum? Similarly, if you search for “*gladiator*”, the text field will give you results for all inscriptions that mention gladiators as well as drawings where we have described gladiators. If, however, we’ve described the gladiator more specifically as a “*retiarius*” or we have gladiatorial equipment, such drawings will be omitted from the list of search results.

We are therefore designing AGP with the capacity for locating figural graffiti through a two-prong solution: with both browsing and searching possibilities.

7.4.1. Browsing capabilities in AGP

For browsing, we have defined nine general categories, which together cover all the types of figural graffiti we have encountered so far (Fig. 8).

At this point, one can browse by choosing a category, which will return all examples in that category. So, for example, the category of “Gladiators/equipment” will return sketches of individual gladiators, gladiators fighting in pairs, and gladiator equipment such as helmets. The category of “Animals” will return all figural graffiti that include drawings of animals. As we process greater numbers of figural graffiti, the results of these categories will become larger.

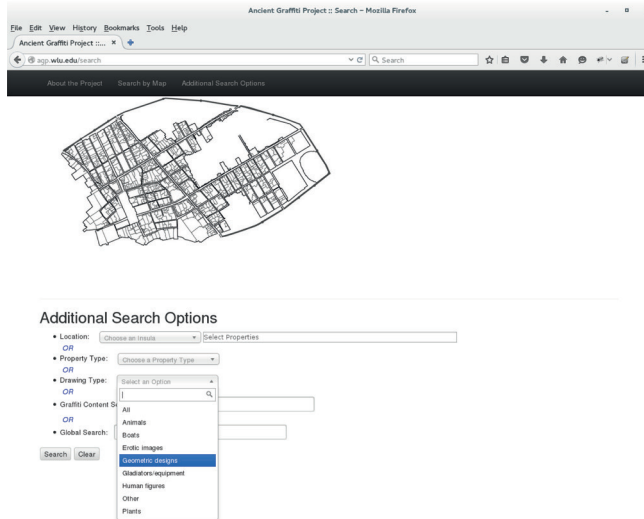


Fig. 7.8. Screenshot of AGP search engine showing browsing capabilities.

7.4.2. Limiting search results in AGP

It is therefore necessary to design a way to limit results, so that a user could find only gladiatorial equipment, or graffiti depicting only boars but not graffiti depicting other animals. We are developing a method of filters and tags that will allow a user to move beyond browsing. These filters will allow a user 1) to limit an initial return of results, 2) to retrieve more specific results, or 3) to perform a secondary level of search. It will certainly be helpful to refine results of an entire category to include only a subset of that category, for example, only pairs of gladiators instead of all gladiators and their equipment.

To allow for this, we are creating a list of tags that we can apply to figural graffiti to allow for greater specificity of searching. By using tags, we can also assign multiple terms to a single image, e.g. stag and dog. Our goal is ultimately to enable searches by these tags as well, so a user can directly find all drawings with dogs.

The search capacity will allow a user to search the tags or the Latin description, so both “*navis*” and “*boat*” will return hits. Again, standardization is necessary. We are currently developing a list of tags that is comprehensive and flexible enough to cover all graffiti, but that includes a level of standardization so that the list of tags offers extensible terms.

We are also creating a system of filters to allow a user to limit the initial results or to move directly to a desired graffito. So, a user can search all graffiti drawings and then limit the search results, for example, to find all the drawings in a particular property (Fig. 9).

Or, it will be possible to do a broad search for all drawings of animals, and then filter to limit the results to find what kind of animals are drawn in taverns, for example, but not public buildings or houses.

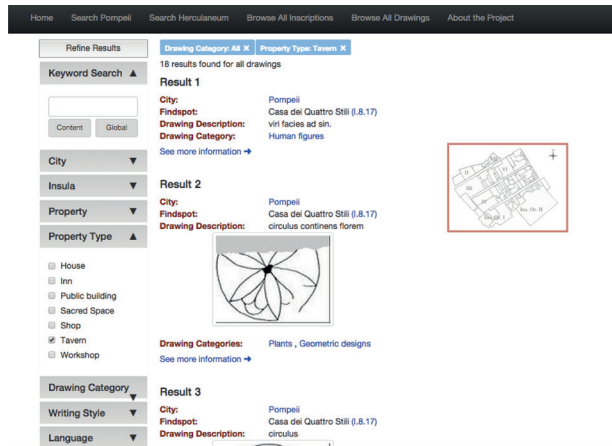


Fig. 7.9. Screenshot showing filters in AGP.

7.5. Conclusion

This system of tags and filters is in the early stages of the design process. These are our proposed solutions for confronting the challenges of working with text and image, and our ideas for creating a resource to complement the strengths of EDR with search capabilities for characteristics that are specific to these heterogeneous, individualized handwritten inscriptions.

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PART II

COLLABORATING IN DIGITAL EPIGRAPHY

8. The EAGLE Data Aggregator: Data Quality Monitoring

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Abstract

The EAGLE project aggregates epigraphy related content from about 20 different data providers, and makes its content available to both Europeana and to scholars. Data Quality monitoring is a key issue in Aggregative Data Infrastructures, where content is collected from a number of different sources with different data models and quality standards. This paper presents a Monitoring Framework for enabling the observation and monitoring of an aggregative infrastructure focusing on the description of the Data Flow and Dynamics Service, and exemplifying these concepts with a use case tailored to the characteristics of the EAGLE aggregation data flow.

An Infrastructure Quality Manager (IQM) is provided with a Web user interface (WebUI), allowing her to describe the data flows taking place in the infrastructure and to define monitoring scenarios. The scenarios will include the definition of sensors (pieces of software plugged into the data flow), which will provide observations of measured objects. The scenarios include also the definition of controls and analysers, which will store and process the observations received from the sensors and will verify if the values of the measured features comply with some expected behaviour over time.

A monitoring scenario for EAGLE has been defined and tested on simulated data (the monitoring framework is still under development) in order to monitor the “health” of different data collections involved in the EAGLE collection and transformation workflows.

Keywords: EAGLE, Aggregative Data Infrastructure, Data Quality, Metrics, Monitoring

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8.1. Monitoring framework

The EAGLE project (fully described in Eagle 2013) aggregates epigraphy related content from about 20 different data providers (cultural institutions all over Europe), and makes its content available to both Europeana (Europeana 2015) (through an OAI-PMH interface) and to scholars and the general public through a Web portal.

Collecting data provided by a number of different sources, very often with different quality standards, presents the challenge of measuring the overall quality of the aggregated data, and how it compares with standards and objectives set by the aggregating institution.

We present here an extension to EAGLE that will take advantage of a *Monitoring Framework* (being developed in the context of another project (OpenAIRE 2015)), enabling the observation and monitoring of an Aggregative Data Infrastructure over time.

By modelling “data processing” as a manufacturing process involving data (Ballou et al. 1998), the Monitoring Framework provides tools for the automatic extraction of observations (numeric indicators about properties of the system) from the context where the data is being processed and stored, providing time series of indicators expressed in user-defined metrics.

The Monitoring Framework offers a *Data Flow and Dynamics Service* (DFDS for short) to the *Infrastructure Quality Manager* (IQM for short), a role that (hopefully) will become standard in data aggregation infrastructures. The DFDS enables the IQM to create one or more monitoring scenarios, each designed to monitor a particular functional area or aspect of the aggregation infrastructure. For example, an EAGLE monitoring scenario could deal with the workflow that builds the aggregated content to be used by the EAGLE Web portal and by Europeana’s OAI-PMH harvesters (Mannocci et al. 2014). After the collection and processing of (possibly heterogeneous) records coming from different content providers, the aggregator stores them into different environments, for different purposes. More precisely: *i*) the processed records are indexed as a full-text index (implemented by Apache Solr) to support search and browse queries from the EAGLE Web portal; *ii*) the processed records are stored also in a document store (implemented by MongoDB) to support OAI-PMH requests. In this case, for example, we might be interested in assessing (and keep assessing over time) whether the total number of artifacts indexed by Solr matches the number of artifacts delivered via OAI-PMH.

This could easily be accomplished by monitoring the number of records stored in the index and the number of records stored in the document store, and comparing their values. As another example, we might be interested in verifying whether the trend of a certain property of the monitored system complies with a given criterion (e.g. the number of records per content provider should be strictly increasing over time).

Using the Data Flow and Dynamics Service provided by the Monitoring Framework, it is possible to define *monitoring scenarios*, which define a conceptualization of the data flows taking place in the aggregating infrastructure. Similarly to what happens to goods in a manufacturing process, data collections and processes acting over that data can be observed thanks to specially devised *sensors*, which in our case are pieces of code providing numeric values about features of interest. The monitoring scenario can also define controls to verify if the values of such features comply with some expected behaviour over time.

With the concept of sensor, we refer to a piece of software capable of generating *observations* (a numeric value plus some contextual metadata) about a measured object. *Measured objects* can be of different granularity, e.g. single data units (datum) or data collections stored somewhere by the aggregating infrastructure. Each observation is expressed in just one specific metric, intended to measure a specific feature of a measured object (e.g. the number of publications present in the data collection stored in the Solr index). A sensor can generate observations in more than one metric, each one referring to a different feature of the measured object.

A sensor can in principle be plugged anywhere in the aggregating infrastructure; with the understanding that the implementation of the sensor and the point of the data flow where it will be placed are the responsibility of the IQM. When the workflows of the aggregating infrastructure are in execution, the sensors will be activated and will produce a stream of observations. The DFDS will separate the stream of observations into different streams, each one related to a specific metric, and will store them as points of time series. In this way, observations can be queried and examined either as charts or tabular data.

The interaction between the IQM and the Monitoring Framework is done through a user friendly user interface (WebUI) provided by the DFDS. In addition to providing easy access to the observation time series, the WebUI provides the facilities to define the overall Monitoring Scenario, which will include the sensors and the *controls*.

For the purpose of monitoring, the IQM can define *controls*, i.e. checks that can be scheduled to automatically verify the compliance of one or more metrics (and their observations) with a desired (or un-desired) condition. A control uses an *analyser* for the comparison of observation values, such as, for example, values alignment, less or greater than, (strictly) monotonic increasing or decreasing values, threshold guards, thresholded peak or percentage variation, etc. For example, as mentioned before, we might be interested to check if the number of artefacts indexed by Solr is equal to the number of artefacts exported in OAI-PMH records, or if the total number of EAGLE objects provided by a content provider is steadily increasing over time, or, as a further example, if the “goodness” of an EAGLE record (the concept of goodness being defined by the IQM and implemented through sensors and controls) remains above a threshold of 0.8. The Data Flow and Dynamics Service offers some analysers out-of-the-box, but also enables the IQM to develop her own custom analysers.

Finally, the Data Flow and Dynamics Service enables the generation of an exhaustive *report* about the defined metrics and controls providing insights, via the WebUI, in a quick glance about key features and potential issues present in the infrastructure. Given a set of controls, the monitoring service also takes care of raising *alerts* and *notifications* informing the IQM about the status of the infrastructure and its operation.

8.2. Architecture

The Monitoring Framework (see Figure 1) is architected as a client-server application, where a core module (imported and used by the code of the aggregating infrastructure) plays the role of *client*. The infrastructure source code needs to be instrumented in order to put sensors in place and produce observations of the measured objects.

The implementation of a sensor provides the logic to produce a measurement; in general, a sensor is devised to probe a specific object type (thus the typing of the measured object is hardcoded), while its configuration can be defined via WebUI and retrieved at runtime (dynamically). Such a design opens up to configurability and extensibility of the sensor’s collection offered by the DFDS, which in any case comes with off-the-shelf implemented sensors.

The *server* component is a stand-alone web application that receives observations from sensors, stores those observations as time series and runs automatically user-defined controls over this corpus of data. The controls present the outcome of their activity as reports, which are made available to the IMQ via the WebUI. There is also an alert and notification service to warn the IMQ about potential anomalies or wrong operation in the aggregating infrastructure.

8.3. The EAGLE use case

In order to apply the monitoring framework described above to the EAGLE aggregator, we need to define first a monitoring scenario, based on the actual EAGLE data flow, which must include the following.

- Sensors to be used in terms of measured objects and metrics implemented (i.e. functions to apply in order to extract observations). Once deployed and running, a sensor dynamically retrieves its defined configuration from the server whenever it is needed. Metrics identified in this test case are reported in Section 3.1.
- Controls representing quality checks to be run against measurements obtained with certain metrics. The framework guides the IQM into the definition of a control according to the scenario defined so far. Controls identified in this test case are reported in Section 3.2.

8.3.1. Metrics

A monitoring scenario has been defined and tested on simulated data in order to monitor the “health” of different data collections involved in the EAGLE collection and transformation workflows. In particular, a first collection is stored in a full-text index (Apache Solr) serving search queries, and a second one is stored in a document store (MongoDB) serving data for OAI-PMH export.

In this same scenario, we are interested in monitoring also the collection workflow by inspecting every single native XML record flowing into the EAGLE infrastructure from content providers. Some useful metrics identified in EAGLE are described in Table 1.

MEASURED PROPERTY	METRIC
Total # of content providers joining the EAGLE infrastructure	Content providers
Total # of languages for translations	Languages
Total # of EAGLE records	Total records
The values of this metric track the percentage of vocabulary-compliant occurrences in the XML field containing the value for "material", over the total amount of occurrences of that field. As an example, if the vocabulary defines the entries "aaa", "bbb", "ccc" and the vocabulary-controlled XML field uses "aaa" four times, "bbb" three times, and "xxx" three times, the metric yields 0.7 (i.e. 7 out of 10 occurrences match the vocabulary).	Voc:material compliance
Completeness of every single collected native XML record. The values of this metric track the percentage of non-empty XML fields among 5 user-defined fields (e.g. title, description, object type, date, material). The value could be 0%, 20%, 40%, 60%, 80%, 100%, depending on how many non-empty values have been found.	Completeness

Tab. 8.1. Metrics implemented in EAGLE.

8.3.2. Controls

Given the metrics described in 3.1, Table 2 reports some controls defined over those metrics.

METRIC	CONTROL
Content providers	Check if the number of content providers indexed in Solr is monotonic increasing over time (considering the three last observations of the metric)
Content providers	Check whether the number of content providers indexed in Solr equals the number of OAI sets present in MongoDB (considering only the last observation of the metric)
Languages	Check if the number of modern languages present in translations indexed in Solr is steadily increasing over time (considering the two last observations of the metric)
Total records	Check whether the total number of EAGLE records (per content provider) is steadily increasing over time (considering only the three last observations)
Voc:material compliance	Check if such indicator, ranging from 0.0 to 1.0, is above 0.9 threshold (considering only the very last observation of the metric)
Completeness	Check if such indicator (actually its rolling average), ranging from 0.0 to 1.0, is above 0.8 threshold (considering only the very last observation of the metric average)

Tab. 8.2. Controls implemented in EAGLE.

8.3.3. Sample implementation

Three different sensors have been defined and implemented for this test on EAGLE: two collection sensors (one for Solr and one for MongoDB) and one single-datum sensor for XML record-by-record inspection. Once the three sensors have been placed in the EAGLE workflow implementation and the EAGLE infrastructure is running, they start to produce observations and deliver them to the server component of the monitoring framework.

As an example, we report in figures included in Section 5 simulated trends of the defined metrics and relative reports (i.e. the evaluation of controls defined over the metrics).

The metric about the “Total number of content providers” is reported in Figure 2; as expected, the number of content providers indexed is monotonically (each value is greater or equal to the previous one) increasing, as stated in the leftmost report, and the number of OAI sets present in the data collection stored in MongoDB equals the number of content providers indexed in Solr, as stated in the rightmost report. It is also interesting to notice how the two trends diverged in time back in October. In the simulated data we introduced an *ad-hoc* problem in October, related to the publication of EAGLE records into the OAI-PMH store, which the monitoring service succeeded to discover.

In Figure 3, we report the “Languages” metric; as expected its trend is strictly increasing over time indicating that the corpus of translations is expanding and that they are correctly integrated into the system.

Figure 4 shows the total number of EAGLE records for four content providers (CP1, CP2, CP3, CP4) and informs the IQM that everything behaves as expected; in fact, the four reports states that the trends of the metric are always increasing over time.

In Figure 5, the metric “Voc:material compliance” is depicted. The four trends show that the four content providers (CP1, CP2, CP3, CP4) are in general increasing the quality of their data by enforcing the use of correct values offered by the controlled vocabulary for materials. However, CP1 (in orange), with a 0.83 score, does not meet the threshold requirement (set to 0.9) indicated in the control, thus its report is marked in red notifying the issue.

Figure 6 reports the oscillations of the record-by-record metric “Completeness” (narrowed down to a hundred records sample), while Figure 7 reports the associated “rolling average” (i.e. each point is the updated average up to that instant). Again, as the last observation of metrics is equal to 0.52, the relative reports is marked in red, as the 0.8 threshold defined in the control is not met.

8.4. Conclusions and future work

We have presented here the possible application of the Monitoring Framework concepts to the EAGLE aggregating infrastructure. The Monitoring Framework is “work in progress” in another European project related to research data infrastructures (OpenAIRE, 2015).

The results presented here are based on simulated data, as the EAGLE infrastructure is not yet instrumented with the sensors needed for collecting observations, but we are planning to instrument it as soon as the development of the Monitoring Framework will reach the *beta* status.

EAGLE represents an ideal *testbed* for this monitoring technology, as the workflows are clean and well defined, the data collected also is well defined, given the mappings that have been defined between the different incoming records and the EAGLE data model.

Finally, when EAGLE will be equipped with the final Monitoring Framework, we expect that it will provide valuable data for ensuring that the epigraphy data made available at the EAGLE portal will be of the highest quality. It will also provide valuable feedback to the content providers, helping them to detect possible inconsistencies and lack of information in their data, in order to improve the quality of the data provided to EAGLE and also, even more important, the quality of the data that each content provider makes available to its users.

8.5. Figures

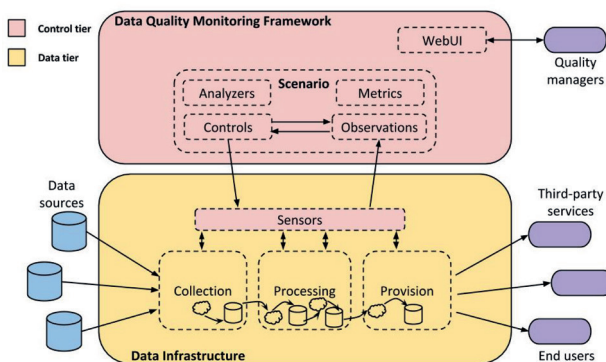


Fig. 8.1. The architectural overview of the monitoring framework.

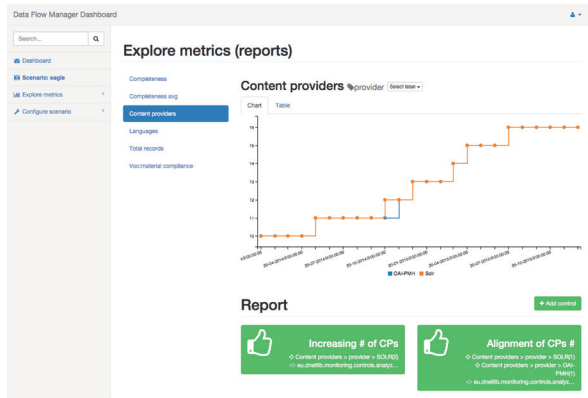


Fig. 8.2. The trend of the metric “Total number of content providers”.

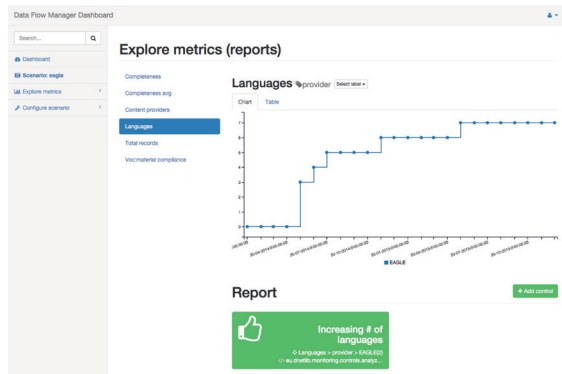


Fig. 8.3. The trend of the metric “Languages”.

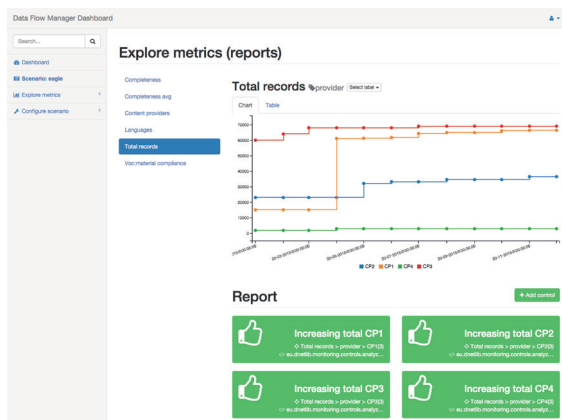


Fig. 8.4. The trend of the metric “Total records”.

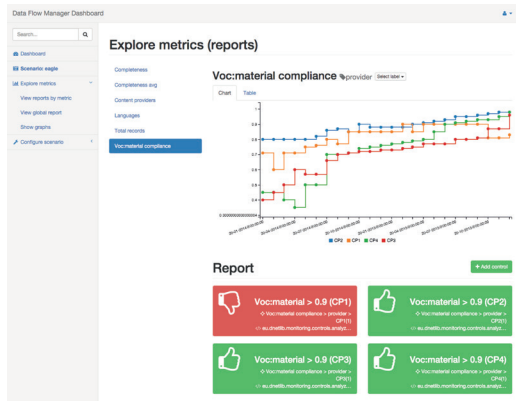


Fig. 8.5. The trend of the metric “Voc:material compliance”.

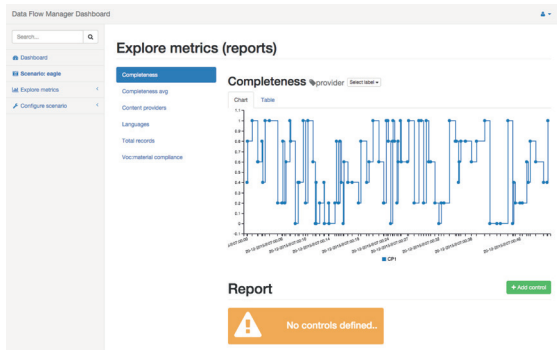


Fig. 8.6. The trend of the metric “Completeness”.

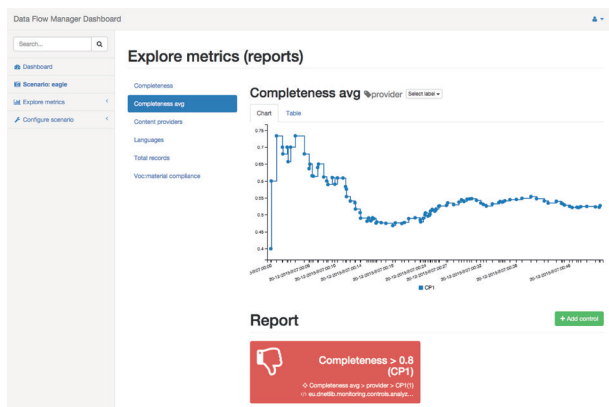


Fig. 8.7. The “rolling average” of the metric “Completeness”.

Acknowledgements

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9. Searching inscriptions through the EAGLE Portal

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Abstract

This paper describes the functionalities and the technical infrastructure of the EAGLE Portal, the main gateway into the EAGLE's massive epigraphic database. The portal can be accessed both by a human through a web browser and by external applications through a set of APIs. It is possible to perform full-text searches using a simple interface, or to launch more advanced queries, including the possibility to upload an image and search for inscriptions that are similar to the provided one. The seven controlled multilingual vocabularies that were created to help aligning the multilingual metadata of the inscriptions from the different content providers, have been also integrated in the search engine as well as all the translations that are available on the EAGLE MediaWiki. All this makes of the EAGLE Portal a very useful tool for the epigraphic community but also for single users and enthusiasts willing to contribute to the research in this field.

Keywords: Search engine, API, image recognition, controlled vocabulary, multilingual translations, advanced search, citizen participation

9.1. Introduction

The EAGLE Portal is the place where the content provided by the epigraphers' community is aggregated and stored and where it is made accessible to the users. It is composed by:

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- The Metadata Aggregation System (in the following referred also as Aggregator), which is where all the content is stored and indexed.
- A Graphical User Interface (GUI), which is the interface through which users can browse the content and interact with it.

The Aggregator relies on the D-NET software toolkit, developed within the DRIVER project and extended within the OpenAIRE, OpenAIREplus¹, EFG, EFG1914² and HOPE³ projects. D-NET is an open source, general-purpose software conceived to enable the realization and operation of Aggregative Data Infrastructures (ADIs) and to facilitate their evolution and maintenance over time. D-NET implements a service-oriented framework based on standards, namely Web Services with SOAP and REST APIs, where ADIs can be constructed in a LEGO-like approach, by selecting, customizing, and properly combining D-NET services as building blocks. The resulting ADIs are systems, which can be customized, further extended (e.g. by the integration of new services), and scaled (e.g. storage and index replicas can be maintained and deployed on remote nodes to tackle multiple concurrent accesses or very-large data size) at run-time (Amato et al. 2013).

The GUI exposes all the content stored in the Aggregator providing to the users the following functionalities (Prandoni et al. 2014).

- Search and browse the rich set of data made available by EAGLE content providers by using either a free text search or a more advanced interface, including faceted browsing through the integration of the EAGLE controlled vocabularies.
- Similarity search through the image recognition algorithm that have been integrated in the EAGLE Portal.
- Access to all the peer-reviewed translations of the epigraphic texts, in several European languages that have been produced and integrated in the EAGLE MediaWiki.
- Export to the user own PC the EpiDoc document of an object for further analysis and processing.
- Annotate and save relevant information in a user Personal Space (e.g. records of inscriptions, search results, queries), including content saved while using the Flagship Mobile Application.

¹ <http://www.openaire.eu/>.

² <http://www.europeanfilmgateway.eu/it>.

³ <http://www.peoplesheritage.eu/>.

- Access to the Flagship Storytelling Application to browse the existing epigraphy-related narratives and to create a new story.

The ingestion and curation of data is performed through a separate dedicated interface made available by the Aggregator. This interface includes a series of functionalities to support data ingestion and storage as well as for importing, indexing, enriching and managing the harvested metadata (Amato et al. 2015).

9.2. The EAGLE Collections

Classical Greek and Latin culture is at the very foundation of modern European identity. From philosophy to architecture, geometry to law, a variety of contemporary subjects and disciplines have their roots in the classical world. Only a small fraction of the total production of Greco-Roman texts has survived to the present day, leaving wide gaps in the historiographical record of an epoch that is immensely relevant to our modern day lives.

The collections held by the EAGLE partners have been assembled with the two-fold criterion of historical-cultural significance and strong thematic unity. They feature a great variety of inscriptions written in Greek, Latin and other ancient languages, providing scholars with an authoritative resource by which to verify the reliability of historical reconstructions. Additionally, they equip the broad public with a way to understand and easily appreciate interesting and geographically dispersed inscriptions.

The EAGLE collections come from a wide range of digital repositories of epigraphic content. The following paragraphs illustrate these repositories.

Arachne⁴ is the central object-database of the German Archaeological Institute (DAI). Since 2001, Arachne has been integrating negative archives of ancient sculpture that went beyond the specialised documentation retained in Cologne itself, such as the negatives of ancient sculpture of the German Archaeological Institute in Rome and the historic glass plate negative collections. Besides this larger project, many additional activities are going on different levels, for example the online preparations for the “Corpus der Antiken Sarkophagreliefs”.

⁴ <http://arachne.uni-koeln.de>.

Archaia Kypriaki Grammateia Digital Corpus (AKGDC) is a searchable digital library based on the 6 volumes of Archaia Kypriaki Grammateia (Ancient Cypriot Literature), published by the A. G. Lev-entis Foundation between 1995-2008. The AKGDC/ STARC collection of Cypriot inscriptions are dated from the 5th century BC to the 5th century AD and are mostly funerary or dedicatory epigrams in elegiac couplet or hexameter.

Epigraphic Database Bari (EDB)⁵ is a project specialized in epigraphic documents of Christian patronage (third to eighth centuries, AD), including those contained in the *Inscriptiones Christianae Urbis Romae, nova series*, voll. I-X, in civitate Vaticana 1922-1992 (= ICVR), and those edited in other bibliographical seats and/or not contained in the ICVR. Currently the inscriptions present in the EDB (counting those already online and those awaiting definitive approval) amount to 40,000 items ca, though this number is obviously increasing continually.

The task of the Epigraphic Database Heidelberg (EDH)⁶ is the systematic entry of ancient Latin and bilingual (usually Latin and Greek) inscriptions into a complex database. The Epigraphic Text Database is the heart of EDH and contains 65,000 inscriptions at present. Almost all of the records present texts, which have already either been edited in the monumental Inscription corpora or published, revised and discussed in thousands of scholarly articles.

Epigraphic Database Rome (EDR)⁷ was launched in 1999 as an experimental project aimed at creating a unified database for ancient epigraphy. EDR is part of the international federation of Epigraphic Databases called Electronic Archive of Greek and Latin Epigraphy. The federation's purpose is to collect all published Greek and Latin inscriptions up to the 7th century A.D. considering their best existing editions, also enclosing, when possible, a number of additional important data and/or images. As part of the federation, EDR aims at collecting the whole epigraphy of Rome and of the Italian peninsula including Sardinia and Sicily, with the exception of Christian inscriptions (under EDB jurisdiction).

⁵ <http://www.edb.uniba.it>.

⁶ <http://edh-www.adw.uni-heidelberg.de>.

⁷ <http://www.edr-edr.it>.

Hispania Epigraphica Online⁸ was created in 2002 when an EU grant enabled a joint research project between the Archivo Epigráfico de Hispania and Mag. K. Schaller, who was developing computing applications for archaeological purposes. The focus of the collection is the rich epigraphic patrimony of Portugal and Spain, mainly written in Latin, but with some small pockets of Greek, Semitic and Iberian inscriptions.

Petrae database⁹ is a system for the recording of Latin and Greek inscriptions developed at the Institut Ausonius, which collects epigraphic texts from the various regions in which its researchers and collaborators are active. Each record produced has the text of an inscription in both an uppercase and lowercase version, accompanied by metadata on all aspects of the monument, including support, fragments, epigraphic fields and text elements (dating, paleography, critical apparatus, translation, notes).

The Last Statues of Antiquity¹⁰ is a project funded in 2009 by the 'Arts and Humanities Research Council' in Oxford. The project collects and analyses all the evidence for new, newly dedicated, or newly reworked statuary in the period *circa* 284–650. The two main results of the project are a major database, with over 2600 individual entries, and a book, published in late 2012, discussing in print the entire phenomenon of the late-antique statue habit.

The picture database VBI ERAT LUPA¹¹ contains stone monuments (sculptures, reliefs, inscriptions, architectural pieces etc.). The project's scope ranges from prehistoric stone monuments to around the time of Justinian (500 AD). Due to its inception in Vienna, most project data at the moment is from the mid- and south-eastern European region.

Finally, thanks to the great effort in the networking activities, many other partners joined the EAGLE Best Practice Network and made available their collections that are currently being uploaded in the EAGLE Portal¹².

⁸ <http://eda-bea.es>.

⁹ <http://petrae.tge-adonis.fr>.

¹⁰ <http://laststatues.classics.ox.ac.uk>.

¹¹ <http://www.ubi-erat-lupa.org>.

¹² For a full list of the EAGLE Associated Partners see <http://www.eagle-network.eu/about/partners/>.

9.3. The EAGLE inscription search engine

The EAGLE Inscriptions Search Engine is accessible through the main horizontal navigation bar of the EAGLE Portal¹³. It represents the core functionality of the portal, through which the entry of keywords and phrases produce matches from EAGLE's massive epigraphic database.

The EAGLE Portal makes available a "simple search", an "advanced search" where the user can specify the values of a number of fields in order to make a more accurate search, and an "image search" where the user can upload an image and search for inscriptions that look similar to the provided one (Prandoni et al. 2014).

The objects that a user can search in the EAGLE Portal belong to three different categories, in accordance with the EAGLE conceptual model (Sicilia et al. 2015):

- "Artefacts", which contain all the information that is somehow related to the physical carrier of the inscription.
- "Texts", which contain all the information that is textual in nature.
- "Images", which contain all the information that is visual in nature.

9.3.1. How to search inscriptions

The simple search user interface is very straightforward. The text entered in the query box is used to make a full text search in all the fields of all the EAGLE objects in the category determined when making the query. By default, the search will be done on all the objects in the "Artefact" category. Two more tabs on the result list (labelled "Texts" and "Images") allow the user to perform the same query choosing a different category.

Using the advanced search interface, a user can specify values for a number of fields, in order to have more accurate results: findspot, bibliography, text of the inscription, type of inscription, decoration, object type, material, type of writing, state of preservation (Fig. 1).

In the fields having a controlled vocabulary, the user is allowed to enter only values coming from the vocabulary. For this purpose, those fields have a "drop-down menu" which displays all the defined values for that field in the "preferred label", i.e. the text string that has been indicated in the vocabulary as the preferred one for display, regardless of the language in which the string is defined.

¹³ <http://www.eagle-network.eu/basic-search/>.

Finally, by choosing the Image Search option, a user can exploit the image recognition algorithm that has been integrated in the EAGLE Portal and that allows to search for images that are similar to the one a user has uploaded, ranked in decreasing order of similarity (Fig. 2).

The screenshot shows the 'SEARCH INSCRIPTIONS' page of the EAGLE Portal. The page header includes the 'europeana eagle project' logo and a navigation menu with links for HOME, SEARCH INSCRIPTIONS, COLLECTIONS, RESOURCES, NEWS, ABOUT, and CONTACTS. Below the header, the page is titled 'HOME » ADVANCED SEARCH' and 'SEARCH INSCRIPTIONS'. On the left side, there is a 'LOGIN' section with fields for 'Username' and 'Password', a 'Log In' button, and a 'Remember Me' checkbox. Below this is a 'Register' button and a 'Greek keyboard' checkbox. A sidebar menu on the left lists search options: 'BASIC SEARCH', 'ADVANCED SEARCH' (which is selected), 'IMAGE SEARCH', and 'ARCHIVES'. Under 'ARCHIVES', there are several checkboxes: 'Modern findspot', 'Ancient findspot' (checked), 'Detailed findspot', 'Location', 'Bibliography' (checked), 'Text of the inscription' (checked), 'Type of inscription' (checked), 'Decoration', 'Object type' (checked), 'Material', 'Type of writing', and 'State of preservation'. At the bottom of the sidebar is an 'Update search form' button. The main search area on the right contains a 'Text of the inscription' text input field, an 'Object type' dropdown menu, an 'Ancient findspot' text input field, a 'Type of inscription' dropdown menu, and a 'Bibliography' text input field. Below these fields are two checkboxes: 'Only with image' and 'Only with translation'. There are also two date range input fields labeled 'Not Before - Year' and 'Not After - Year', and a 'Search' button at the bottom.

Fig. 9.1. Search for inscriptions in the EAGLE Portal.

Content Based Image Retrieval (CBIR) is becoming an effective way for searching digital libraries, as the amount of available image data is constantly increasing. CBIR applications are increasingly becoming useful in accessing cultural heritage information, as a complement to metadata based search. In fact, in some cases metadata associated with images do not describe the content with sufficient details to satisfy the user queries, or metadata are completely missing. For example, images containing reproductions of works of art contain a lot of implicit information that is not generally captured in manually or automatically generated metadata (Amato et al., 2013).

The EAGLE Image Retrieval System (IRS) receives in input the image of an epigraph and provides effective and efficient image similarity search and image content recognition of epigraphs.

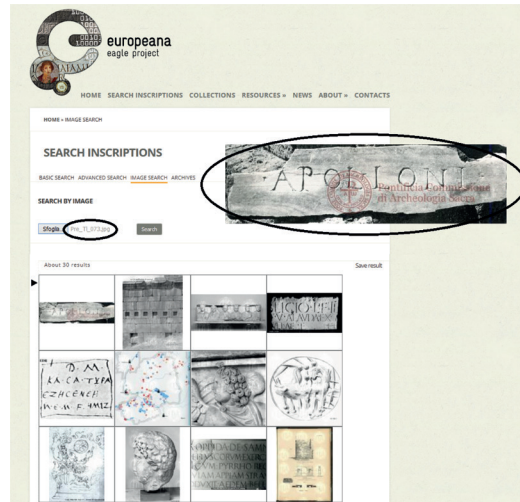


Fig. 9.2. Image search in EAGLE.

The images provided by the EAGLE content providers and collected in the Aggregator have been processed by a set of IRS components (Image Feature Extractor, Image Indexer, CBIR Index) to build the index that allows a fast and efficient similarity search during the query phase.

In addition, for those epigraphs where a set of images is available (training set), each training set has been processed to extract the main features characterizing the epigraph. The training sets and the characterizing features are the base for building another index, to be used by the image recognizer in order to decide if a received image (during the query phase) can be classified as belonging to one of the existing sets or not. In this way, in many cases, the recognizer is able to properly recognize the content of a query image even if the image given in the query was never stored in the database.

The screenshot shows the Europeana Eagle Project search interface. At the top left is the logo, which is a stylized 'e' composed of various inscriptions and a portrait. To its right is the text 'europeana eagle project'. Below the logo is a navigation menu with links: HOME, SEARCH INSCRIPTIONS, COLLECTIONS, RESOURCES, NEWS, ABOUT, CONTACTS. The main content area is titled 'HOME » BASIC SEARCH' and 'SEARCH INSCRIPTIONS'. On the left side, there is a 'LOGIN' section with fields for 'Username' and 'Password', a 'Log In' button, and a 'Remember Me' checkbox. Below this is a 'Register' button. Further down is a 'BASIC SEARCH' section with links for 'ADVANCED SEARCH', 'IMAGE SEARCH', and 'ARCHIVES'. A list of filters is provided, including 'DECORATION', 'MATERIAL', 'OBJECT TYPE', 'STATE OF PRESERVATION', 'TYPE OF INSCRIPTION', 'WRITING', 'ANCIENTFINDSPOT', 'MODERNFINDSPOT', 'HASIMAGE', and 'HASTRANSLATION'. At the bottom of the filter list is an 'Apply filter' button and a note 'Uncheck all'. The main search results area shows 'About 2835 results, page 1 of 284' and a 'Save result' link. Three results are displayed, each with a thumbnail image and text:

- DOBLE EPITAFIO**: Content Provider: Hispania Epigraphica Online - HEPOL; Ancient findspot: Baetica; Modern findspot: Magacela; Text: Terentia L(uci) f(ilia) Te(r)tulla Sempronia M(arci) f(ilia) Cris(pina filia ann(orum) / XL h(ic) s(itae) sunt; Date: not available.
- AE 1903, 0310**: Content Provider: Epigraphische Datenbank Heidelberg; Ancient findspot: Germania superior, Bilingium; Modern findspot: Bingen; Text: Alia Deccav[?] / filia Coss[ia] / fil(ia) Pusinna fil(ia) / Sextio filius / C(aelus) Coledius Trever / coniux ob pietate / posu(it); Date: not available.
- GRABINSCHRIFT DES ATESTAS**: Content Provider: Ubi erat lupa; Ancient findspot: not available; Modern findspot: Mölbrücke / Lumfeld; Text: Atestas Attonis f(ilius) / Lutussa Bittonis f(ilia) mater / Bucca Gannici f(ilia) uxor / Matugenta f(ilia); Date: not available.

Fig. 9.3. Results list - Artefacts.

9.3.2. Filtering and browsing results

After having submitted a query, the user is presented with a paginated list of results containing some basic information (Fig. 3).

By using the facets displayed on the left side panel, the user has the possibility to refine the query by applying some filters based on the fields that are associated with a controlled vocabulary or based on the fact whether the inscription has an image and/or a translation.

Regardless of the type of query performed by the user and of the category in which the query was done, clicking on one of the items in the result page will display a summary of all the information available for that item, with links to get further details (Fig. 4).

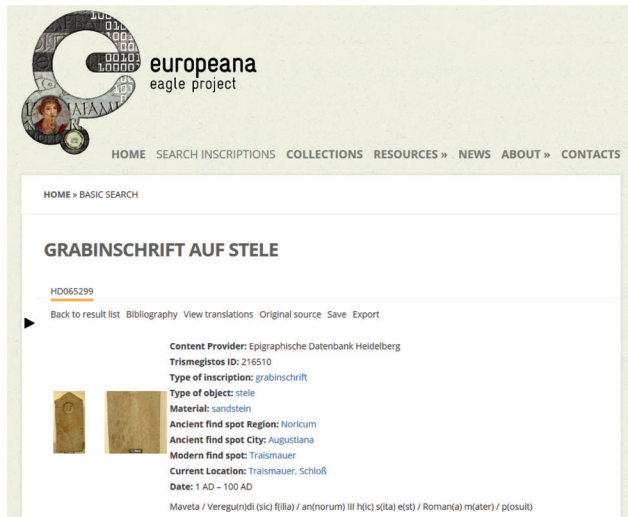


Fig. 9.4. Object details.

The text in big characters on top of the page is the Title of the object. Below the title there is the local ID of the object and after that there is a line collecting all the clickable items of the summary page: Bibliography, which opens a text box with the bibliography associated with the object; Translations, which displays all the translations available for the inscription of the object; Original source, which links the page of the object in the database of the Content Provider who provided it; Save, which allows to save the object in the user's personal space; Export, which allows to download locally the EpiDoc document describing the object. Finally, all available pictures are displayed, together with the remaining descriptive metadata.

Duplicates identification has been performed through the Trismegistos platform¹⁴. By standardizing publication references, collection information, material, provenance and date, the overlap of the various databases has been mapped to identify records describing the same inscription. Afterwards a unique numeric identifier, the Trismegistos ID, has been assigned to each document and spread across the partner databases for inclusion in the metadata record to be uploaded in the EAGLE Portal.

¹⁴ <http://www.trismegistos.org/>.

If more than one instance of an object is available, the other instances appear on the summary page as clickable “tabs”, each tab being labelled with the local ID of the other instances of the same object.

The seven controlled multilingual vocabularies that have been created (Type of Inscription, Object Type, Material, Execution, Decoration, State of Preservation, Dating Criteria) to help aligning the multilingual metadata of the inscriptions from the different content providers, have been also integrated in the EAGLE search engine. Every time that a term which belongs to one of the vocabularies is displayed, it is automatically linked to the specific page describing the term, where further connections, synonyms and translations can be explored. The EAGLE vocabularies are accessible also as Linked Open Data¹⁵.

Finally, all the peer-reviewed translations in several European languages that are available, have been integrated in the EAGLE Portal too through a RESTful API native of Wikibase, the MediaWiki extension used for this purpose¹⁶. For each inscription it is possible to view the existing translation, to request a new one and to contribute by connecting to the EAGLE MediaWiki¹⁷.

9.3.3. Annotating and saving objects

A registered user, during a “web” or a “mobile” session, has the capability of annotating and saving (some of) the information that is being provided by the EAGLE system.

Depending on the information the user is looking at, hitting the save button will save two types of data in the personal space:

- A query and its results.
- Detailed information about an inscription.

The data saved by the local user on the EAGLE server is stored internally in a relational database.

A registered user logged in at the EAGLE Portal can access his/her saved data and perform some simple operations on it:

- Display of the saved queries or objects.
- Modify the textual annotations associated with the saved item.
- Delete the saved item from her personal space.

¹⁵ <http://www.eagle-network.eu/resources/vocabularies/>.

¹⁷ <http://www.eagle-network.eu/wiki>.

- View the saved item.
- Import the data that he/she saved during a mobile session.

It has to be noted that, when a user views one of the saved items, the object is displayed exactly as he/she saved it. The saved data might be different from the data that can be retrieved by issuing the same query at the time of editing, due to changes in the data stored in the EAGLE database. This allows the user to make comparisons between the information that was available when he/she first saved the object and what has been added afterwards.

9.4. Conclusion

This paper presented the main functionalities of the EAGLE Portal, giving some highlights of the content that is available and of the technical infrastructure that allows to search and browse them.

EAGLE aims to build a multi-lingual online collection of millions of digitised items from European museums, libraries, archives and multi-media 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, completed with the essential information about them, enriched through the use of seven multilingual vocabularies, and complemented with a series of peer-reviewed translations in several European languages, which are notoriously unavailable for inscriptions.

All this makes of the EAGLE Portal a very useful tool for the epigraphic community but also for single users and enthusiasts willing to contribute to the research in this field.

The participation of Europe's citizens in scientific research represents an important opportunity for improving European competitiveness, because of the value that citizens can add in specific areas of research. In particular, the participation of citizens in the research on CH and humanities has the potential to play an important role in the development of the European Research Area, and can take the lead in the discovery of new directions of cross-disciplinary research.

In this framework, the CIVIC EPISTEMOLOGIES¹⁸ project developed a Roadmap for the use of e-Infrastructures to support the participation

¹⁸ <http://www.civic-epistemologies.eu>.

of European citizens in CH practices and humanities research, where such engagement has a twofold benefit for culture: to be enriched by the citizens' contributions and to become more widely used and exploited (also, for example, with the participation of creative industries) (fresa\s\do5(r)oadmap\s\do5(2)015). The future development of the EAGLE initiative will refer to the CIVIC EPISTEMOLOGIES Roadmap for investigating how to put in place more advanced services supporting citizen science in epigraphic research.

The EAGLE Portal is only an example of application that makes use of the APIs provided by the Aggregator to access the EAGLE collections. Other examples are the Flagship Mobile Application¹⁹, that allows to access the inscriptions' database through a mobile device and to fully exploit the image recognition features integrated in the EAGLE Portal, and the Flagship Storytelling Application²⁰, that allows a user to create stories starting from the content available in EAGLE, Europeana and many other data sources. Other applications may be created based on the APIs provided by the Aggregator, which uses a SOLR-base search engine through which it is possible to search and browse the full set of content²¹.

Furthermore, APIs are provided to register a new user, login and perform an image-based search using the EAGLE image recognition algorithm.

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¹⁹ <http://www.eagle-network.eu/resources/flagship-mobile-app/>.

²⁰ <http://www.eagle-network.eu/stories/>.

²¹ For further information see http://wiki.apache.org/solr/#Search_and_Indexing.

10. Mapping Epigraphic Databases to EpiDoc

*Liuzzo Pietro**

Abstract

The Europeana network of Ancient Greek and Latin Epigraphy brings together most repositories of ancient epigraphic material and aims to provide historians not just with a useful research tool, but a curated online edition which has high quality content as well as high quality data. In this paper some of the up-conversion, alignment and enrichment tasks are presented.

Keywords: EpiDoc, XML, Vocabularies, Linked Data, Data harmonization

10.1. Introduction

The Europeana network of Ancient Greek and Latin Epigraphy¹ brings together most repositories of ancient epigraphic material and aims to provide historians not just with a useful research tool, but a curated online edition which has high quality contents as well as high quality data. Towards this end many steps are needed as the databases on which many institutions have worked for decades cannot be just discarded. Epigraphy enjoys a special position among digital resources as most transcriptions of existing classical inscriptions have been digitized. Many duplicates exist and a lot of the content lacks metadata almost entirely, but the work continues with dedication so that among the 10 % of digitised European Cultural Heritage, Ancient Epigraphy can certainly claim to play a strong role.² While the long term aim for epigraphy is on

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¹ Orlandi et al. 2014b, Orlandi et al. 2014a, Liuzzo et al. 2014 <http://www.eagle-network.eu/>.

² The data is taken from the Europeana 2020 strategy report available at <http://strategy2020.europeana.eu/>.

the one hand to keep up with new finds and studies and on the other to have a common and flexible entry point and backend on which to work together, this is not easy to accomplish without a careful process which involves a gradual transition from independent databases (the best option at the time when the EAGLE databases were created) to a common online data entry and editing system working on XML files in EpiDoc, as it has now become feasible. In this paper some of the mapping and content harmonization efforts undertaken by the EAGLE BPN to achieve this step towards a common epigraphic resource, will be presented as a case in which this apparently technical task involved deep revision of contents related to the discipline and required discussions and collaborative efforts by the working groups of digital epigraphists, encoders, epigraphists and developers, coming from several different background and experiences. The result of this work are the automated conversion to TEI EpiDoc XML of 90% of the text features in the EAGLE databases and the EAGLE Vocabularies, the largest existing controlled and aligned vocabularies for classical epigraphy.³

10.2. Why XML

Choosing XML for an online publication is almost obvious given the current stage of development of the editorial methodology in epigraphy. However there is room for a brief explanation of why this is preferable on a large scale to a relational database. I would like to suggest a comparison here. Coffee is produced by filtering water through a powder more or less thick. This can be accomplished by pushing water through the coffee (as in most systems, from a mocha to an espresso machine) or coffee through the water (as in a french press, where the coffee floats and is pushed down). There is pretty much the same difference when we compare the action of entering data into a database, i.e. a rigid structure of information, and marking up a text, adding tags to the text itself. The first process forces data through a grid however well thought off, while in the second case structure is added on the contents without altering them, but just enhancing their potential so that the richness and values of both contents and structure empower each other. There is just more taste and much more freedom of encoding to the level desired and to the complexity one wants.

³ <http://www.eagle-network.eu/resources/vocabularies/>.

An additional advantage is the level of interoperability. An XML file is virtually software independent, it is not an Access, FileMaker or whatever database format. A third reason is that an XML file can host a complete textual description with semantic markup and still have the structure of a normal text edition, while the same source can be used to produce a database or an index for interrogation purposes. For example the same markup of an abbreviation `<expan><abbr>C</abbr><ex>aiο</ex></expan>` can be used to produce a database of abbreviation marks and expansions, to output in a diplomatic edition only the character actually on the stone or to print the expanded abbreviation in a critical edition.⁴ To print a database to a book would be at least more cumbersome. XML provides also a better service as an archival format being explicit on the values it uses to describe contents, moreover if these follow a schema of agreed value of such elements. This said producing and sharing XML files means that more quality editions can be produced, printed editions can be produced and all sort of outputs can be supported with flexibility; it means that data is safe from software developments and support; it means you don't have to put information into a rigid table which is then hard to restructure, but that you can annotate your text as much as you want thus adding layers and layers of "possible databases" of relevant information to be extracted and used. The text is what one uses to describe situations and complexities, the markup allows also the machine to know and retrieve that information as in a database: you don't need a field or an element to state what the orientation of your text is, you can simply state and describe as you would do in a normal publication and if you want to reuse information about the text orientation then you can add elements and attributes to do so. XML allows not to worry too much on "what goes where" or about "where do I put that info" because it is not a database, so that the editor can instead focus on "what is that" and on accurately describing it. The TEI specification which is EpiDoc allows the specific epigraphic content to be described fully for what concerns the text of inscriptions, drawing on more than a decade long experimenting and development of this standard thanks to a vast and active international community. The simple fact of using the same markup to describe our texts allows us to study them together and to produce and run software for more than just one corpus of inscriptions.

⁴ <http://www.stoa.org/epidoc/gl/latest/trans-abbrevmark.html>.

10.3. EAGLE mappings and metadata modeling

The EAGLE BPN has taken 18 different content providers and has come to the decision to take the first steps to bring hundreds of thousands of ancient Greek and Roman inscriptions to TEI. This required 14 mappings of local database metadata models to TEI/EpiDoc, as well as the elaboration of XSL Transformations⁵ for up-conversion⁶ and the alignment of the text markup. Although this was thought to be a trivial task it turned out that whereas databases claimed to use the same conventions, a considerable amount of differentiation took place due to the data structure and to data entry procedures as well as to policies and internal decisions.

The main harmonization task undertaken has been to align the XML format of data provided for aggregation and ingestion, to the TEI specification EpiDoc.⁷ This well established TEI schema, broadly used in many high quality projects, allows for a very easy alignment, for the production of an XML file compliant with international standards and for high flexibility for integration of the vocabularies and places gazetteer in use.

Moving from a database to a marked up text is a partially mechanical operation which involves a theoretical jump. As coffee is better when water goes through coffee powder rather than when coffee goes through the water (as in a french press), a database has fields to be filled, while marking up a text is a descriptive activity which is attached to information whichever textual form it takes.⁸ Mapping from a database to XML forces into the XML a structure and a logic which is that of a database, whereas the freedom and flexibility achieved with XML are yet to be actually realized and exploited.

In order to offer a complete and critically structured endpoint to the user on the side of data, to describe inscriptions and their representations, EAGLE considered beside TEI also CIDOC CRM, studying and providing a full EpiDoc to CIDOC-CRM mapping.⁹

⁵ <https://github.com/EAGLE-BPN>.

⁶ This is the terminology used by Kay 2008, 906 to describe transforming without explicit structure in data which has it. In this case it is a transformation from a less explicit database structure to a fully explicit and interoperable one.

⁷ <http://www.stoa.org/epidoc/gl/latest/>.

⁸ See above.

⁹ Still under development, within the ARIADNE project. <http://www.ariadne-infrastructure.eu/>. The need for a working group and a variant declension of CIDOC for epigraphy have been highlighted during the Nicosia EAGLE meeting in March 2015.

This would have enabled a further full description in a different logic, that of the web of data, but the attempts made proved the need for more specific efforts.

There are several mappings involved in the aggregation work of EAGLE. Content providers need to map to a common Eagle Metadata Format, and the data produced will then be mapped to the Europeana Data Model¹⁰ in order to be aggregated in Europeana, for a wider dissemination with a special eye for the general user.

10.4. EAGLE metadata model and harmonization

The occasion of a mapping work allows also for other tasks of curation to be performed. EAGLE Members had in some case the text of a same inscription with three parallel different types of encoding conventions applied.

Content Curation: Transcriptions

<p>5</p> <p>D(is) M(anibus) s(acrum). L(ucio) Silicio Niconi filio, qui vixit an(n)is XXII, mens(ibus) VI, die= b(us) XX L(ucius) Silicius Ni- con pater fecit.</p>	<p>D(is) M(anibus) s(acrum) / L (ucio) Silicio Niconi / filio qui vixit an(n)is / XXII mens (ibus) VI die/b(us) XX L (ucius) Silicius Ni/con pater fecit</p>	<p>D M S L SILICIO NICONI FILIO QVI VIXIT AN XXII MENS VI DIE B XX L SILICIVS NI CON PATER FECIT</p>
<pre> <div type="edition" xml:lang="la"> <head>Text</head> <abbr>b n="17"<expand><abbr>D</abbr><ac>le</ac></expand> <expand><abbr>M</abbr><ac>anibus</ac></expand> <expand><abbr>s</abbr><ac>acrum</ac></expand><lb n="27"><expand><abbr>L</abbr><ac>ucio</ac></expand> Silicio Niconi<lb n="37">filio qui vixit <expand><abbr>n</abbr><ac>nis</ac></expand><lb n="47">XXII <expand><abbr>mens</abbr><ac>ibus</ac></ expand> VI die<lb break="no" n="57"><expand><abbr>b</abbr><ac>us</ac></expand><ac>us</ac></expand> XX L<expand><abbr>L</abbr><ac>ucius</ac></ expand> Silicius Ni<lb break="no" n="67">con pater fecit</ab> </div> </pre>		
<p>D(is) M(anibus) s(acrum) L(ucio) Silicio Niconi filio qui vixit an(n)is XXII mens(ibus) VI die- b(us) XX L(ucius) Silicius Ni- con pater fecit</p> <p style="text-align: center;">5</p>		

Fig. 10.1. Different Texts before and after harmonization though up-conversion.

In the context of the mapping to EpiDoc of the metadata, the text also underwent transformation with tools which have been developed to support the alignment and harmonization of data from content providers to international standards for what concerns digital editions of inscriptions.

Given the template described in Part III, and ANNEX II of the EAGLE Metadata Schema (Sicilia et al. 2015), an XSL Transformation converts from string epigraphic texts in marked up TEI-EPIDOC XML, following the EpiDoc¹¹ guidelines (Elliott et al. 2007-2016).

¹⁰ Sicilia et al. 2015.

¹¹ <http://www.stoa.org/epidoc/gl/latest/>

These XSLT:¹²

1. allow the conversion of epigraphic texts with various encodings and conventions from string to Epidoc markup and valid against the The EpiDoc RelaxNG schema.
2. Populate appropriate elements with available common URI from the EAGLE vocabularies¹³.

This export set up will also guarantee that contents are kept aligned to the EpiDoc guidelines at all stages guaranteeing an effort free alignment to these international conventions for partners who can continue to apply local conventions for editing. But I would like to give more details on the steps of this process as an example of how it was possible to extract semantics, entities, and patterns from these text while aligning metadata format to an internationally recognized standard.

10.4.1. Step 1

Each project uses different conventions and therefore the regular expressions used to match particular situations are different. The process of mark up of the string text in `div[@type="edition"]` is accomplished in several steps to guarantee consistency and precision.

The `textstructure.xml` looks for marker of different sections and tokenize them to apply the same XSLT to each section of the text which needs to be contained by an `<ab>` element. If there is only one part it applies following instructions to that only.

Each section of text is then processed by the `brackets.xml`. Normalizing brackets is important for the following steps and splits individual semantic values. The notation `[ort 3]`, which would mean that a supplied text is followed by a gap of three letters, is divided into `[ort][3]`.

The normalized string which results from this process is then passed to the `up-conversion.xml` which works using a specific operation to search for regular expressions patterns (`xsl:analyze-string`) and substitute them with correct xml elements.

Running the transformation on the pattern `<E=F>` will return the following result:

```
<choice><corr>E</corr><sic>F</sic></choice>
```

¹² Based on `Chetc.txt` (by Hugh Cayless, Elli Mylonas, Gabriel Bodard and Tom Elliott) and further support from the Epidoc Collaborative (especially from Gabriel Bodard).

¹³ <http://www.eagle-network.eu/resources/vocabularies/>.

The result of this template is then passed to a further template which gives consistent numbers (insertnumbers.xsl). Empty lines do not need to have numbers, so Xpath is used to evaluate where to put a 0 as value of the @n in the <lb> element. Starting from this

```
-----] / e[t?] Q(---) Bl(a)e[sus?] / contub/ernalis / eius / d(e) s(uo) l(ibens)
l(aetus) d(edit)
```

The result of this processes is then the following¹⁴

```
<ab>
<lb n="0"/><gap reason="lost" extent="unknown" unit="line"/>
<lb n="1"/>e<supplied reason="lost" cert="low">t</supplied>
<abbr>Q</abbr>
Bl<expan><ex>a</ex><abbr>e</abbr></expan><supplied
reason="lost" cert="low">sus</supplied>
<lb n="2"/>contub
<lb break="no" n="3"/>ernalis
<lb n="4"/>eius
<lb n="5"/><expan><abbr>d</abbr></ex><ex>e</ex></expan>
<expan><abbr>s</abbr></ex><ex>uo</ex></expan>
<expan><abbr>l</abbr></ex>ibens</ex></expan>
<expan><abbr>l</abbr></ex>aetus</ex></expan>
<expan><abbr>d</abbr></ex>edit</ex></expan>
</ab>
```

10.4.2. Step 2

On the elements which contain information such as Object Type, Material, Execution Technique, etc. which are typically handled with a controlled vocabulary a series of XSL transformations is passed, one for each vocabulary related to that element to match the content of the element with the vocabulary entry into the SKOS vocabulary stored in git, regularly updated and published as a self standing resource on the EAGLE portal.¹⁵ What follows is a brief description of such vocabularies and their development.

¹⁴ The amount of feature supported is much higher and some example of complex text successfully converted can be seen in this presentation online.

¹⁵ <http://www.eagle-network.eu/resources/vocabularies/>.

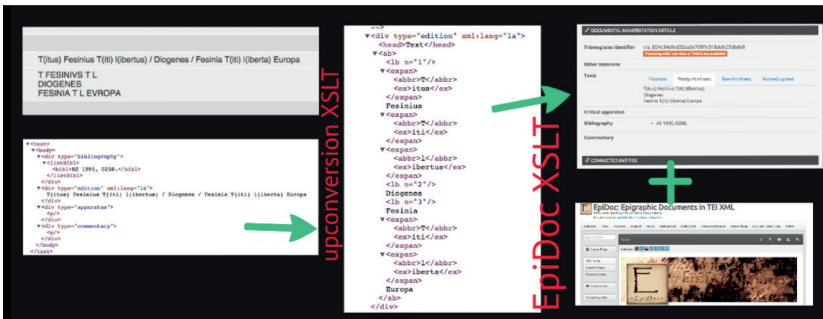


Fig. 10.2. Stages of transformation of a text: database, template, up-conversion, checking and display with EpiDoc XSLT.

10.5. Classification problems: the EAGLE Vocabularies

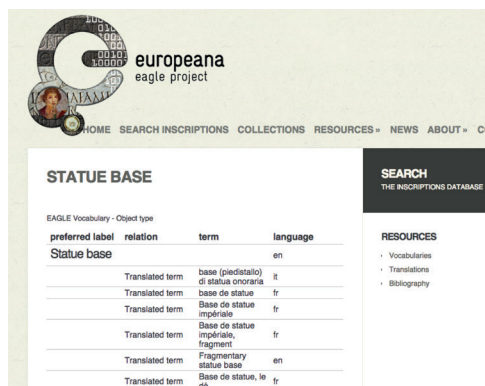
As Di Stefano Manzella¹⁶ clearly explained classification is no easy issue in any field: epigraphy is no exception to this rule. Traditionally the CIL VI (Rome) classification has been used as a reference, as this typology has served as a model for all epigraphic production in the Roman Empire. There are nevertheless new glossaries and classification curated by http://cil.bbaw.de/cil_en/dateien/glossar.php#auswahlglossarCIL, which retain the scientifically selective constraints of a formal classification, together with the benefits of this.

Problems are various, and include also the use of terms across vocabularies and the doubts which might be generated by archaeological chance.¹⁷

What looks like an **altar** could be also the **base** of a statue, for example. Or perhaps it could have served two different function has an object of which we might or not have any archeological, contextual or textual trace.

¹⁶ Di Stefano Manzella 1987, 109.

¹⁷ See Piso 2001, XI-XII, following a current of studies which has its main in G. Susini and J.-N. Bonneville.



STATUE BASE

EAGLE Vocabulary - Object type

preferred label	relation	term	language
Statue base			en
Translated term		base (pedistallo)	it
Translated term		di statua onoraria	fr
Translated term		base de statue	fr
Translated term		Base de statue impériale	fr
Translated term		Base de statue impériale, fragment	fr
Translated term		Fragmentary statue base	en
Translated term		Base de statue, le dé	fr

SEARCH
THE INSCRIPTIONS DATABASE

RESOURCES

- Vocabularies
- Translations
- Bibliography

Fig. 10.3. Statue Base.

This is also the case when we deal with techniques of execution of an inscription. Those can also be multiple and an inscription can be for example both a graffito and painted. And this is just not to mention the extreme complications of having a lot of independent vocabularies, each one for its own sake and small scope purpose. This is often the best option for correct attribution as local habits do vary. But within the framework of harmonization activities, it is important to refer to connected and interrelated definition of terms (not univocal!) and to allow for multiple values to coexist. This is one best practice in the definition of vocabularies which is very important for the nature of content in question. This is also the reason why the EAGLE decided to provide not just definitions of all main terms but also examples from different areas and in different state of preservation, and as far as possible also bibliographic reference to authoritative sources.

The EAGLE Vocabularies are the following

- <http://www.eagle-network.eu/voc/typeins.html> Type of Inscription
- <http://www.eagle-network.eu/voc/objtyp.html> Object Type
- <http://www.eagle-network.eu/voc/material.html> Material
- <http://www.eagle-network.eu/voc/writing.html> Writing and Execution
- <http://www.eagle-network.eu/voc/decor.html> Decoration
- <http://www.eagle-network.eu/voc/statepreserv.html> State of Preservation
- <http://www.eagle-network.eu/voc/dates.html> Dating Criteria

The image shows a screenshot of the Epigraphic Database Bari website. On the left, there is a record for 'Chelone (chelon) (plur.) in pluri' with a small image of a shell. A green arrow points from this record to two EAGLE vocabularies on the right: SCALPRO and TAFEL.

SCALPRO
EAGLE Vocabulary - Writing

preferred label	relation	term	language
Scalpro			la
	Translated term	chiselled	en
	Translated term	chiselado	es
	Translated term	geritzt / ziseliert	de
	Translated term	incise a scopello	it
	Translated term	incise	en
	Translated term	incised	en
	Translated term	incised	fr
	Translated term	incised	en
	Translated term	inscribed	en
	Translated term	inséer	fr
	Translated term	inséer	hu
	Translated term	okukladivo	sr
	Translated term	التشريح	ar
	Preference	inscribed with chisel	en

TAFEL
EAGLE Vocabulary - Object type

preferred label	relation	term	language
Tafel			de
	Translated term	tabletta	it
	Translated term	sheet	en
	Translated term	slab	en
	Translated term	tablette	fr
	Translated term	tabula	la
	Translated term	tableta	sr
	Translated term	tableta	hu
	Translated term	tableta (skivo obrtnica)	sr
	Translated term	table	en
	Translated term	table	ar
	Related term	inscribed plaque	en
	Related term	plaque	es

Fig. 10.4. EAGLE Vocabularies used by the Epigraphic Database Bari.

The EAGLE vocabularies are maintained in a git repository where they are manually updated and transformed to a readable versions (with another XSLT transformation) published on the EAGLE website as a self standing resource linked to several others. A user is thus able to search for a type of object and read a definition as well as searching for more information on Wikipedia, Wikidata, Wikisource, etc. including the partners' websites. The Vocabularies perform thus both a technical function and are at the same time a living resource which can be read and used independently.

10.6. Linked Open Data

The Europeana LOD practice for metadata recommends the adoption of machine readable vocabularies. Within the EAGLE BPN Linked Open Data practices and approaches have been taken on board for a process which will bring current material some steps closer to that practice.¹⁸ Addressing existing problems in classification and the publication of a machine readable vocabulary of values (controlled vocabulary) is one of these steps:¹⁹ it involves identifying and matching values as well as giving them stable identifiers and making of them self standing resources where possible.

¹⁸ Bizer et al. 2009.

¹⁹ Harper 2012 for the definition. See also Isaac et al. 2012.

In fact the many problems and complexities which Di Stefano Manzella (1987) underlined and exposed can find a solution using the LOD approach.²⁰ Both the limits of choices and hierarchical organization can be bypassed using unique identifiers and relations among those. Polyhierarchical structures as well as the presence of many possible denomination with specific and self standing definition allows for both precision, consistency and sustainability over time of this approach.²¹

For example, an inscription can easily be classified both as *magistrati populi romani* and as *decuriones municipales*; a document can be classed both under the *fasti* and under the individual mentioned in the text. These major advantages can be exploited when the effort of publishing open machine readable material is undertaken and a document can be then classified chronologically and alphabetically without the need of an authorial choice.²²

Nevertheless, the major possible advantage is that there is no evident need, with a LOD approach, to distinguish among Greek and Latin inscriptions: they can find their place together in a Linked Data edition and benefit of other efforts in this direction.

10.7. Crosswalking EpiDoc to EDH with XSLT

The proof of concept of usability of the XML source file is given by the reverse function being possible, i.e. to transform the XML files into a database data structure. A team of people from the EAGLE BPN²³ and Scott Vanderbilt, curator of the online edition of the Roman Inscriptions of Britain,²⁴ worked on mapping the EpiDoc contents of that project to the EDH database model,²⁵ facing a series of problems and challenges, which brought an interesting discussion, also on principles of “up-conversion” and cross-walking, which should be as often as possible multi-directional.²⁶

²⁰ Bizer et al. .2009.

²¹ Harpring 2010.

²² I would like to thank prof. Piso for input on this point, given during the work of the Working Group.

²³ Gabriel Bodard, Pietro Liuzzo, James Cowey, Frank Grieshaber, Brigitte Gräf and Francisca Feraudi Gruénais.

²⁴ <http://romaninscriptionsofbritain.org/>.

²⁵ The work was largely based on the previous exercise of this kind, made by Gabriel Bodard and James Cowey for the Inscriptions of Roman Tripolitania.

²⁶ The files are available here: https://raw.githubusercontent.com/EAGLE-BPN/Epidoc2EDH/master/rib_to_edh-2.xsl.

Challenges included

- alignment to EDH internal vocabularies
- alignment to EDH conventions for bibliographic references
- use of internal references and retrieval of key based information
- matching of existing items
- formatting to EDH conventions differentiated based on the type of content extracted (text or names)

The result was successful and proves once more if needed that an XML source format is a preferable option whatever the variety of desired output are.

10.8. Conclusion

I have presented in this paper the effort of a large consortium of people and institutions belonging to the same field of interest, that of Ancient Roman and Greek Epigraphy. Mappings and harmonization of data have been for the EAGLE project not just a way to allow machines to do more, but an intellectual effort of revision of contents and establishment of best practices. This work prepares further steps which hopefully will take place soon, in which one repository of inscriptions will be accessible to all to edit, contribute and download data from several websites and interfaces. In such environments related contents based on descriptive URIs, as well as places, personal names and other semantic information will be possible and meaningful and perhaps in a not too far future classicists will have a complete and functioning network of Linked Ancient World Data, including texts, manuscripts, papyri, coins and inscriptions.

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11. Trismegistos Places, a geographical index for all Latin inscriptions

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Abstract

The Trismegistos database has recently created a geographical index for all Latin inscriptions. For the moment we have 67.820 geographical references attested in Latin documentary texts, but this rough starting material still has to be refined. This paper describes how we undertook this task, which problems we encountered while doing so, and the choices we made for the presentation of the material.

Keywords: Imperium Romanum, Latin, epigraphy, topography, geography, Trismegistos

The Trismegistos (TM) database (<http://www.trismegistos.org>) of the Leuven in Belgium gathers the metadata for all documentary and literary texts from Egypt and the Ancient World in general written in whatever language or script between 800 BC and 800 AD. In this respect we try to collaborate as much as possible with other scientific databases all over the world. We started some ten years ago with the papyrological material from Egypt (both Greek and Egyptian), and the last few years – through the collaboration with EAGLE – we have also been incorporating Latin epigraphical texts from the whole Roman world. For the moment TM shows the metadata for 618.917 texts, 439.858 of them written in Latin or containing Latin passages, but the number keeps on growing. Our direct EAGLE partners Epigraphic Database Heidelberg (EDH), Epigraphic Database Roma (EDR), Hispania Epigraphica Online Database (HEp) and Epigraphic Database Bari (EDB) mainly focus on inscriptions on stone and other important texts from the regions they cover, but they usually omit

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the inscriptions and stamps on *instrumentum domesticum* or other minor materials. Since TM also wanted to incorporate these texts, we were glad to find them in the Epigraphik-Datenbank Clauss-Slaby (EDCS), which contains virtually all published Latin inscriptions, to fill in the missing gaps, a process which is still going on.

Trismegistos is a relational database created within the computer program Filemaker (with as latest version Filemaker Pro 14). Its contents are uploaded weekly to an online MySQL / PHP environment. Attached to the main TM Text file are numerous other files, such as Collections, Archives, People, Names and Places. These files automatically copy the relevant information for every card from the main file, so that no double work is needed. With the help of the Papyrological Navigator (PN) (<http://www.papyri.info>) we developed a PHP environment with the assistance of a programmer (Jeroen Clarysse), to tag all words starting with a capital occurring in the published papyrological texts, which yielded in the end a full index of all personal names and toponyms in every Greek and Latin papyrus. This process is nowadays called Named-Entity Recognition [NER]¹. These TM files within People and Places are freely accessible online and can be looked up, questioned and investigated in a number of ways. But that is a different story. Here we want to focus on our project to do the same for all published Latin inscriptions.

The main credits for the whole set-up of this new project go to Mark Depauw, the Trismegistos director. The general idea remained the tagging of all words starting with a capital, but this time Depauw tried a new approach, which was completely imbedded within Filemaker. Since the Roman 'tria nomina' hardly occur in the Greek papyri, also a new onomastical structure had to be devised for the automatic recognition. As a test case we choose the full text corpus of the EDCS. All these texts were 'cut up' in capital clusters, i.e. strings of consecutive words all starting with a capital. Words as *filius*, *nepos* and *libertus* were added to the string so that in most cases the full identification of a person could be grouped together, e.g. *Quintus Caecilius Quinti filius Quirina Mustacus* (TM 332260), *Caio Annioleno Cai filio Arnensi Karthaginiensi Galliano* (TM 349961) or *Maesiaes Cai libertae Chrysidis* (TM 244384). A minor disadvantage of this corpus was the capitalization of the first word of every inscription (which is not done in the PN),

¹ For more information on NER, Broux and Depauw 2014, 304-313.

which yields quite a significant number of mere nouns in the group of expected personal names and toponyms. Also other words starting with a capital were not our prime goal: names of gods, religious festivals, months, army units, ships, animals, mythological persons and Roman numbers. Excluded (for the moment) are also the names of the emperors and the members of the imperial family, often occurring in a complicated titlature which is not easy to standardise. In the end this yielded 898.134 capital cluster cards. From our previous projects we already had a fairly elaborated reference corpus of Roman personal names, which was now expanded and used by Depauw to match every word in the capital clusters with the names in the reference corpus. If there was a match, the case of the ending was added, e.g.

Caio Annioleno Cai filio Arnensi Karthaginiensi Galliano
 dat dat gen filius tribus origo dat

The screenshot shows a FileMaker Pro interface for a Named Entity Recognition card. At the top, it displays 'EDCS id temporary 36305' and 'TM_textid 349961'. Below this, there are fields for 'Cluster001' (Caio Annioleno Cai filio Arnensi Karthaginiensi) and 'Numpipes_Cluster001' (7). A 'check' field is set to 'check'. A 'georef' field is visible with a dropdown menu. The main part of the card is a table with columns for 'cluster_interpretation', 'Word01-Word15', and 'Word01_case-Word15_case'. The 'Word05' entry 'Arnensi' is highlighted with a 'GEO OK' status. At the bottom, there are fields for 'TM_provenance' (Tunisia, Africa - Uccula), 'EDCS province' (Africa proconsularis), 'EDCS place' (Henchir Durat / Uccula), and 'TM_century'.

Fig. 11.1. Named Entity Recognition with FileMaker Pro 14.

The technical details of this complicated process are better discussed by Depauw himself at some other occasion. On the basis of this matching all capital cluster cards were split up in two groups: (1) 'yes', this card contains a personal name [454.183], and (2) 'no', this card does not contain a personal name [443.951].

Within the second group also other labels have been added, e.g. army [23.201], god [15.663], emperor [41.944], which will be useful for future research.

This is also the phase where the toponyms come in (which can occur both in the first and in the second group). Within the EAGLE project we created already a fairly large reference corpus for toponyms from the Roman empire, but this corpus was enlarged by entering the toponyms occurring in the *Itinerarium provinciarum Antonini Augusti* [3.434] and the *Tabula Peutingeriana* [3.287]. The TM Geo file now contains 46.707 toponyms from all over Egypt and the Roman empire, both ancient and modern, which cover most of the places where ancient texts have been found, and most of the toponyms mentioned in Egyptian papyrological and Latin epigraphical sources². We played with the idea of automatic matching, like we did for the personal names, but except for the case of the relatively straightforward tribus names, this yielded no satisfactory results. A lot of toponyms resemble personal names (e.g. *Florentia*, *Venusia*, *(Fundus) Bassianus*), and the automated identification of strings such as *Colonia Ulpia Traiana Augusta Fidelis Lepcis Magna* (TM 198383) or *Municipium Augustum Hipponiensium Regionum* (TM 200133) seemed too cumbersome. In the end, we settled for plan B, which shows that in ‘Digital Humanities’, the human component is still essential: we had to go through all 900.000 capital cluster cards manually, identifying the toponyms in every cluster, adding the corresponding TM Geo number and – whenever necessary – correcting the indications for yes/no and the automatic identification of the cases of the personal names. It was six months of tedious work, resulting in 61.139 capital clusters with at least one toponym. No doubt some toponyms escaped our attention, but we do hope to have identified the majority of the names involved. In this process, however, we also encountered some set backs, especially in the longer texts and in the more complicated wooden or metal tablets: in the beta version on which we worked, the creation of the capital cluster strings was not always so perfect as we had hoped for, and also the line numbers automatically assigned to each cluster string have sometimes gone astray. Mark Depauw is developing a new and improved version, especially in preparation for the much larger batch of personal names, where it is virtually impossible to manually correct everything that has gone wrong.

² For more information on TM Geo, Verreth, 2016.

Due to these problems I guess that we now have about only 80 to 90% of the toponyms occurring in all Latin inscriptions, but on the whole we are quite pleased with the result and in due time the remaining toponyms no doubt will find their way into the database also.

Phase 1, the identification of toponyms in the capital cluster strings, was finished in the beginning of July 2015, and we have now almost completed phase 2, the incorporation of the capital cluster file into the 'real' TM Georef file. For every place listed in TM Geo we try to list all the ancient text references where that place is attested. The file of these geographical references (TM Georef) is directly linked with the main TM Text file, so that every reference automatically receives a chronological and a geographical context. Every toponym found in the capital cluster file is exported to a separate Georef card. When a toponym exists out of several consecutive elements, like the *colonia* and *municipium* examples mentioned before, they are automatically grouped on one card. Twofold toponyms such as '*Bithynia et Pontus*', which cannot belong to the same capital cluster string because of the intermediary '*et*', are exported double and then afterwards joined manually. For the moment TM Georef lists 67.820 geographical references attested in Latin documentary texts and 10.474 references attested in Latin literary texts (but except for Egypt the latter have not yet systematically been entered). The Latin references make out almost 40% of the total of 196.794 Georef cards.

The screenshot displays the 'Georef' interface for a specific place record. The top navigation bar includes 'Goto', 'Georef', 'People Info', and 'File'. The main content area is divided into several sections:

- Process:** Shows 'general_id' (157291) and 'modified' (03/08/2015 09:20:45).
- Attributes:** Includes 'phnum' (2058), 'country' (Italy), and 'names' (LAT).
- Name:** 'Lattum - Roma'.
- Text:** '2829/10 | CIC VI.8.3 41420:6'.
- Text Inventory:** Lists 'LAT' and 'EDCS'.
- Georef:** Lists 'P W' and 'Città del Vaticano'.
- DUKE EXPORTS:** Includes 'Import EDCS 2015_08_22'.
- EDCS:** Contains the Latin text: 'Flavio Maximo viro clarissimo con[qu]l[is] / concessum locum Pet[ri] vicari[us] urbis / Romae ex st[atu] volu[it] (num 3) / et contigi eius Iohan[ne] a beatissimo / papa Hormida et Trans[un]do 3) / prae[po]sit[us] be[at]i Pet[ri] (apost[oli] 3)'. Below this is a 'Text Inventory' table with columns for 'Text', 'Lattum', and 'EDCS'.
- EDH:** Contains the Latin text: 'Flavio Maximo viro clarissimo con[qu]l[is] / concessum locum Pet[ri] vicari[us] urbis / Romae ex st[atu] volu[it] (num 3) / et contigi eius Iohan[ne] a beatissimo / papa Hormida et Trans[un]do 3) / prae[po]sit[us] be[at]i Pet[ri] (apost[oli] 3)'. Below this is a 'Text Inventory' table with columns for 'Text', 'Lattum', and 'EDCS'.
- EDR:** Contains the Latin text: 'Ergo[rum] tractu] Flavio A[ug] Maximo viro clarissimo con[qu]l[is] / concessum locum Pet[ri] vicari[us] urbis / Romae ex st[atu] volu[it] (num 3) / et contigi eius Iohan[ne] a beatissimo / papa Hormida et Trans[un]do 3) / prae[po]sit[us] be[at]i Pet[ri] (apost[oli] 3)'. Below this is a 'Text Inventory' table with columns for 'Text', 'Lattum', and 'EDCS'.
- EDB:** Contains the Latin text: '(Cetera quadam] Flavio Maximo viro clarissimo con[qu]l[is] / concessum locum Pet[ri] vicari[us] urbis / Romae ex st[atu] volu[it] (num 3) / et contigi eius Iohan[ne] a beatissimo / papa Hormida et Trans[un]do 3) / prae[po]sit[us] be[at]i Pet[ri] (apost[oli] 3)'. Below this is a 'Text Inventory' table with columns for 'Text', 'Lattum', and 'EDCS'.

Fig. 11.2. The Georef Card.

In this phase we also start comparing the reading of the toponym in EDCS with the readings of the same passage in EDH, EDR, HEP and EDB, which can all be shown simultaneously in the Filemaker database.

In theory it is possible to automatically look for differences in readings among all these databases, but because each of them has its own approach, there will be so many small differences in line numbering, punctuation, the use of uncertainty dots and the way unconventional spelling in an inscription is indicated, that we doubt that there will be many exact matches. We therefore think that it will not be worth the enormous amount of work that it would involve. Human observation is again the answer and we do hope that our partners and the users of the geographical index will point out to us any mistakes we have made or obsolete readings we have kept. For the online version we have to talk with our partners whether they want to have their texts also shown on the TM page (like TM does for the texts from PN) or not. For the Open Access CC-0 texts in the Europeana EAGLE portal, this will in any case be implemented in the future. Anyway it is always possible to put a direct link on the Georef page to every partner that has the text in its corpus.

Since the users of TM must be able to look for specific spelling variants of each toponyms, all these references are presented the way they are on the stone, with as little additions or emendations as possible, except of course for any abbreviations at the end of the word; e.g. *T(h)ra[c(um)]* becomes *Tral[c(um)]*, and *Rom(a)e* becomes *Rome*. In another field the standardized nominative case is given, without brackets or uncertainty dots; e.g. *Trax* and *Roma*.

The screenshot shows the Georef database interface for the entry 'Philadelpheia'. The interface is divided into several sections:

- Places:** Contains fields for *georef_id* (7074), *placodes_id* (737008), *modified* (13/08/2015 17:50:03), *pinum* (1760), *country* (Egypt), and *nomos* (00a).
- name:** *Uis - Philadelpheia (gharabet el-gerza)*
- See also:** Empty field.
- text_id:** 13022 | *P. Hyt. Gr. 4 611*
- author:** Empty field.
- prefix, column, line, suffix:** Fields for *3*, *9*, and *13022/3*.
- name:** [v]ico Phil[adelphia]
- clean:** Philadelpheia
- etno:** Latin
- context:** Empty field.
- date:** AD 87 - 88
- specif:** Empty field.
- admin:** Arsinoites
- status:** vicus
- topic:** Empty field.
- location:** Empty field.
- detail:** (date), in the Arsinoites nomos, in the vicus Philadelpheia
- biblio:** ChLA 4 248 (new reading)
- note:** obsolete reading: [v]ico Phil[adelphe]
- comment:** Empty field.

On the right side, there is a 'Related Information' sidebar with several expandable sections:

- Archives:** Expandable section.
- People in this text:** Expandable section.
- Text:** Expandable section, showing 'AD01'.
- Text Inventory:** Expandable section, showing 'Manchester, John Rylands'.
- Geotex:** Expandable section, showing 'F W Egypt, 00a - Philadelpheia'.
- Georef:** Expandable section, showing '00 - Arsinoites (Fayum)'.
- DLKE EXPORTS:** Section with fields for *filename*, *line*, *name*, *start*, *end*, *duke_TM* (13022), and *ident* (-1).

Fig. 11.3. Philadelpheia.

For every text in TM we try to give a reference to the most authoritative edition, where the user can find the best and most up to date reading and interpretation of that text. As authoritative editions we preferably use CIL, *Année épigraphique* and more recent major editions such as RIB, ILAlg, ICUR or I. Alex. Imp. Any corrections to the reading of the toponym with regard to that edition are to be listed in the field Bibliography, while the obsolete reading is recorded in the field Note. If the correction comes from one of the online full text databases, we add a reference to the number of the text in that database.

A major problem is the dating of the texts. Unfortunately not every edition provides a date for each inscription. Even if the scholar who publishes the text, has a fairly good idea of the century or range of time to which the text might belong, it is not always mentioned explicitly in the edition. For every Latin text for which TM did not receive a date from its partners, we added the broad range of 199 BC till AD 799, hoping that this dating will become more refined in the future.

The third and final phase involves the context of the toponym. In the field Detail we give a plain translation of the immediate phrase to which the toponym belongs. The translation should be a standardised as possible, with *termini technici* preferably added in Latin, so that the users can easily search for them in the database; e.g. 'Tiberius Iulius Martialis son of Tiberius of (the tribus) Claudia from Savaria, soldier (miles) of legio XV Apollinaris', 'praefectus Aegypti', 'cohors I Tungro-rum'. If the place is explicitly ascribed to a *provincia* or a region, this *provincia* is listed in the field 'Administrative situation'. If a town is explicitly called an *oppidum*, a *vicus* or a *civitas*, this information is listed in the field Status. By adding this information in searchable fields we hope that the user can start asking quite specific questions; e.g. the first and last attestation of a place in the sources; the periods in which a town was called a *colonia* or a *municipium*; the places in which the '*ala I Thracum Mauretana*' has been attested.

TM is a relational database, which implies that it is possible to get to the information from different angles. If someone is studying a certain text, he can get a list of all toponyms mentioned in that text. On the other hand, if someone is examining a certain place, he can find the list of all attestations for that place, in the order that he wants. In some cases a scholar can have very specific questions, which are difficult to search through the online TM search interface; it is quite well possible,

however, that these questions can be easily answered in the more complex Filemaker structure we have at our disposal; just contact us and we will try to solve the problem for you.

We are aware that this is a very succinct presentation of the new and exciting developments in Trismegistos Places, but everybody interested is always more than welcome to ask for more information. Please feel free to provide us with any addenda or corrigenda to the database you might have.

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12. Augmenting the Workspace of Epigraphists. An interaction design study

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Abstract

This paper presents the results of an interaction design study that focuses on the use of natural user interfaces for professionals in the fields of epigraphy and archaeology. This study proposes solutions for utilizing the sensors that can be found in popular handheld devices, such as tablets and smart phones, in order to naturally perform common tasks from the typical workflow of epigraphists. The developed interface allows the users to naturally hold digitized inscriptions, interact with them in order to relight or manipulate them as if they were real physical objects, and interact with metadata or other multi-modal data, such as text and images.

Keywords: Mobile Applications, Interaction Design, Natural User Interfaces, 3D models, Archaeology

12.1. Introduction

The technological advances in the last decade have equipped the general public with several handheld electronic commodities that changed significantly daily routine in a personal and professional level and contributed to the user's quality of life not only in developed countries but also in developing economies in Africa and Asia (Osman 2011). Handheld devices, such as tablets and smart phones, not only connect the users with tremendous amount of information through the internet, but also offer interfaces for natural user interaction that enable non-technology-oriented populations to use computers intuitively.

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In the fields of epigraphy and archaeology, the areas of digital epigraphy and computational archaeology have benefited from the use of several of the sensors available in handheld devices. Crowd-sourcing of photographic data and geo-spatial information, augmented-reality navigation in archaeological spaces and museums, and 3D scanning of historical artifacts, using smart phones and tablet computers, are few of the exemplar applications of handheld sensors in epigraphy and archaeology. One common component in all the aforementioned applications is the ability to record tridimensional data either in the form of geo-spatial coordinates, or in the form of local 3D point coordinates needed for augmented-reality interaction, or for the construction of triangular meshes of 3D models.

There are several examples in literature that present 3D digitization projects that have been undertaken by museums including the Epigraphic Museum of Athens (Papadaki et al. 2015; Sullivan 2011), Museo Arqueológico Nacional de Madrid (Ramírez-Sánchez et al. 2014), Museo Nazionale Romano di Palazzo Altemps (Barmpoutis et al. 2015), Museo Geologico Giovanni Capellini di Bologna (Abate and Fanti 2014), National Museums Liverpool (Cooper et al. 2007), Smithsonian Institution (Wachowiak and Karas 2009), and several other museums and institutes (Gonizzi Barsanti and Guidi 2013; Landon and Seales 2006; Levoy et al. 2000).

Several novel methods for scanning, processing, and analyzing 3D models of inscriptions have been developed, including methods for text extraction from inscriptions (Aswatha et al. 2014; Sullivan 2011), accurate 3D scanning of inscriptions (Papadaki et al. 2015), visualization of inscriptions (Bozia et al. 2014), as well as 3D applications for other archaeological artifacts (Babeu 2011; Esteban and Schmitt 2004; Malzbender et al. 2001; Pollefeys et al. 2001). Comparative studies of 3D scanning methods for cultural heritage can be found in (Pavlidis et al. 2007) and (Böhler and Marbs 2004).

The aforementioned examples show that the use of 3D technologies in epigraphy and archaeology has been a well-studied topic over the past two decades. However, there is a notable disconnect between the research on these technologies and the actual use in the professional epigraphic and archaeological practice, as it has been hard for non technology-oriented audiences to handle and manipulate tridimensional data, using conventional computer equipment.

Furthermore, without mechanisms for proper user interaction, a 3D model that is projected on a 2D screen is not significantly advantageous compared to a set of 2D photographs.

The recent advances on Natural User Interfaces (NUI) along with their marketing as low-cost general-purpose devices (smart phones and tablets) have created a nurturing environment for integrating them in cultural heritage applications. Popular low-cost NUIs, such as touch screens, marker-less position trackers, motion sensors, and head-mounted displays have been recently studied and employed by museums as mechanisms for multi-sensory virtual experiences (Ujitoko and Hirota 2015; Soile et al. 2013; Ikei et al. 2015).

This paper tries to fill the gap between the 3D technologies and their actual professional application in the field of epigraphy by proposing innovative uses of NUIs specially designed to serve epigraphists. This is, to the best of our knowledge, the first systematic interaction design study in the field of epigraphy. This study proposes solutions for utilizing the sensors that can be found in popular handheld devices to naturally perform common tasks from the typical workflow of epigraphists. The developed interface allows the users to naturally hold digitized inscriptions and interact with them in order to relight or manipulate them, as if they were real physical objects, and also interact with metadata or multi-modal data, such as text and images.

12.2. Understanding the workflow of epigraphists

Understanding the users is one of the integral steps of interaction design, which is an iterative process during which representative users interact with preliminary designs and provide useful feedback (Preece et al. 2015). For the purposes of this study, our team interacted with early adopters of our prototype system, who were epigraphists and conservation specialists from Cornell University, the University of California, Berkeley, the University of Lyon 2, the Berlin-Brandenburg Academy of Sciences and Humanities, the U.K. National Archives, and the University of Florida. The goals of our interaction were twofold: a) to study the various forms of physical interaction that epigraphists have with an inscription as a real physical object and b) to expose epigraphists to a digital interface that imitates their interaction routine, using digital replicas of physical objects.

The first part of our study revealed 3 common types of interaction with the inscriptions as physical objects:

1. Change of point of view: Observation of the inscription from different viewing angles assists epigraphists understand better the shape of the inscribed letterforms.
2. Change of lighting conditions: Relighting the inscription by introducing artificial shadows or additional light sources from different angles may reveal details that were not legible in the original lighting conditions.
3. Magnification of inscribed details: Close observation of an inscribed region of interest, with or without artificial magnification, may assist epigraphists in assessing weathered fragments and make a better informed decision regarding the deciphering of the original text.

It should be noted that in addition to the above 3 types of interaction, there are two additional interactions that are special cases of I and II. More specifically, the physical object can be either portable (such as a small fragment of stone or other material) or not (when the inscription is on an inscription bearer). In the case of a handheld object, interactions I and II involve manual movement of the inscription with respect to the fixed observer (case I) or the fixed light source (case II), while in the case of large rigid objects the observer and the light source move with respect to the fixed inscription.

According to the above analysis, in the case of digitized inscriptions a NUI should provide the means for an epigraphist to “hold” the virtual object, “move” the point of view with respect to the virtual object, “manipulate” the virtual object with respect to the virtual light source, and “focus” on details of interest. The next section presents a NUI-based interaction design that proposes natural solutions to the aforementioned forms of interaction that seamlessly imitate the typical workflow of epigraphists.

12.3. Natural User Interface design for epigraphy

Natural User Interfaces consist of sensors that track the natural behavior of users and provide a natural form of interactivity with computers and other electronic devices.

The common forms of NUI sensors are: pressure sensors for sensing touch gestures (e.g. touch screens and touch pads), motion sensors for sensing user-initiated changes in the orientation and acceleration of the device (e.g. accelerometer, gyroscope, and compass), and position sensors for tracking changes in the relative position of the user with respect to the device, such as body motions (e.g. Microsoft's Kinect), finger motions (e.g. Occipital's Leap Motion), eye movements, and others.

An optimal interaction design solution should be intuitive, minimalistic, and non intrusive (Preece et al. 2015). Therefore, in order to design interaction for epigraphy one should choose devices that are easily accessible by epigraphists and do not interfere with their workspace (e.g. avoid introducing new devices or external sensors). All forms of interaction described in Sec. 1.2 can be implemented, using motion and pressure sensors, which can be easily found in tablet computers or smart phones. In both types of handheld devices the virtual object can also be assumed handheld, without loss of generality, in order to generate a multi-sensory experience for the user (i.e. holding the device = holding the digital inscription). Hence, NUI design is possible by utilizing accessible devices and without the use of external sensors as it is described in details in the following sections.

12.3.1. Natural interactive relighting of 3D models

In order to achieve natural interactive relighting of an inscription, the system should imitate the process of relighting a handheld physical object (such as a paper cast of inscription) by reorienting the object with respect to the light of the environment. Without loss of generality, we can assume that the default virtual lighting source is located on the ceiling, right above the device, which is also a very intuitive choice as it is the most probable real-world lighting condition. Under this assumption, a gyroscope, a sensor that tracks the orientation of the device with respect to the gravitational vector, is enough to track the slope of the device with respect to the virtual light. The top row of Fig. 1 shows the approximated real-world orientation of a tablet computer as it was estimated using the gyroscope of the device. The orientation is updated in real-time as the user moves the device.

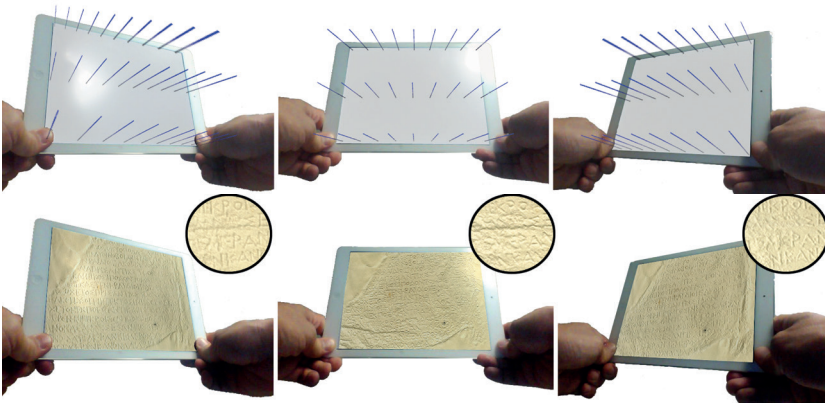


Fig. 12.1. Top row: Illustration of interactive manipulation of the virtual lighting by moving the device. The figures show the corresponding field of normal vectors in the 3D space as computed using the gyroscope of the device. Bottom row: Demonstration of interactive relighting of a 3D digitized inscription. Different virtual lighting angles reveal different inscribed details.

The estimated orientation of the device can be used in order to re-light the depicted 3D model of the inscription, using the angle of the device with the direction of the virtual light source. The bottom row of Fig. 1 demonstrates interactive relighting of a digitized paper cast. Epigraphists can relight an inscription by reorienting the tablet as if it were a real physical object. This process matches perfectly with the physical interaction of epigraphists with real inscriptions and can be extrapolated intuitively to the case of 3D models of large inscriptions that were not handheld in the real world (see Fig. 3).

12.3.2. Natural interactive manipulation of 3D models

Another important form of interaction in the epigraphic routine is the change of the point of view in order to understand better the structural details of the inscribed letterforms. Assuming that the model of the inscription is parallel to the screen of the device, the change of the point of view involves only change of the perspective projection of the digital object without any virtual rotation. In such case the rotation of the object is equivalent to the physical rotation of the device without any virtual rotation of the object.

Fig. 2 shows 15 different projections of the same virtual cube that correspond to the change of perspective caused by moving the observer's head parallel to the screen. Note that all cubes are parallel to each other.

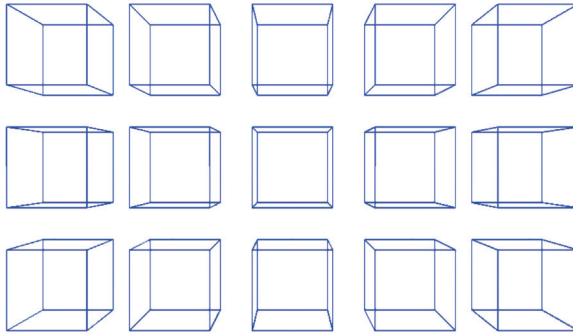


Fig. 12.2. Visualization of same-size boxes using 15 different perspective projections with the same FOV angle and different cropping parameters. None of the boxes is rotated in the space.

In the case of a tablet computer, the change of perspective can be implemented using the accelerometer of the device, which senses non-gravitational accelerations in the 3D space. With the logical assumptions that: a) the tablet is initially facing the user, and b) the user's eyes remain in a relatively fixed position in the 3D space (otherwise an eye-tracker should be required), the change of perspective can be realistically achieved by naturally reorienting the tablet as shown in the top row of Fig. 3. The superimposed boxes in this figure were estimated, using the accelerometer reading of the device for three different orientations of the tablet.

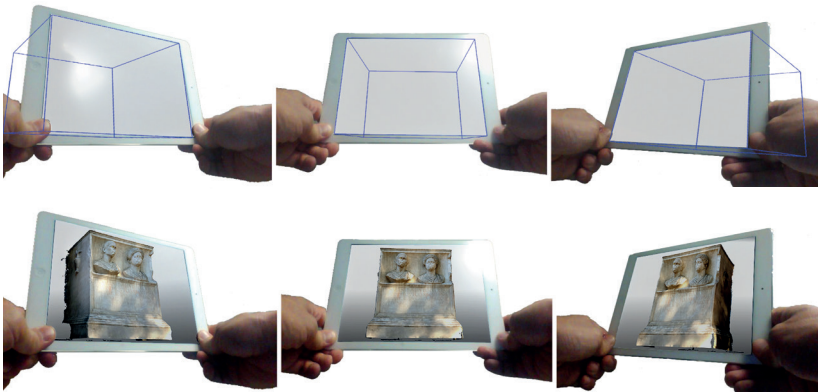


Fig. 12.3. Top row: Illustration of interactive manipulation of the perspective projection by moving the device and using the “fixed eye” assumption. Bottom row: Demonstration of interactive visual inspection of a 3D digitized inscription along with the inscription bearer. The user can view the object from different perspectives, using natural motions.

Interactive manipulation of a 3D digitized inscription bearer is shown in the bottom row of Fig. 3. Different sides of the bearer can be observed by reorienting the tablet naturally. In this example a large inscription model with its bearer was chosen in order to demonstrate that the proposed interaction design remains intuitive independently of the scale. It should also be noted that the interactive manipulation of the perspective can be optionally performed simultaneously with the interactive relighting as shown in Fig. 1 (bottom) in order to perform a more realistic interaction that causes relighting and change of point of view at the same time.

12.3.3. “Touching” the metadata: Interacting with multi-modal data

The forms of interactions presented in 1.3.1 and 1.3.2 involved only the motion sensors of a tablet computer without utilizing the pressure sensors of the screen of the device. The commonly used touch gestures (such as 2-finger twist to rotate, 2-finger pinch to zoom, and 2-finger translate to move) can be employed in order to enhance the proposed NUI design. In addition to the aforementioned gestures, a tap gesture could activate regions of interest with additional modalities of information, such as text, images, and metadata. The user can interactively browse the different forms of data by using intuitive touch gestures as shown in Fig. 4. This set of 2D interactions along with the 3D NUI design presented earlier can compose an intuitive yet powerful workspace for an epigraphist who can now perform digitally several parts of the epigraphic workflow.



Fig. 12.4. Screenshot of our interactive environment. The user interacts with the 3D object, using touch gestures and selects one of the regions of interests. This action initiates other data tools, such as the image viewer or the edge filter as shown in this example.

12.4. Conclusions and future directions

In this pilot study, a complete set of natural user interactions was designed based on the physical interactions of epigraphists with real inscriptions. The proposed interactions utilize the existing sensors in a typical tablet computer or smart phone in order to interactively relight a digitized inscription and manipulate the user's perspective, using a set of intuitive gestures that imitate the natural interaction with a physical object. In the proposed design, the epigraphist can "hold" a digital inscription, relight it by reorienting it as a tangible object, observe it from different perspectives, and finally interact with other modalities by following a set of 2D touch gestures. The prototype system was developed as part of the Digital Epigraphy and Archaeology (DEA) project, using the open-source library VisiNeat for 3D visualization and interaction, and is compatible with iOS, Android, and Microsoft RT tablet and smart phone devices. The interface is available through the web-site of the project: <http://www.digitalepigraphy.org>.

In the future, we plan to quantitatively evaluate the designed interface by tracking the user activities and analyze their motion patterns in the 3D space while they are interacting with their handheld device.

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13. TIGLIO. Translations and Images of Greek and Latin Inscriptions Online

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Abstract

This paper describes the aims of a project funded by The Andrew W. Mellon Foundation to speculate on the best ways to deal with two forgotten types of content in the realm of ancient epigraphy: translations and images. Translations available online are less than 3% of the total available transcriptions online; images are often subject to policies which make extremely difficult their use for research, publication, even simple viewing. There has been no thought given to these before in an articulated manner although these are the types of content which can bring a much larger group of users to epigraphy.

Keywords: Translations, Images, Greek and Latin, Epigraphy, Online

13.1. Introduction

Nearly all Greek and Latin epigraphic texts are available, sometimes in multiple versions, after three decades of continuous digitization and online publication. Without counting repeated inscriptions and *instrumenta*, there are about 300.000 Latin inscriptions¹ online and about

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¹ EAGLE disambiguated total: 235.626; EDCS not disambiguated total without *instrumenta* and *inscriptiones christianae*: 308.581. On the definition of Roman Epigraphy, see Panciera (2012).

200.000 Greek Inscriptions². In some databases there is also abundant metadata and a structured bibliography. The situation for translations and images of these inscriptions (text and support) available in the digital space is nevertheless quite different. The ratio between images of inscriptions and text is of one image every two inscriptions,³ but those inscriptions which have photographic documentation usually have many photos.⁴ Translations are present only in smaller corpora edited online in most cases and the Attic Inscriptions Online project⁵ is an *uniquum* in its intent to provide mainly translations of inscriptions.⁶ There are many publications offering translations in print, but these are not published online. An estimate calculation, based on the 11.000 translations present in the EAGLE Media Wiki, and known collections of printed translations of inscriptions, compared to a total of texts usefully translatable of around 300,000 texts, brings to an alarming 10% of translated texts, of which only a third (slightly more than 3%) is online. Translations are perhaps not a priority for researchers who know Greek and Latin, but are a way to clarify the interpretation of a text and an invaluable tool for didactical purposes and teaching: they are the only way in which an inscription can reach a wider public in a significant way as part of cultural heritage. The same could be said for images, even more obviously, since researchers also need them because: 1) they cannot always reach the place where an inscription is stored to study it (given that the inscription is still there); 2) there are cases in which a photo might be all we are left with and these are quickly increasing as monuments get lost or are destroyed. The imbalance in the documentation is thus pressing, since translations and images are our two best controls on the constitution

² Data from the latest Integrating Digital Epigraphies's (https://youtu.be/OPfDj_hjeok) harvest from the Packard Humanities Institute, Searchable Greek Inscriptions (<http://epigraphy.packhum.org/>), with some duplicates, 207.964.

³ At the time in which this paper is being written () the Epigraphic Database Heidelberg has ca. 35.000 photos and ca. 71.000 texts (0,5); The Epigraphic Database Roma has a slightly better ratio with 45.000 photos for 71.000 texts (0,6); The Epigraphic Database Bari has 34538 texts and 10341 images (0,3). In the EAGLE aggregator, the total ratio (excluding the related content of Arachne), is of 0,79 images for each text (235626 documental entities per 185999 visual entities) because smaller corpora tend to have a better photographic documentation.

⁴ The Epigraphic Database Heidelberg has to date ca. 14.000 records with a photo or a drawing attached, bringing the average number of images per inscription to 2,5.

⁵ <https://www.atticinscriptions.com>.

⁶ Lambert and McCourt 2014.

and interpretation of ancient documentary texts. To an extent, digital epigraphy today is the direct descendant of epigraphy's 19th century analog self: many texts, few translations, few images. This project aims to take initial steps to redress that imbalance, building resources that allow epigraphists and ancient historians to bring translations and images more closely into the suite of existing digital epigraphy resources.

13.2. Problems

Let's look at the data we have. The EAGLE project has gathered some insights on small collections of images of inscriptions openly published online, on Wikimedia Commons,⁷ and on a set of translations of inscriptions, collected in the EAGLE Media Wiki.⁸ We shall compare their impact and reach on the wider public to that of the texts of inscriptions, to underline the urgency for these materials to be produced also in order to bring epigraphy outside its restricted circles. Let's look at the visits to the Epigraphic Database Claus-Slaby, the largest collections of texts (with minimal metadata and no directly stored image): EDCS has an average 3000 requests per day.⁹ The result page is always one, containing all the results from the database, which has a total of 491353 texts. We have no means to provide better data unfortunately but for the comparison these will be enough. The images collected under the category "Media Contributed by EAGLE" on Wikimedia Commons contains instead around 8000 photos of inscriptions and we have some good insights on this data¹⁰. These photos have been viewed in 19 months 22,236,085 times. Another interesting information is the number of people who have worked on them, by no means only members of the EAGLE project: 7 users have made more than 1000 edits, which could be anything above the figure; 20 have made between 100 and 1000 edits; 71 have made between 10 and 100, and even more interestingly 581 have made between 1 and 10 edits. This is a critical mass of active users, uploading, editing, curating, using

⁷ https://commons.wikimedia.org/wiki/Category:Media_contributed_by_EAGLE

⁸ Liuzzo et al. 2014 http://www.eagle-network.eu/wiki/index.php/Main_Page

⁹ This can be easily monitored looking at the counter on the website at the end of each day. No better statistics are available.

¹⁰ Thankstouser:Fae and the authors of the BaGLAMa2 tool. See https://commons.wikimedia.org/wiki/Category_talk:Media_contributed_by_EAGLE/reports and <https://tools.wmflabs.org/glamtools/baglamma2/#gid=148&month=201508>.

data they are interested in the same situation can be noted for the 11.000 translations in the EAGLE Media Wiki, which were viewed in 18 months 1.380.000 times and have seen 280 active users, who have at least made 1 edit. The tool is not well known outside the EAGLE consortium and is a very small prototype, but the fact that it has already attracted such a mass of views is significant. What would happen if we gave 100.000 translations in the way we have given them to the people in the Mediawiki, completely openly? What would happen if those people contributing to images and translations were empowered to operate easily and intuitively to enter more and more data? Inscriptions will never get as many fans as we would like to, but perhaps their content and related resources would be a bit more accessible to non-initiated. This comparison confirms also that the usability of resources is measured at a different level when they are made open, and that images and translations have an undeniable higher relevance as an online resource, thus attracting interest also to the transcriptions, while this does not happen the other way around and only those who know what they are looking for will stumble upon an ancient inscription published online. Nothing new in these observations, but this obvious observation is in contrast with the actual situation in which photos are few and translation even fewer.¹¹ Why so, then? The possible reasons are:

1. the lack of an entry point which is easy to access and use;
2. people get easily worried by copyright due diligence and find difficult sometime to track back who is the author or the copyright owner of a photo;
3. a lack of coordinated effort, planning and management of the storage of both these types of content;
4. researchers working on inscriptions identify their intended audience in a very specific academic community which does not need translations and instead needs edited texts (transcriptions and metadata);
5. publication of content with (sometimes unnecessary) restrictions;
6. lack of time for this effort, unrecognized in academic settings as a contribution to the progress of knowledge, as, sadly, most other digital efforts.

¹¹ Photographs are very useful for simple stones inscribed monuments in large lettering (as e.g. Roman monumental texts), but for most longer documentary inscriptions, including most Attic material, after autopsy, squeezes are the most important editorial tool, because photos are mostly 2 D images of 3 D objects.

We shall point out what has been done to solve these problems and cater for an improvement in this part of documentation and production of online content in the future.

The international group of partners, which includes University of Heidelberg, University of Cardiff, Duke University and Tufts University is holding regular workshop meetings to design and develop a suite of resources that support generation of epigraphic translations, with peer-review and publication workflows supported by Perseids' extension of the Son of the Suda On Line code (SoSOL), with publication supported by the EAGLE Mediawiki, and image management, reference ontology, geo- and other services, supported by Integrating Digital Epigraphies, and with Attic Inscription Online translations as the key content stream for development and testing.

13.3. Translations

To face these challenges with regard to translations, it is the opinion of the project team that tying together existing resources is a better way to tackle the issues rather than trying to superimpose a new tool or system. The available building blocks for such systematization of existing resources are the following:

- the existing local data entry point of Attic Inscriptions Online, in the process of moving to TEI-EpiDoc markup for the underlying data;
- the EAGLE Mediawiki, with the Wikibase Extension, which collects translations from several users as a part of the work of the EAGLE consortium to bring epigraphy to a wider public;
- the Perseids peer review system,¹² which uses the Son of the Suda Online¹³;
- Leiden+,¹⁴ a simplified markup which allows the use of normal diacritics instead of tags to enter XML markup;
- identification and disambiguation done by content providers (the epigraphic databases) and by projects such as Trismegistos¹⁵ for the members of the EAGLE consortium and IDEs¹⁶ for Greek Epigraphy projects;

¹² <http://sites.tufts.edu/perseids/>.

¹³ Baumann 2013.

¹⁴ <http://papyri.info/docs/about> and J. Sosin presentation at <http://www.stoa.org/archives/1263>.

¹⁵ <http://www.trismegistos.org/>.

¹⁶ <http://blogs.library.duke.edu/dctthree/projects/>.

- referencing and resolution services provided by IDEs which do not just align content relating to one resource but describe the relation among them

These consider two kinds of users:

- users involved in a project with access to a data entry point in a database (using XML);
- independent contributors.

With the available building blocks what can be done currently for translations is:

- a standalone javascript library to enter translations using Leiden+ (to be implemented and tested in AIO, as the best candidate for its focus on translations) which implies;
- an enlargement of the encoding guidance and conversion capabilities of Leiden+ to EpiDoc for translations;¹⁷
- recommendation on how to mark up translations for the EpiDoc guidelines.

These developments will hopefully be beneficial to the EpiDoc users community as well, which has in the past asked for more guidance on how to encode translations.

- An export of AIO in EpiDoc to the Perseids platform in which translations will be peer-reviewed for ingestion in the EAGLE wiki, bypassing the harvest process for EAGLE. This might be useful as a use case for future project willing to publish their translations with the others collected into the EAGLE Media Wiki;
- facilitate flow between existing tools and services;
- EAGLE and Perseids worked together in the past years in order to integrate the two services offered, but this had a number of limitations, e.g. the requirement for a translation to be already present in the wiki in order to be able to publish another one via Perseids. This reduced the number of items for which the integration could be used to a minimum, forcing the use of workarounds as mock text and placeholders. The integration of the EAGLE wiki with Perseids will now enable users to enter translations for any inscriptions and even a new translation from scratch with a specific new language, thus covering all possibilities for the EAGLE Mediwiki user.

¹⁷ <https://github.com/TIGLIOPROJECT/documentation/wiki>.

This requires nevertheless:

- unique identifiers for Latin and Greek texts, which are currently provided for the first by Trismegistos, and for the second group of texts by IDEs;
- a citation URN structure which is agreed upon and otherwise usable. This will be based on the scheme already in use for EAGLE built on CTS URN syntax as in the example:

urn:cts:pdlepi:eagle.tm12345.perseids-translation-1

where the structure is

urn:cts:namespace:textgroup.work.version

- The complete workflow from data entry to publication in a website and to the common EAGLE resource via Perseids will then be a complete and replicable workflow, scalable for use from larger projects and documented to guarantee easy and sensible connection of the resources online.

The workflow for the connection of new translations and images to existing online content will be then facilitated in this way. A project with its own data entry interface should be able to use the javascript library to enter translations using Leiden+ and following the conventions already extended and public in papyri.info. They should then be able to identify with a TM or IDEs id these translations and infer a URN to push these directly to the Perseids system. Here the translations will be peer-reviewed and then sent both back to the source with an approved status and to the EAGLE Media Wiki. If this database is partner of the EAGLE project the texts will be harvested separately and the translations linked back from the Media Wiki. From the Media Wiki API they will also be available as such to external users. An independent contributor instead will be able to look up the TM text id or IDeSt of the inscriptions he wants to translate and enter it to the EAGLE Media Wiki. From here this will be sent to the Perseids system and returned as described above.

The short term goal is therefore to stitch together existing resources already in development, and especially to provide ids and a clear citation syntax for all available inscriptions, which will have counter benefits also for any other digital project with these requirements.

13.4. Images

Most of the existing images of inscriptions are currently safely stored in private computers. Large collections of images of inscriptions are available at the major databases, and can count up to thousands of photos of inscriptions or drawings. Large collections of images are also on Flickr (e.g. Visible Words) and Wikimedia Commons (CIL and AE categories provide a good overview of what is available).

The major problem preventing publication is that people do not know if they can share the images which they have. The copyright regulations are too complicated and possible contributors opt for doing nothing instead of taking any unknown and unwanted risk. Storage of images of inscriptions in the major databases happens under very strict conditions of reuse and publication and while it is the best possible way to operate for these projects, there can be no mirroring or distribution of the resources available so that the life expectancies of content curated for decades is tied to the lifetime of these databases. A test has been done with the images of non identified items in the Epigraphic Database Heidelberg, uploaded to Wikimedia Commons and users have contributed to identify a number of those. Uploading photos on Wikimedia Commons requires an open license, which cannot always be guaranteed, whereas on Flickr it is possible to retain rights whilst publishing the photos, so that it makes a nicer tool for this kind of content, although it does not allow community editing and batch upload, which is instead possible via tools developed by Europeana and the Wikimedia Foundation for Commons.¹⁸ A unique repository or a connection hub for all these photos would be a solution to keep the content under sight but this would still require control over resources daily published in Flickr and Commons, an involvement into the communities of users online, together with the extension of citation structures to these groups. There is no easy solution for the copyright side of the problem, but a continued encouragement to share will build towards

¹⁸ The GLAM Wiki toolset, https://commons.wikimedia.org/wiki/Commons:GLAMwiki_Toolset_Project.

the critical mass needed for a change in perspective on this issues in the coming few years. During this project we will try to list requirements for a tool to ease out the upload of images online, which will match images and metadata provided in various formats, suggesting ids and adding them in a format compliant to the citation scheme agreed. It is in fact true that the amount of time required to use tools which ask for a one to one upload of images is another important factor which reduces the amount of content shared even from those willing to do so.

13.5. User involvement and expert sourcing

The problems of all digital projects looking at putting together materials from various sources and contributors are on one side to get people involved, on the other to overlook the work done and take care of the administration. The possible user scenarios are eventually many more. Two especially deserve to be mentioned here. Most input has been provided in term of new translations in the EAGLE Media Wiki during Workshops and Secondary Schools class work. Some teachers with a background in epigraphy have been contacted by the Epigraphic Database Rome to start and experiment with a didactic model which would include translating inscriptions. The students worked on a specific corpus of inscriptions, studied the text and the support and produced a translation which they entered in the EAGLE Media Wiki with the supervision of their teacher. This experience has proved successful for the students which have seen their contribution directly where it should be, together with other scholarly content. On the other side, every new translation matters in such a state as the one described above. The second example is the work done in two consecutive workshops, held in Ercolano and at the Centre for Hellenic Studies in Washington DC of the Ancient Graffiti Project,¹⁹ which has published multiple translations for all the graffiti of Herculaneum. In this context the usability of the Wikibase software has been tested and it proved to be an extremely intuitive and powerful tool. It takes very little explanation, but there are caveats for this simplicity and namely that it is extremely easy to do things in slightly creative ways, as entering statements as source information or typing an id in a slightly different way, which then need to be monitored and fixed.

¹⁹ <http://ancientgraffiti.wlu.edu/>.

13.6. Conclusions

Some of the tasks above have been already carried out, some are under way, but there are some general conclusions which can be summarized. There is a need to unify the resources, agree on standards for reference and citation and provide stable identifiers and citation structures, providing a comprehensive list of epigraphic publications with the relevant abbreviation in use. Although some work has been done, the amount of data makes this task continuously needed together with that of disambiguation. Other efforts need to go in the direction of flexible but harmonized standards for encoding and working on data entry giving priorities probably in a slightly different way as before, updating the tools to be able to cope. More generally, while tools are abundant and so are guidelines and cookbooks, an agreed venue for coordination of the efforts is still a desideratum, and should include not only scholarly project but also community based efforts such as those of the Wikimedia Commons users and of the Flickr user's groups. These people could be also part of the peer review process, thus contrasting the side effects of an inactive board.²⁰

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²⁰ The last meeting of the project, dealing with images and CTS URN structure still had to take place at the date of submission of the present contribution.

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14. A Virtual Research Environment to Document and Analyze Non-alphabetic Writing Systems. A Case Study for Maya Writing

*Katja Diederichs, Sven Gronemeyer, Christian Prager, Elisabeth Wagner, Franziska Diehr, Maximilian Brodhun, Nikolai Grube**

Abstract

No existing digital work environment can sufficiently represent the traditional epigraphic workflow ‘documentation, analysis, interpretation, publication’ for a non-alphabetic writing system. Using the Maya hieroglyphic script, this workflow will be transferred to a digital epigraphy. Digital methods and tools will be developed and reused in a Virtual Research Environment to create a freely accessible, annotated textual corpus, including metadata on cultural and object history and references.

Keywords: Classic Mayan, Digital Epigraphy, TEL, EpiDoc, CIDOC-CRM, Metadata Schema, Open Science

14.1. Digitalizing the epigraphic workflow

In order to develop a digital work environment that represents the traditional epigraphic workflow for documenting and studying inscriptions in a non-alphabetic script, the individual steps of this workflow need to be technically implemented using methods and tools from the Digital Humanities. The workflow begins with the documentation of the text carriers and compilation of descriptive data; proceeds to epigraphic analysis, including sign classification and transliteration

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and transcription of the texts; continues with morphological segmentation and linguistic interpretation; and concludes with translation and digital publication of the inscription (Diederichs 2015).

The Virtual Research Environment (VRE) TextGrid initially provides the necessary framework for executing the workflow that technically facilitates documentation and digital registration of the text carriers in the form of images and drawings, as well as annotation of the objects with metadata. TextGrid offers input forms, annotation tools, and a Text-Image-Link-Editor, and provides long-term storage, and free access to the data in an open web repository (Neuroth *et al.* 2011).

Although more detailed steps in an epigraphic workflow, such as detailed linguistic and epigraphic analysis of primary texts, can be technically carried out within a VRE such as TextGrid, they still necessitate creation and adaptation of their own XML-based metadata model, as well as annotation schemas for object and textual contexts (Prager 2015). Using this approach, the Maya hieroglyphic script will for the first time be able to fulfill a central requirement of corpus linguistics, namely machine readability (McEnery and Wilson 2001).

Fig. 1 provides a schematic illustration of the following points that represents in great detail the steps in epigraphically analyzing Maya inscriptions, a process which can also be used in modified form to study other non-alphabetic writing systems. The modulated VRE is thus applicable not only to the study of Maya texts, but also to researching texts composed in other hieroglyphic, cuneiform, or linear writing systems.

1. Identification of hieroglyph blocks by alphanumeric classification
2. Original spelling
3. Reading order of individual signs
4. Number of signs within one block
5. Identification and isolation of signs in one block
6. Classification of signs based on the sign catalog by Eric Thompson
7. Classification of signs in one block
8. Transliteration of individual signs
9. Description of sign function (syllables, logographs)
10. Transliteration
11. Broad transcription
12. Morphological segmentation
13. Morphological analysis
14. Determining congruence between block- and word-boundaries
15. Determining syntactic function















1	D13			E13					D14		
2											
3	type A			type B					type A		
4	3			5					3		
5											
6 ⁶	T264	T21	T575	T1	T257	T1	T624	T178	T74	T712°504	T178
7	T264:21:575			T1:257.1:624:178					T74:712°504:178		
8	ju	bu	yi	U	TOK'	U	PAK	la	ma	CH'AB° AK'	la
9	syllable	syllable	syllable	logograph	logograph	logograph	logograph	syllable	syllable	logograph	syllable
10	ju-bu-yi			U-TOK' U-PAK-la					MA' CH'AB°AK'-la		
11	jubuy			utok' upakal					ma' ch'ab [ma'] ak'al		
12	jub-uy-ø			u-tok' u-pak-al					ma' ch'ab ma' ak'al		
13	to come down-THM-3SA			3SE-flint 3SE-shield					NEG-creation-[NEG]-night		
14	1:1			1:2					1:4		
15	verb			subject					patient		
16	verb			nominal phrase					nominal phrase		
17	verbal phrase			nominal phrase					nominal phrase		
18	"came down"			"his flint, his shield"					"no creation, no night"		
19	"it came down his flint, his shield, he who is without creation, without night"										
20	"defeated was the army of the captive"										

Fig. 14.1. Visualization of the important steps in the workflow of epigraphic analysis, drawings by Christian Prager (2015).

14.1.1. Conceptual questions

When developing and technically implementing the digital epigraphic research environment, the major focus is on pursuing the following objectives:

1. Creation of a markup schema to represent these steps (which in practice are interconnected and may also occur parallel to each other in the form of alternative interpretations);
2. Defining of the precise requirements that a data structure must fulfill in order to sufficiently represent complex i.e. non-alphabetic textual data for epigraphic analysis and research.

14.2. Prerequisites for making a non-alphabetic writing system digitally accessible

In order to make syllabic or logo-syllabic writing systems accessible for corpus linguistics, for instance to carry out a corpus analysis as part of the basic lexicography required to compile a dictionary of Classic Mayan, the phonology, morphology, syntax, semantics, and pragmatics of the language in question must be captured, marked up, and saved in the corpus. As such, the basic characteristics that distinguish the graphematic

lexicon of syllabic and logo-syllabic scripts from those of alphabetic writing systems must be taken into account. Thus, methodological and technical prerequisites must be fulfilled in order to be able to digitally represent and analyze a non-alphabetic script, such as Classic Mayan, for the purposes of epigraphic analysis.

14.2.1. Registering object data

When designing the digital epigraphic work environment, one must also account for the current state of decipherment of the script and language that are to be documented. Thus, Classic Mayan presents great challenges, as at least one third of the known graphemes have not yet been completely deciphered. Even when a lexeme can be read, its etymology or semantic domain is often unknown, and in some cases not even its lexical class can be determined, which causes difficulties when attempting to read and understand a text. In order to decode an unknown sign, word, or sign sequence in its respective context of use, for instance, semantic fields are generally investigated by means of applied substitution. From a structuralist perspective, this method investigates the paradigmatic relation between two linguistic entities as indicated by whether or not they appear in the same context. This step yields results when sufficient quantities of data can be digitally compiled, marked up and investigated using corpus linguistics.

The VRE currently being planned is the laboratory for this process, where new decipherments will be obtained and existing readings will be tested against primary source material while also considering all of the contextual data. The context of the contents that is referenced during decipherment may refer to the text carrier itself. For this reason, registering data on the object on which the text is written is just as important as documenting the text itself.

The decoding of Ugaritic cuneiform at the beginning of the twentieth century provides an example of a successful decipherment that resulted from studying the relationship between object and textual data. Scholars suspected that the word "axe" occurred in repeating, brief sign sequences on inscribed bronze axes. Building on this hypothesis, they determined the phonetic values of individual signs using data on the language and completely deciphered the script (Day 2002). Such investigations enable initial association of signs with both content and function in the relevant language so that the signs may later be gram-

matically, morphologically, semantically, etc., defined and eventually deciphered. This work also facilitates more precise typological classification of a writing system (Gronemeyer 2015).

Like the relationship between writing and the object, the relationship between text and image must also be coded. Associated depictions can potentially illuminate the contents of an inscription. Working from this analytical basis, a writing system can be registered in its respective contexts of use in order to derive semantic meanings and, ideally, linguistic decipherments. As such, contextual information concerning the text carrier as an object must be recorded, because its physical features may influence the text's contents and arrangement. In this respect, the size of the object, for example, may be just as influential as the material itself.

For example, the text carrier may influence scribal economy. The recent discovery of an inscription on very hard jade in Nim Li Punit (Belize) illustrates how the use of this particular writing surface can lead to a reduced spelling, meaning that the scribe omitted final syllables or used very simple sign variants that were almost geometric.

The form of a text carrier and its function also influence the text. Different lexemes may thus be determined for describing round or quadrilateral altars, with the result that conclusions may be drawn concerning the semantics and possible linguistic decipherments. Physical description of the text carrier as an object and its linguistic, historical, and cultural contextualization are indispensable for deciphering a previously unknown text or analyzing its arrangement. These metadata must be consulted in order to grammatologically and linguistically analyze the text's contents. Modelling an object biography and culturally contextualizing the texts must be initially addressed with information technology in order to facilitate epigraphic analysis of the text's contents in its extra-linguistic, cultural context. Thus, it is necessary to create an object metadata schema that captures such information concerning the language's cultural area and makes it available for use.

For these purposes, an epigraphic object metadata schema that compiles and represents extra-linguistic information about the inscriptions in an ontological structure must be created, in addition to an XML-based analytical metadata schema for linguistics.

The CIDOC-CRM standard for documenting cultural heritage offers a broad foundation that can be supplemented with other

standards, such as Dublin Core or the SKOS vocabulary. In addition to taking advantage of the comprehensive understandability of CIDOC-CRM, the scheme also requires to reuse data and to connect them with data from other research projects in the spirit of Linked Open Data (Diederichs 2015; Prager 2015).

14.2.2. Making linguistic data accessible

An interdisciplinary and widely accepted standard that takes into account both generalized and special characteristics of writing systems beyond those of a single script must be developed in order to be able to satisfactorily annotate records from various writing traditions that use syllabic signs and logograms to represent language.

In most cases, the scripts annotated and encoded in TEI and also those prepared for epigraphic analysis in EpiDoc are alphabetic, and most of them are linear and arranged in rows. Non-alphabetic writing systems, such as Egyptian, various cuneiform systems, or Hieroglyphic Luwian, arrange their graphemes principally in groups or blocks, and only secondarily in rows or columns, with a high rate of metathesis (Lacau 1903) in order to optimize the use of space. Furthermore, many of these writing systems demonstrate a high degree of allography, which is no longer apparent in a pure transliteration. Various desiderata become apparent when an epigraphic project attempts to use the standards provided by TEI and EpiDoc to edit texts composed in these scripts.

Annotating texts composed in such writing systems that use only alphabetic transcription is insufficient; instead, the original spelling of a lemma should be represented. This approach facilitates studies of paleography or sign usage across time and space. In addition, it can reveal preferred sign arrangements within a block or preferences for particular signs that correspond to the material used or to the subject of the text, for instance. Thus, when creating a standard for non-alphabetic scripts, object metadata and annotations for orthographic and linguistic analysis must be taken into account, and the creative process should also promote discussion of terminological and typographic conventions for these annotations (Sachse and Dürr 2016). The goal is to create a generic markup model that can be implemented regardless of the particular script or language in question.

The inscriptions of the Maya hieroglyphic writing system alone feature attestations of various vernacular languages (Lacadena and Wichmann 2002), a phenomenon which raises several preliminary questions: what exactly are the demands, and what are the goals of an epigraphic and linguistic annotation? Where do possibilities and limitations exist for annotating these writing systems using established standards, such as TEI or EpiDoc? Existing standards have to be modified to some extent and possibly new standards have to be created, to overcome these limitations.

14.2.2.1. Representing the primary text source

When defining a text, acknowledging an interpretation of the source text itself is unavoidable. The meaning of the “original text” that resides in the “source text” is an important point of discussion in epigraphy. Thus, the annotation does not contain a guiding text in the conventional sense, because it is merely reconstructed using all given text information and one’s own conclusions and interpretations, and then represented with the aid of alphabetic transliteration and transcription. In this respect, one should always leave open the possibility of separating primary data (in the case of hieroglyphic texts, photographs of the text carriers, for example) and secondary data (e.g. drawings or interpretive annotations) (Stührenberg 2012). This strategy can be implemented using stand-off annotations for data. Similarly, such an annotation should permit multiple descriptions, i.e. alternative statements concerning the data (Stührenberg 2012). For example, sign sequences in Classic Mayan can be variously analyzed depending in a particular vernacular context (Gronemeyer 2014). Only in this manner can various ways of thinking be appropriately recorded and relayed to the scientific community for discussion.

A key objective of the XML-based markup of hieroglyphic, cuneiform, or linear texts should thus be to represent the original spelling and arrangement of the signs in their respective contexts. A linear transcription alone cannot represent the original text or primary source in its entirety, as many details remain undocumented. For example, signs in Maya hieroglyphic texts are not arranged according to their literal reading order, but instead in spatially distinct, square or rectangular units (so-called “blocks”), each of which in most cases corresponds to a word or morpheme sequence. A detailed markup of the original text is therefore of great importance, particularly for partially deciphered

and undeciphered graphemes and writing systems in general. In such cases, an alphanumerical or numerical nomenclature is often used to refer to the signs in order to carry out a corpus linguistic analysis of the texts. The arrangement of each block, as well as the text and its position on a text carrier, should be documented as well. To fully understand a writing system – i.e. the language and information expressed in it – a detailed representation of the primary source and its context must be a key objective in the digital markup of documents. When studying complex writing systems (respectively non-alphabetic writing systems), digital documentation of the original spelling using annotation standards like TEI is a basic prerequisite for conducting a detailed graphemic and graphetic analysis of the relevant script and for providing a basis for a linguistic and corpus linguistic investigation. This need represents a significant desideratum in epigraphic research, and it also constitutes a core pillar of computational linguistics (McEnery and Wilson 2001).

In an interdisciplinary effort, epigraphers and experts of digital markup-languages alike need to discuss methods for investigating syllabic and logo-syllabic writing systems using the XML-based standards like TEI or EpiDoc. When doing so, they should discuss the following points of emphasis, among others:

14.2.2.2. Graphetics

Graphetics concerns the formal structure of linguistic units and the structure of texts (Crystal 1997). Classic Maya hieroglyphic inscriptions, for instance, may display a very high degree of variation in writing styles for arranging texts, a phenomenon which is deserving of investigation. In this manner, various systems of notation are studied in their individual, social, and typographic aspects, for instance. Similarly, in paleography, script decipherment is examined from graphetic perspective. The arrangement of texts, for instance, different grapheme or block sizes of text fields, or different styles of hieroglyphic writing (equivalent to alphabetic font style and size) are analyzed.

Research addresses the degree to which attested variation in the composition of hieroglyphic texts may be ascribed to specific scribal schools or to regional forms of expression, rather than to differences in the meaning of the signs' contents.

14.2.2.3. Graphemics

When analyzing the contents of these texts, it is important to investigate meaningful variation underlying the manner in which the writing is arranged and to thereby identify distinct units. Graphemics is devoted to this area of research, and consequently to exploring the meaningfully distinct features of signs.

Allography of graphemes

A very important example of a subject of graphemic research is provided by allography, a phenomenon which describes a 1:n relationship between a grapheme and its various graph representations (Crystal 1997).

The process of establishing a suitable annotating-tool thus must be oriented toward a series of questions: What is the significance of allography for the respective grapheme inventories? Are allographs annotated in the transliteration or transcription of the respective writing systems?

For example, in Maya writing, there are over twenty different allographs for the vowel sign <u>, which is used e.g. as the 3rd person ergative pronoun u- "he, she, it". Additional research questions may comprise 1) the reading order of the signs in context; 2) the existence of word separators or other graphic aids used to differentiate between meaningful units or words; 3) multiple possibilities for establishing a reading order of signs within a block that are equally meaningful (with alternatives documented or marked by epigraphers); 4) the reading order of meaningful units within the texts; 5) variations or violations of these orders (and if so, with a markup as well); 6) cases where images appear with the text and their possible relation; 7) integration of texts into the images or vice versa.

Graphotactic strategies of a writing system

For analysis, it is important to convey the graphemics of a writing system, which are lost in an alphabetic transliteration. Graphemics concerns sign function, or graphotactic strategies for constituting a meaningful unit or word. Representing the reading order of signs in the text and in each block is similarly imperative. To graphotactically link individual signs in a hieroglyphic block in Maya writing, various representational rules may be used (see Fig. 2), e.g. affixation, infixation, conflation, or superimposition (Zender 1999).

Additional typical, functional traits of logo-syllabic writing systems include underspellings, diacritics, phonemic complements and indicators, semantic classifiers and determinatives, and sign class convergences. However, these characteristics may have very diverse graphotactical manifestations in different writing systems, which nonetheless need to be standardized and communicated in a digital structure in order that researchers may thus take note of various interpretations under discussion.

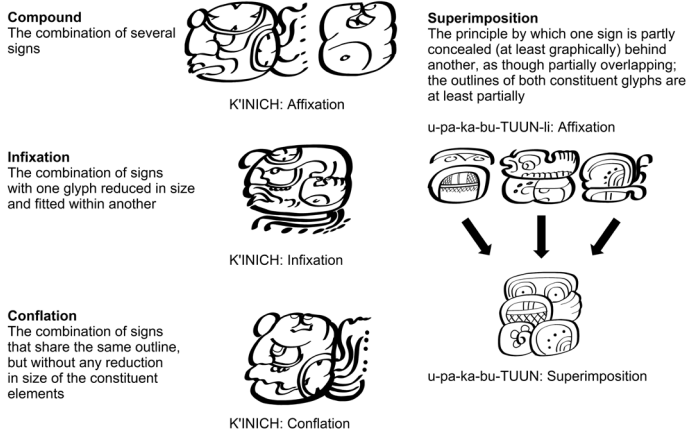


Fig. 14.2. Some possible sign combinations in Classical Mayan hieroglyphs after Zender (1999), drawings by Christian Prager (2015).

14.2.2.4. Signary: sign classification and sign catalogs

The graphemic lexicon provides a central reference for marking up texts composed in non-alphabetic writing systems. In the case of the Maya script, signs whose phonemic reading is unknown or unconfirmed are denoted using reference systems from various classification catalogues. Use of question marks for indicating unclear readings, for example, should be avoided, because such signs impair machine readability and sometimes represent control characters or part of an escape sequence. In this context, it should be determined what significance sign classifications and nomenclatures have in their respective branches of epigraphic research. Also their role in transliterating and transcribing texts in the respective writing system, as well as in sign classification is to be examined.

Sign inventories constitute a central authority in an epigraphic VRE, and they need to be modified or supplemented in accordance with the ever-changing state of research as soon as newly discovered material is entered and signs are identified that had not previously been isolated or identified as discrete graphemes.

14.2.2.5. The state of decipherment and the readability of texts

In the case of unreadable or only partially deciphered writing systems, the question in the forefront is the state of decipherment of the relevant writing system and the handling of undeciphered signs or text passages. As archaeological artifacts, texts are also subject to processes of decay that inhibit visible legibility. It has several implications: 1) the treatment of undeciphered signs or text passages; 2) the indication of physical gaps (as texts are also subject to processes of decay that inhibit visible legibility) and their marking in the transliteration and transcription of the text; 3) the treatment of hypothetical, yet plausible, readings of singular signs or passages; 4) the handling of alternative readings of the same passage; and 5) a review to what extent the EpiDoc Metadata standard, into which the Leiden Conventions have also been incorporated, is able to capture these features of readability and alternative interpretations of inscriptions.

These and other characteristics of non-alphabetic scripts, which to a certain extent reach beyond the epigraphic problematic of alphabetic writing systems, illuminate a desideratum here and the need to formulate ideas that contribute to the design and modelling of appropriate XML-based metadata schemas.

14.3. Open science strategy

A Digital Humanities project working in the spirit of Open Science fundamentally intends the work environment that it develops to be reused. As such, a VRE for non-alphabetic writing systems such as that of the Classic Maya should be developed as generically as possible, in order that structural interoperability may ensure that they can be reused by similar epigraphic projects.

In this respect, any metadata schema that is created should be widely intelligible and ensure the data's syntactic and semantic interoperability by using common, given, XML-based annotation and metadata

standards, like TEI and EpiDoc, and controlled vocabularies, such as SKOS, that are already established in the Digital Humanities (Diederichs 2015).

Another objective of database projects in the Digital Humanities should be to ensure open access to their data and metadata, and thus to maximize usage of their research by maximizing user access to it. As all current and future research and innovation stands on the shoulder of giants, an efficient system for broadly disseminating and allowing uninhibited access to the project's research (raw data and metadata), as well as for guaranteeing the contents' productive reuse, must be ensured through the use of free licenses (DFG 2013).

As such, all the contents of a database and data infrastructure that are being planned will be made available under so-called "Open" licenses (Open Access, Open Source, Open Methodology, Open Data, etc.), with the goal of pursuing a comprehensive Open Science strategy (Diederichs 2016).

All methods and the process of developing tools must thus be carefully documented to maximize reuse of all schemas and software. In particular, all research information and results should be made available not only to the scientific community, but also to the general public, to contribute to the digital safeguard and dissemination of humanity's cultural heritage.

14.4. Summary

The creation of digital infrastructures and metadata schemas that facilitate recording and further analysis of the appropriate annotation for non-alphabetic writing systems, including their respective cultural contexts, is a desideratum in the Digital Humanities that needs to be addressed.

The recommendations articulated here for an object database, as well as for a structure for recording epigraphic and linguistic data, can make a significant contribution to understanding how traditional epigraphy can be transferred to digital form. In working towards this goal, methods and tools from the field of Digital Humanities will be suitably adapted to the needs of epigraphy, and new methods and structures from the digital world will find their way into digital epigraphy.

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15. Integration of Multimedia Collections and Tools for Interaction with Digital Content. The case study of the Archaia Kypriaki Grammateia Digital Corpus

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Abstract

Supporting a discovery, use, and navigation of digital collections is a fundamental part of providing access and encouraging inquiry, interpretation, and knowledge. In this paper we present our efforts to store and explore multimedia collections of archaeological data. Particularly, the case study of the Archaia Kypriaki Grammateia epigraphic collection is presented. Our work can be seen twofold. One aspect of our work is to provide a place where the data coming from various sources can be stored and accessed. Another aspect is to provide users with means to explore this data. We argue that currently digital libraries are constrained by their webpage-based paradigm, thus not providing the means for utilizing the full potential of the heritage data.

Keywords: Digital libraries, Data repository, Epigraphy, User interfaces, Data visualization, Interaction

15.1. The world going digital

Nowadays digital information format found its ways to all the spheres of our lives. Cultural heritage is no exception to this. Gigabytes of data are being created on an every-day basis. For some time now, digital libraries are used to store and provide access to digital heritage data. However, existing digital libraries often fail to provide the ability to iteratively explore items, compare data trends, and engender the wisdom that comes from exploring data in new ways. Current digital libraries are limited by their inadequate webpage-based paradigm,

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and it is easy for even the most experienced scholar to get lost (Bergstrom and Atkinson 2009). To overcome this issue, a new generation of digital libraries should emerge that will serve as an interactive knowledge environment in which knowledge is created by interacting with the data. Digital collections often lack features for deeper quantitative and qualitative analysis, and even very useful functions, such as the ability to annotate or bookmark content, are often not supported. After digitisation, these collections are typically monolithic, difficult to navigate, and can contain text which is of variable quality in terms of language, spelling, punctuation and consistency of terminology.

According to Fast and Sedig 2010 digital libraries are seen as a store of epistemic potential with interaction having the role to reveal much of the hidden complexity. In Buchel and Sedig 2014 the authors demonstrated the role that a set of interactions can play in supporting users' understanding of spaces and their formation of cognitive maps when working with map-based visualisations. According to Algee, Bailey, and Trevor 2012 interactive visualizations empower users to discover meaning and patterns within digital collections using dynamic, interactive displays. One example of utilizing the interactive graphics in a real world digital library is presented in Hienert et al. 2012. Authors developed interactive visualization tools that support exploration of search queries and search results and help users in formulating new queries. Another example, the application called DaisyViz shown in Ren et al. 2010, tries to help users acquire better insights of the data by enabling users to rapidly develop domain-specific information visualizations without traditional programming. In Nasar, Mohd and Mohamad Ali 2011 authors proposed a conceptual framework that uses interactive visualizations for managing personal collections of images and videos with focus on data re-finding and improved filtering. INVISQUE (Wong et al. 2011) is a novel system designed for interactive information exploration. Instead of a conventional list-style arrangement, in INVISQUE information is represented by a two-dimensional spatial canvas, with each dimension representing user-defined semantics. Search results are presented as index cards, ordered in both dimensions. Intuitive interactions are used to perform tasks such as keyword searching, results browsing, categorizing, and linking to online resources such as Google and Twitter. An approach for overview-first exploration of data collections based on user-selected metadata properties is presented in Bernard et al. 2012.

In a 2D layout representing entities of the selected property are laid out based on their similarity with respect to the underlying data content. The display is enhanced by compact summarizations of underlying data elements, and forms the basis for exploratory navigation of users in the data space. In Nan et al. 2012 authors propose a novel visual design termed “Whisper” to fulfil the need for tracing information diffusion processes in social media, in a real time manner. BirdVis (Ferreira et al. 2011) leverages visualization techniques and uses them in a novel way to better assist users in the exploration of interdependencies among model parameters. Furthermore, the system allows for comparative visualization through coordinated views, providing an intuitive interface to identify relevant correlations and patterns.

15.2. “A place where the past meets the future”: the STARC repository

STARC repository was initially developed to store the data coming from the daily work of the research group and as content aggregator for various digital libraries projects: data from archaeological excavations, museums artefacts, epigraphic corpora, etc. Data stored in the repository ranges from high resolution images, 3D models, texts, maps, videos and audio resulting from various data acquisition procedures such as photogrammetry, laser scanning, 3D modeling, photography, sketching, drawing and so on. Every item in the repository is described using a metadata schema that depends on the type of data and according to the needs of the project. For most of the items, we are using our own metadata schema (STARC metadata schemas) (Ronzino, Hermon and Niccolucci 2012; Vassallo et al. 2013), that was developed to thoroughly describe various aspects of data creation process. Once data is uploaded and available, it can also be used in different systems. For example, the repository serves as source of data for aggregation procedures by which our data feed the Europeana portal (<http://www.europeana.eu/portal/>) through different digital libraries projects (e.g. Athena, CARARE, Linked Heritage, AthenaPlus, EAGLE). In order to facilitate the migration of data from heterogeneous sources, the repository provides ingestion capabilities, that enable easy transfer of data from any available data end-point. Another aspect of the back-end is the user management. It deals with providing different access levels for different users’ groups.

It also manages personal user space, where users can add their own information to the repository and have access to it when exploring the data. Data annotations and personal collections are some of the examples of how users can add information to the repository and use it for data exploration.

15.2.1. Tools for accessing data

We wanted to provide users with a number of tools that they can use while exploring the repository. In traditional web based system, navigating from one tool to another usually means that we click on a link and then move to another page where the tool is available. Once the user is on a page s/he can start interacting with the tool by adding or modifying data or by performing any action relevant to the selected functionality. The process of exploring the repository starts by running the initial query (Fig. 1).

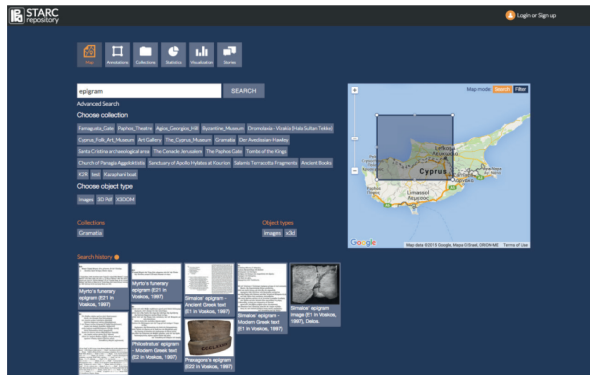


Fig. 15.1. The exploration process starts by running the search. Once the results are available the user can add or remove exploration tools. By default map tool is present in the view. The map tool is used to mark the geo-referenced data on the map, and also to perform geo-search by defining the region of interest.

Once the results are returned and displayed, the exploration process can start. By default the map functionality is available in the view. When a new tool is added to the screen, it automatically gets an access to all the data available in the current search. It also gets notified on any other tools that might be active in the view, so the necessary communication channels are established. Once the results are ready, there are a number of filters available to filter out the data, either by data type, collection. Search form can be used to filter out the data by typing

the text used to filter the data. As the user types, the data is automatically updated to show only those items that are related to the text in the search field.

The user can then run a new search repeatedly, and the search history functionality will store all those searches for later reference. The map tool (Fig. 1) is used to show information about the geo-referenced data. It provides two main functions. One is that it accompanies the search tool. Whenever the new search is ran, and the results become available, the map tool updates itself with new data, showing the geographical distribution of the search results. The user can then use the map to filter out the data by clicking on the markers on the map. Also the map can also be used as a search tool. By selecting the search map mode, the rectangle mask appears on the map, that is used to define the region of interest on the map. This region is then used as an additional parameter for the search.

Annotation tool is used to attach the information to the objects in the repository and share it with other users, or use it to facilitate more efficient search. The tool is used by selecting object from search results, then either by selecting a region in the image files (Fig. 2), or by selecting a point for 3D models, and by adding textual description of the selected part.

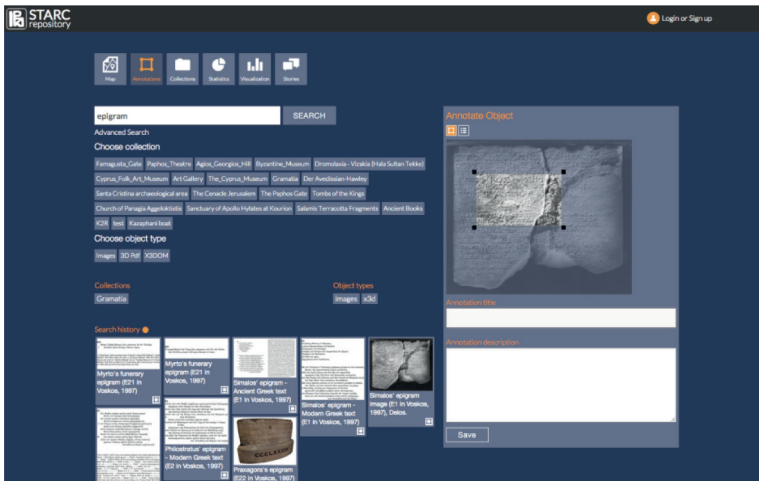


Fig. 15.2. The annotation tool. The user first selects the object in the search results, then selects the region of the object and then adds the annotation. The annotation can be accessed when the annotated object is accessed, and by specifying in the search that the search should also include annotations.

Once the search results are available, and the user selects the collection tool, the user can start adding and removing the objects from the collection. Finally the collection is described and saved. Same as for the annotations, the collection information is saved in the user's personal space, and can be also used in search, by specifying to the search that it should include the personal collections in the search. This means that the search will look not only for objects descriptions and metadata, but will also look inside collection descriptions to try and match the query.

In order to help in exploring the datasets, there are statistics and visualization tools. Statistics tool shows the basic properties of the repository. A visualisation tool is used to accompany the search tool (Fig. 3). Story creation tool is another tool that supports collaborative user generated content. It provides users with an online document editor, where users can write their own ideas, notes, insights about the data. The document created in this way is stored in the repository and can be accessed in the personal workspace, and shared with the others.

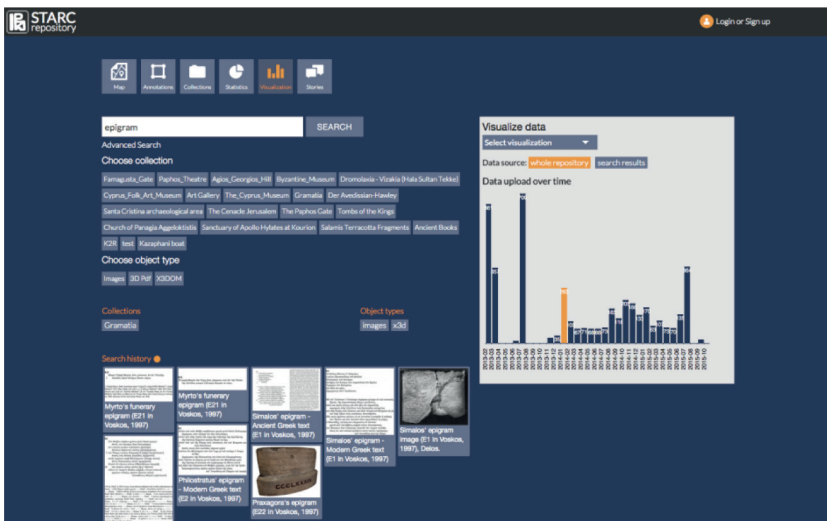


Fig. 15.3. Visualization tool. Visualization tool is used to accompany the search tool by showing live visualizations as the search results change. When the search is ran and the search results are available the visualization tools automatically update itself and shows the visualisation related to the current search results.

15.3. Archaia Kypriaki Grammateia, the STARC Repository and the EAGLE infrastructure

One of the most interesting collection stored in the repository is the Archaia Kypriaki Grammateia Digital Corpus (Pitzalis et al. 2012). The collection is composed of Ancient Greek and Latin epigraphic texts produced within a time span of circa 13 centuries (from the 7th century BC to the 6th century AD). The texts are attributed to Cypriot authors or were produced in Cyprus. The corpus consists mainly of funerary or dedicatory epigrams published with their translation in Modern Greek, critical apparatus and philological comments (Voskos 1997).

The peculiarity of the digital collection consists in the fact that, beyond the epigraphic texts, it is composed of a series of multimedia digital resources that describe the content in a multidisciplinary way: digital texts, images related to the epigraphic supports, 3D representation of the inscriptions, video, audio files, and so forth (Fig. 4).

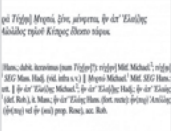
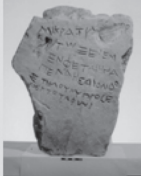


Object				
Format	Text	Image	3D	Audio

Fig. 15.4. Multimedia data constituting the AKG digital collection stored in the STARC repository.

Such a material needs to be described in the right way, in order to provide detailed information about all the elements that constitute the collection. For this reason a specific metadata schema has been developed: it covers the multidisciplinary research carried out on this material in a manner that users comprehend the complexity of such an approach through access to heterogeneous types of information (Vassallo et al. 2013).

The metadata schema for Ancient Cypriot inscriptions integrates multidisciplinary information regarding the objects and their multiple digital resources. It is the result of a research line developed within the group (Liuzzo, Rivero Ruiz and Vassallo 2014) and 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).

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, include all disciplines relevant for description and representation of epigraphies: archaeology (investigating for example the context of the finds), philology (analyzing the text, the writing style, the scripture), chemistry and geology (providing details on the material upon which inscriptions were carved), conservation (giving information about the state of the artefact), visualization and museology (about the museums and places of conservation).

Besides the inscriptions, since the Cypriot collection consists of their digital representations (pictures, 3D models of inscriptions, videos, etc.), the metadata schema takes into consideration their descriptive features, their digital provenance and other related information. For example, through the metadata it is possible to describe the digital provenance of the 3D model of an inscription and to give information about the acquisition phase (the technique, the tool used, 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), according to the digital resource obtained (Fig. 5).

The metadata schema for ancient Cypriot inscriptions aims at the following goals:

- to describe in detail the digital resources and its digital provenance,
- to provide related information about the context of the inscription,
- to enable harvesting to larger initiatives (e.g. Europeana, Ariadne).

15.3.1. From STARC Repository to EAGLE infrastructure

Beyond the functionalities developed for an enhanced users' access to the content, the STARC repository plays as aggregator for different digital libraries projects that in turn provide content to Europeana portal. The epigraphic content of the Archaia Kypriaki Grammateia digital corpus is ingested through the EAGLE Project.

The “Europeana network of Ancient Greek and Latin Epigraphy”, is an EU funded project under the umbrella of the CIP-Best Practice Network and whose aim is to bring together some of the most prominent European institutions and cultural archives in the field of Classical Latin and Greek epigraphy. One of the aim is to provide Europeana with a comprehensive collection of unique and curated online edition of historical and archaeological sources.

To encode inscriptions from different epigraphic databases, EAGLE developed a metadata format that assessed the provider’s metadata structures and considered two sets of standards: TEI EpiDoc and CIDOC CRM. EpiDoc allows a full description of the text of inscriptions while CIDOC CRM enables a further full description object-oriented, reflecting at the same time the different souls of Epigraphy, the philological and the archaeological one. Content providers use different models according to the fact their databases are more oriented towards the text of an inscription or towards the archaeological object that bears the text. According to the epigraphers’ community needs, EAGLE consortium developed the data model on the base of the two sets of standards (Liuzzo, Rivero Ruiz and Vassallo 2014). Finally, the EAGLE data model is mapped to the Europeana Data Model (EDM), in order to be ingested into the Europeana portal.

The content provided by the EAGLE consortium, due to the transformation into the EAGLE metadata model, produce three different groups of metadata according to the digital objects they are connected to: artefacts, documental manifestation, visual representation. The data that are sent to Europeana belong to the category of the artefacts (the inscriptions represented as texts, called by Europeana “Cultural Heritage Object” - CHO) and of the visual representation (the images related to the inscriptions, called by Europeana “WebResource”). The distinction between CHO and WebResource has been introduced in Europeana as a result of the introduction of the new EDM schema to provide the users with a better navigation and data retrieval and to aggregate under the same umbrella all the resources available for a Cultural Heritage Object, avoiding data duplication in the portal.

Most of the consortium data, as well as the majority of the existent epigraphic databases worldwide, are compliant to Epidoc. This allows to perform a smooth mapping to the EAGLE data model, to have results that are aligned to the project aims (e.g. the possibility

to create dedicated groups of metadata associated with the category of the object) and to simplify the involvement of other databases in EAGLE through the enlargement of the consortium.

As previously mentioned, the Archaia Kypriaki Grammateia digital corpus data integrated in the STARC Repository are different from other epigraphic databases data. The study of the epigraphy is not text-centric. The text is one of the representations of the artefact: the archaeological object, the support, the 2D image or the 3D of the object are all resources that, even if connected, have their own identity and their own set of information. Moreover, the AKG is a collection of texts accompanied by their translations, notes and commentaries as published in its last edition by Voskos (Voskos 1997), therefore it is a digital form of this important editorial printed work, to which are connected all a series of digital resources that help to enrich the corpus.

Such a material and the metadata schema used for the description of this content converges in a difficulty to map our metadata schema to EAGLE data model. This implies a further effort to integrate the content into the EAGLE infrastructure for a compliant visualization with the other content and retrieval in the EAGLE and Europeana portals. Concerning the issues connected to the mapping and integration of the AKG data into EAGLE portal, possible solutions have been investigated and are currently under tests:

- the creation and use of relations that are able to aggregate all the resources under a specific resource identified as reference item.
- the creation of rules for the development of a script that will be able to map to the EAGLE data model every time according to the type of object we are dealing with. This implies also an editing of the metadata, creating single items that have as head the information about the inscription (e.g. the Ancient Greek text) and to which are attached all the other metadata sets concerning the related objects (e.g. the Modern Greek text, the image support of the inscription, the commentary, the 3D of the support-inscription, etc.).

Even if the first solution would be much faster from a technical point of view, at the moment is under preparation a test for the second solution. In fact the latter, even if it is time-consuming in terms of elaboration, seems to be the best solution for avoiding data duplication and for having more cohesive data.

15.4. Conclusions

We presented in this paper a digital data repository and showed numbers of innovative tools used to access and explore its collections. We argued that by interacting with data in an innovative ways can help users better understand data and stimulate knowledge creation. One of the most interesting collections stored in the repository is the Archaia Kypriaki Grammateia Digital Corpus composed of Ancient Greek and Latin epigraphic texts. With the set of proposed functionalities we also enabled exploration of the epigraphic text in a way that supports sense making, understanding and collaboration. We also showed how the collection of epigraphic texts can be used within other projects by mapping our data to the appropriate data formats. Next step is to set up an evaluation framework that will try to measure and evaluate the contribution of each tool to the users' daily tasks. We want to measure the benefits of using such a tools by performing various evaluation tasks and measuring the user's performance.

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PART III

USERS, EPIGRAPHY AND THE SOCIAL WEB

16. Free Reproduction of Cultural Heritage for Research Purposes: Regulatory Aspects and New Prospects for Project EAGLE

*Mirco Modolo**

Abstract

This paper traces the genesis and activity of the “Fotografie libere per i Beni Culturali” movement promoting free remote reproduction, and reuse for scientific purposes, of manuscripts and antique volumes conserved in Italian archives and libraries. Simultaneously, evidence highlights the advantages of deregulating cultural heritage images for historical research, in particular for the study of antique epigraphy developed by the EAGLE project.

Keywords: Archives, Libraries, Manuscripts, Reproductions, Creative Commons

16.1. Free reproduction of cultural heritage outlined in the “Art Bonus” decree

On the first of June 2014, the ‘Art Bonus’ decree came into effect, sanctioning the free reproduction of all cultural heritage for scientific purposes (even reproduction carried out at a distance). It represented a new first for historical research:¹ numerous archives and libraries opened and made free of charge the reproduction of manuscripts and historical volumes with a user’s camera. This provided a clear advantage for historical research, particularly epigraphy, which considers antique manuscripts from the 15th and 19th centuries an important source for the study of Latin and Greek inscriptions.

As a direct consequence of the Art Bonus decree, some institutions, including the State Archives of Florence (Archivio di Stato di Firenze), allowed users to make digital copies of records in consultation.

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¹ Decreto-legge 31 maggio 2014 n. 83, art. 12.

Unfortunately, just one month later, a restrictive amendment modified the original text of the law, explicitly excluding printed books, manuscripts and archival documents from the liberalisation.² Many scholars' surprise was overtaken by irritation, driven by an apparent paradox: museum photography remained free for the tourist, yet the scholar engaged in research activity in archives and libraries would not reap the benefits of liberalisation.³

16.2. Current state of the problem

Excluding bibliographic and archival records from liberalisation has effectively restored the previous regime, still in force today: taxing images taken with a personal digital device (in the institutions still allowing this freedom), or an outright ban on use of a personal device – requiring the paid use of a photographic service. Rates for using a personal device are the most varied (on average 3 Euro per unit), while some archives require a rental fee for making reproductions on a personal device in a specialised room. Thus an extreme variety of tariffs emerges, commoditising research to the detriment of those who contribute to enhancing documentary heritage through their own study. Furthermore this is in direct contrast with the Italian Constitution which, according to articles 33 and 9, requires the Republic not only to guarantee free research, but also to actively promote it. An effective “tax” on reproduction with a personal device becomes a research obstacle; it is absurd to expect a fee for a service provided autonomously by the researcher himself.

Regarding ‘reuse’ of the image, publication for scientific purposes remains subject to a precise and formal request to have ‘publication authorised’ granted on stamped paper, hugely time consuming for administrator as well as applicant. The payment of fees for use (‘canoni di utilizzo’ or royalties) is excluded instead for the publication of images of cultural heritage (such as archival documents, ancient printed books or ancient inscriptions) in scholarly books or papers with a cover price of less than 77 Euro and up to 2000 printed copies (as per circular 21/2005 of the ‘Ministero dei Beni e delle Attività Culturali e del Turismo’).

² Legge 29 luglio 2014, n. 106.

³ Modolo, *Sogno infranto*; Brugnoli, *Ancora sulla riproduzione*; Ciociola, *Libere riproduzioni*; Gallo, *Il decreto Art Bonus*; Stella, *Le costose riproduzioni*; Stella, *La gabella*; Stella, *Biblioteche*.

16.3. Traditional objections to liberalisation of reproductions

The principal objections opposing the liberalisation of reproductions of bibliographic and archival records, and which must be addressed here, regard both ‘conservationist’ as well as derivational ‘improper use’ risks for the images.

The protection of archival material is one of the principal arguments against free reproduction. Indeed archivists at the State Archives of Florence (Archivio di Stato di Firenze) directly noted the advantages of free reproduction in the month “Art Bonus” came into force (prior to the approval of the restrictive amendment): one could observe not only that the images did not damage the archival material, but rather, being subject to less movement, actually contributed to its conservation.

If the remainder of the problem is indeed conservation, it is difficult to understand why this might be considered a problem only in Italy: the policies of the National Archives of the United Kingdom and the French Archives Nationales already foresee free reproduction with a user’s personal device. In recent months the British Library has spread across the web a short video demonstration in order to instruct the users in the proper handling of the codex manuscript. Specifically, the video prompts the user to employ simple lead cordons to hold open the pages of a codex without compressing the back of the volume and risking damaging the binding.⁴

In addition, digital replaces contact photocopy (which still exists in some archives), primarily by reducing the wear and tear in handling a manuscript over the course of extended periods. As such, reproduction at a distance not only does not damage media more than normal handling during consultation, but rather may be a powerful ally to its conservation. For this reason it should be incentivised and not limited or in fact denied as happens today.

To those fearing ‘abuse’ relating to improper use of images (different from those permitted by authorisation) it is easy to respond that prior authorisation had already been eliminated from “Art Bonus” for photographs of all cultural heritage other than bibliographical or archival records. In other words, ‘ex post’ control instead of ‘ex ante’ control, characterised as the only genuinely effective measure.

⁴ Modolo, *Il dibattito sulla liberalizzazione*. http://www.bl.uk/reshelp/inrooms/stp/copy/selfsrvcopy/book_photography_video.mp4.

It is hard to imagine now, in the digital era, strict ironclad control over all who request daily permission to reproduce mass of images which are each day authorised only for “educational purposes”! This is a problem which doesn’t exist in France: the Archives Nationales does not in fact provide any specific request for autonomous reproduction, while the Bibliothèque National de France allows anyone to freely download PDF documents or antique volumes in good resolution without the need to include distinctive watermarks.

The application of tariffs for reproduction and reuse of cultural heritage images appears, even more than a means of generating profits, a pretext designed to discourage reproduction of manuscripts and ancient volumes and to minimise the risk of abuse associated with using the images for profit-making activity, in a way which might ‘damage’ the public treasury.⁵

16.4. The proposal of “Fotografie libere per i Beni Culturali”

To meet scholars’ demands, in September 2014 researchers spontaneously formed a movement of ideas, “Fotografie libere per i Beni Culturali”. The group launched a petition asking Minister of Culture on. Dario Franceschini for free reproduction in archives and libraries, renewing the original spirit of the “Art Bonus” decree.⁶ It was an unprecedented initiative given not only the number of signatures (more than 4200), but also the quality of subscribers: a chorus comprising the highest representatives from each of the historical-humanitarian disciplines from around Europe: associations, university docents, researchers, students, and simple fans of local history, along with directors of state archives and functionaries of the ministry itself.⁷

Moreover, the movement produced a proposal to amend article 108 of the Codice dei Beni Culturali regulating the reproduction of cultural heritage,⁸ to eliminate the exclusion of printed books and documents

⁵ <http://www.bianchibandinelli.it/2015/05/25/fotografie-libere-un-comunicato-dellassociazione-bianchi-bandinelli/>.

⁶ Lupoli, *Libere foto*; Pigliaru, *Un selfie*. <https://fotoliberebcc.wordpress.com/category/adesioni-e-contatti/>.

⁷ Pigliaru, *Un selfie*; Manacorda, *Fotografare*; Manacorda, *Petrolio*, 122; Modolo, *Ricerca storica*.

⁸ <https://fotoliberebcc.wordpress.com/category/la-nostra-proposta/>.

from the liberalisation archive, hence complying with copyright and personal privacy for archival documents. Free photography is therefore a fundamental tool which, without contradicting the demands of conservation, greatly facilitates the task of transcribing documents and historical research – allowing significant time and money savings for the scholar, especially those forced to move to archives distant from their own place of residence.

Free photography means the ability to use one's own smartphone or camera in archives and libraries during consultation, without the need to request prior written approval (for purposes other than profit). A 'cultural' exception should be provided for a particular form of profit, scientific publishing, given the belief that research is meaningful only if it can be disseminated in the broadest way. "Fotografie libere per i Beni Culturali" in fact proposes to make free the publication of images of cultural heritage in scientific texts in circulation and of a limited cover price (below 77 Euro and 2000 copies)⁹ with the sole duty to always specify the name of the library/archive of provenance, and to provide a copy of the publication. In such cases the official request for authorisation by ordinary post may be substituted by a simple communication online at the institute with the intent to publish. For the "greater" publications, other than the usual indicated above, and in general for moneymaking activities, the concession regime will remain in force, requiring both a formal authorisation request as well as a payment for the canon of use (royalties).

16.5. The free reuse cultural heritage images

The reuse of cultural heritage images, briefly mentioned in the proposal scope for "Fotografie libere per i Beni Culturali", intersects closely with EAGLE's need to publish Latin and Greek inscriptions online for cultural purposes. To this end, EAGLE established an agreement with the Italian Ministry of Culture on the 21st November 2005, to publish on the web low-resolution reproductions of previously published Latin and Greek inscriptions dated before the 7th century.

Cfr. anche Modolo e Tomicelli, *Una possibile riforma sulla riproduzione; Modolo, Il dibattito sulla liberalizzazione.*

⁹ According to circolare n. 21 Direzione Generale per gli Archivi (Mibact).

A second agreement, signed in 2012 with the Archivio di Stato di Roma (State Archives of Rome), authorizes EAGLE to web-publish images of archival documents, including dates and information of interest for the study of antique epigraphy. Despite these formal agreements, those working for EAGLE in Italy and across Europe, understand how difficult it is to publish images of inscription – mostly due to the mistrust of those who still view diffusion of digital images as a form of “expropriation” and not an occasion of cultural enrichment.

The added-value of digital resides in its ability to disseminate knowledge, and not in static storage, as clearly demonstrated in numerous international examples which head in the direction of an ever-greater open majority toward free-reuse: the British Library for instance, which incidentally in the past months has liberalised reproductions to satisfy the demands of users, explicitly promotes the sharing of images and manuscripts on social networks, recognising the ‘great benefit in sharing images’. An interesting case is the Metropolitan Museum of New York, which has made available hundreds of thousands of high-resolution photographs of their own works, even allowing their reuse in scientific publications, in free format but also free from prior authorisation; the Walters Art Museum in Baltimore proposes an even more extreme model in giving anyone the possibility to reuse excellent resolution images for any purpose, including commercial (!) with a “CC0” license.

Free reuse of the images, at least for cultural purposes, has obvious positive effects on the liberal circulation of scientific content, and also represents an important way to improve the visibility of institutions and their collections. Museums, archives and libraries should therefore be seen as active and dynamic centres of cultural promotion, more so than bureaucratic offices for the static conservation of cultural heritage.¹⁰

16.6. Encouraging first results and European perspectives for project EAGLE

The effort underlying the collection of thousands of signatures has already led to encouraging openings. A recent law proposal aims to restore the original spirit of the “Art Bonus” decree,¹¹ and the comparable

¹⁰ Cfr. on the Creative Commons licences in archaeology: Brugnoli and Gardini, *Fotografia digitale.*; Gualandi, *L'archeologia italiana*.

¹¹ <http://www.senato.it/japp/bgt/showdoc/showText?tipodoc=Sindisp\&leg=17\&id=914146>.

availability shown by the Ministry of Culture, are in fact events which inspire optimism – primarily because they mark a return to this topic in parliament after one year. It will begin a course that will hopefully soon arrive at the modification of article 108 of the “Codice dei Beni Culturali” regulating reproduction and the release of an appropriate circular which should affirm, without ambiguity:

1. the free reproduction in archives and libraries for research purposes and in accordance with complete respect for privacy and copyright law;
2. the free reuse of images of cultural heritage for purposes outside of financial gain, or free publication online and in print within the limits mentioned above.¹²

It is important that these principles remain valid in archives and libraries which pertain not only to the State, but also to the local administrations and – why not – to the private owners of cultural heritage which, although private, constitute the patrimony of public interest. If in Italy one might achieve a similar result, as is hoped, the immediate next objective would be to export this model to other countries in the EU to encourage the widest possible circulation of information in the field of historical research at the community level.

Photography, as noted here, is an indispensable method for studying not only epigraphic text but also the supportive material which contains it. The advantage for EAGLE will then be two-fold: the liberalisation of photography in archives and libraries can facilitate the study of numerous epigraphic repertoires which can be found in manuscripts and antiquarian sources, while the free reuse of cultural images in museums across Europe may allow the broadest sharing of inscription reproductions on the web.

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¹² Modolo e Tumicelli, *Una possibile riforma sulla riproduzione*; Modolo, *Il dibattito sulla liberalizzazione*. See also: <http://www.senato.it/japp/bgt/showdoc/frame.jsp?tipodoc=Emendc&leg=17&id=956757&idoggetto=959154>.

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17. Digital enhancement of the “Paolo Orsi” museum: a Google Street View 360° pilot project tour

*Elisa Bonacini**

Abstract

The aim of this paper is to present the pilot project in progress at the “Paolo Orsi” Archaeological Museum (Syracuse, Italy). Thanks to a free partnership with Google Business Photos, we have managed to map the entire museum for an online 360° tour on Google Street View. A dozen archaeological finds have been selected for 360° virtual tours, provided with descriptive sheets. Among them the beautiful ‘inscription of Nassiane’, from the Catacombs of San Giovanni in Syracuse, has been selected.

Keywords: Google, Sicily, Sicilian Cultural Heritage, Virtual Museum, Virtual tour, Digital Heritage

17.1. The “Paolo Orsi” Archaeological Museum

The “Paolo Orsi” Regional Archaeological Museum of Syracuse, together with the “Antonino Salinas” Regional Archaeological Museum in Palermo, is the most important Sicilian archaeological museum and it is one of the most important and richest archaeological museums in Italy.

The National Archaeological Museum of Syracuse was born by a royal decree in 1878, known as “national” for its collections’ importance and size. Well-placed inside the historical palace in the Cathedral Square on Ortigia island, it was directed by Paolo Orsi from 1895 to 1934.

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The archaeological collection has been enlarged by over 70 years of archaeological research making it necessary to move the collection to a new museum space. Designed by the architect Franco Minissi, the new museum was built in the Villa Landolina garden between 1967 and 1986 and inaugurated in January 1988. The collection consists of artefacts from the prehistoric, Greek, Roman and Christian periods found in archaeological excavations in Syracuse and in other Sicilian sites. The museum space is divided in three levels (floor 1, 2 and basement), distributed around a central space which is dedicated to the history of the museum and temporary exhibitions. First level is divided in three sectors (A – C) and testifies the history of central-eastern Sicily from prehistoric ages to the Greek one. On the upper floor, sectors D and F were inaugurated in 2006 and contain finds from the Hellenistic-Roman and Christian periods. Section E will open next year with findings from sites in central-eastern Sicily (as Centuripe, Morgantina, Tindari and so on). Moreover, a precious and unique collection of coins and medals from archaic to the medieval age is located in the basement, opened in 2010.

17.2. The project: reasons and birth

This project born from the desire to fill the deep gap in the promotion and enhancement of Sicilian cultural heritage.

Sicily has the highest number of UNESCO heritage sites (7/51 in total)¹ and of UNESCO intangible cultural heritage (3/6)² in Italy and in the world. Infact, Sicily has some of the largest and most important archaeological sites in the world: the temple of Concordia in Agrigento, for its exceptional state of preservation has become the symbol of UNESCO itself.

Despite of this, Sicilian cultural heritage struggles to be present on Google's platforms such as Google Art Project and others, as it should, compared to other Italian cultural sites (Bonacini 2013; 2014).

¹ 1997: Valley of Temples in Agrigento; 1997: Villa del Casale; 2000: Eolian Islands; 2002: Late Baroque Towns of the Val di Noto (South-Eastern Sicily); 2005: Syracuse and the rock necropolis of Pantalica; 2013: Mount Etna; 2015: Arab-Norman sites, Palermo and the Cathedral Churches of Cefalù and Monreale.

² 2008: Opera dei Pupi, Sicilian puppet theatre; 2013: Mediterranean diet (transnational); 2014: Traditional agricultural practice of cultivating the 'vite ad alberello' (head-trained bush vines) of the community of Pantelleria.

It is not so difficult to explain where the difference between the island and its mother country comes from. Sicily has the status of independent region, therefore it has an exclusive competence in the field of regional cultural heritage. Sicilian heritage is released from any convention that the Italian Ministry of Cultural Heritage and Tourism has signed since 2009 with Google. The Regional Department of Culture and Sicilian Identity has never bothered to solve this really huge gap regarding its cultural heritage and landscapes.

In Street View Gallery,³ which now has contributed a great number of users from all over the world, thousands are the spherical and geo located photos of Italian places. However, tightening the selection to “Landmarks of Italy”,⁴ Sicily has only 9 spherical photos, showing the beaches of the Aeolian Islands (7), the islands of Favignana (1) and Marettimo (1).

Among Art Project’s 605 museum collections,⁵ 47 are Italian, especially relevant to Rome, Turin, Venice and Milan. One of these, not the best artistic production, is a Sicilian contemporary collection, relevant to the International Festival of Street Artists in Giardini Naxos (Me). No other Sicilian museum, collection or archaeological site has been included in Art Project.

Browsing on the Street View Gallery, 21 sites are all over inscribed on the World Wonders Project:⁶ for Italy, only Pompeii and the historic center of Florence are inscribed in this still restricted list. Many more sites can be visited virtually from the same project linked on Google Cultural Institute’s website:⁷ 172 sites in the world, 22 in Italy and, finally, 2 of them in Sicily. Until last year the Unesco site of the baroque town Val di Noto was the only one in Sicily; currently Mount Etna, has been added.

Google organized its Google Camp 2014 and 2015 editions by selecting as exceptional locations two of the most evocative archaeological

³ “Google Street View Gallery,” ultima modifica 10 gennaio 2017, <https://www.google.com/maps/views/streetview?gl=us>.

⁴ “Italy Highlights,” sulla Google Street View Gallery, ultima modifica 10 gennaio 2017, <https://www.google.com/streetview/#italy-highlights>.

⁵ “Google Art Project” sul portale del Google Cultural Institute, ultima modifica 15 febbraio 2017, <http://www.google.com/culturalinstitute/about/artproject/>.

⁶ “World Wonders Project” sul portale del Google Cultural Institute, ultima modifica 24 maggio 2016, <https://www.google.com/intl/it/culturalinstitute/about/wonders/>.

⁷ “Google Cultural institute” sul portale del Google Cultural Institute, ultima modifica 28 febbraio 2017, <https://www.google.com/culturalinstitute/beta/?hl=it>.

sites in the world, Selinunte and Agrigento. Nevertheless the beauty and heritage of Sicily, ironically, is not on Google's platforms.

This project was born in collaboration with Mr. Gianfranco Guccione, a certified Google Business Photo photographer, while he was working as a freelance consultant at the General Direction of the Regional Department for Cultural Heritage and Sicilian Identity in 2014. He proposed to realize the Street View mapping of a museum and an archaeological site in Sicily, considering the possibility of creating "augmented" virtual tours (3D virtual tours of objects displayed in museum's windows and virtual aerial tours, with the addition of text and audio descriptions).

The profound reason of this project consists in an effort to bridge this gap, "increasing" fruition and enhancement of Sicilian cultural heritage.

With the agreement between the General Direction of the Regional Department for Cultural Heritage and Sicilian Identity and the European Coordination of Google Business Photo, it was decided to choose as a sample of this project two cultural regional institutions, the "Paolo Orsi" Museum in Syracuse and the Valley of the Temples in Agrigento, both UNESCO sites since 2005 and 1997. The project was then structured as a research fellow project at the University of Catania and carried out by the present writer in close collaboration with Mr. Guccione.

The first part of the project at the "Paolo Orsi" Museum, which we will discuss here, is about to be completed. The second part at Valley of the Temples in Agrigento is going to start.

17.2.1. The 360° tour on Google Maps: some technical data

A large photographic survey began in August 2014, with the aim of mapping all areas of the first and second level open to visitors (only the collection of coins and medals, for security reason, has not yet been photographed).

A total of 3.924 shots to get about 327 360° virtual tours have been made using a mobile station made up by a reflex camera with fisheye type camera lens, tripods with panoramic head. Because of the peculiarity of the light in the different museum's sectors, it was necessary to adjust the brightness each time. The windows in the winding path often reflect one another and precautions were taken to avoid, as far as possible, those refractions.

Once loaded on Google’s software Business Photos, the pack of images from the 327 virtual tours were geo located in Google Maps Street View, mounted avoiding defects of sight between the images.

The 360° virtual tour makes it possible browsing the entire museum and its collection, between levels connected by arrows, placed online at the link <https://goo.gl/maps/oagnd8urP1H2> (for the first level) and <https://goo.gl/maps/vrpDfuPPgwM2> (for the second level). As you can see in Fig. 1, by clicking on the first link, the remote user can enter the museum through the Street view panel: the 360° virtual tour begins at the entrance and the user can browse moving with the directional arrows, between sectors and levels.

The project provided the opportunity to carry out 360° virtual tours of some exposed archaeological finds, like an “augmented” virtual tour, certainly innovative compared to what Google’s platforms provide.

Art Project, for example, allows you to view points of interest along the path in a museum, but captions are short and photos are static. A pilot initiative has been recently launched featuring the possibility to in-browse almost 300 3D photos of objects from the collections of six cultural institutions in the world. However 242 of these consist of scans of animal skulls (pieces of nature, not works of art) from the California Academy of Science collection; 22 objects of art come from Museo d’Arte Orientale (the only Italian cultural institution to join the project until now). These 3D objects, described by short captions, are available to users to be rotated and zoomed. The aim of this new Google’s project is to begin building the most important and largest database of 3D scans of art works worldwide.

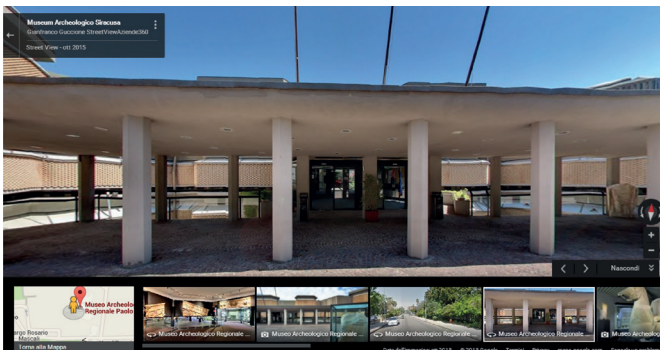


Fig. 17.1. The virtual entrance to Archaeological Museum “Paolo Orsi” on Google Street View.

As for the displaying on Google Maps of the 360° virtual tour of the objects, we must specify that Maps so far does not support the integration of menus, captions, photos, video, info inside the Street View virtual tour technology. Infact, it is only allowed navigation in 360°, i.e. a virtual walk.

We tried to find an answer in order to show on Maps all the information, captions, maps, levels and 360° virtual tour of objects. Thanks to customized i-frame we made these virtual tours possible with their captions and the maps with different levels and clickable points of interest, adding them to the existing virtual tour of the Museum, already on Maps, through a link containing the Google mapping of the Museum. In this way the virtual tour of the Museum – made with Google standards – is “augmented” by another virtual walk much more exhaustive, located via link on the Google Maps board of the Museum, where you can view all these additional items.

Both the virtual tour of the museum and the virtual tour of the objects will also be placed on the Museum’s website, on the Regional Department for Cultural Heritage and Sicilian Identity portal (<http://www.regione.sicilia.it/beniculturali/museopaolorsi/>). Because of the profound principle that this non-profit project would improve the visibility and promotion of Sicilia Cultural Heritage, the Museum’s virtual tour and its reproductions belong to Google; Museum’s objects virtual tours, instead, belong to Paolo Orsi Museum, which is free to reuse them.

17.2.2. The “Paolo Orsi” Museum 360° tour

Coming from Sector A, after turning around a couple of casts of dwarf elephants from Spinagallo cave (Syracuse), a remote user can see the displayed artifacts, starting with Neolithic phase of Stentinello (VI millennium B.C.) to reach the great exhibition space dedicated to Bronze age: Ancient Bronze age (facies of Castelluccio), Middle Bronze age (facies of Thapsos), Late Bronze age (facies of Pantalica) and Final Bronze age (facies of Finocchito), where the large containers from Thapsos and Pantalica necropolis.



Fig. 17.2. 360° tour of Sector A: a couple of casts of dwarf elephants from Spinagallo cave.

In the Sector B1 remote users can admire findings from the first colonies founded by the Greeks in eastern Sicily (Naxos, Zancle, Leontinoi, Katane, Megara Hyblaea) with some of the most important Greek masterpieces, as the naked sculptures of young men from Leontinoi and Megara Hyblaea.

The B2 Sector introduces the visitor to the archaeological finds from the city of Syracuse, from its foundation to classical age. Here the most important spaces are those dedicated to the architecture of archaic and classical temples (Athenaion, Ionic temple, Olympeion and Apollonion), to the statuary and the terracotta findings from urban excavations during the last decades (Piazza Duomo, Ortigia, Piazza della Vittoria) and to the urban and extraurban necropolis (Fusco, Giardino Spagna) with rich funerary kits.



Fig. 17.3. 360° tour of Sector B2: the findings from Athenaion and Ionic temple in Syracuse.

Sector C is dedicated to the colonies founded by Syracuse – Eloro (670 B.C.), Akrai (664 B.C.), Kasmenai (644 B.C.) and Camarina (598 B.C.) -, to Gela (689 B.C.) and Agrigento (580 B.C.), the largest colonies of south-eastern Sicily with their ceramics, architectural remains of temples, findings from sanctuaries and necropolis, as well as finds from other indigenous hellenized centres.

Sector D on the second level contains finds from the Hellenistic age to the Roman period, including statuary, beautiful portraits from the Roman age, architectural pieces, ceramics, mosaics, cinerary urns and various handcrafts.

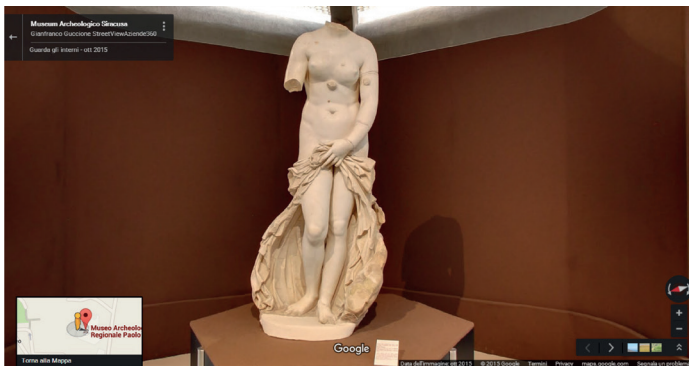


Fig. 17.4. 360° tour of Sector D: the Venus Landolina.

They document the multiple aspects of life in Syracuse and come from urban necropolis from III-II century B.C. Here are masterpieces like the wonderful statue of the Venus Anadiomene, called Venus Landolina, here in Fig. 4.

In Sector F finds from the various catacombs in the city are on show, documenting life in the Christian era. Here is the Sarcophagus of Adelfia, a Christian marble sarcophagus found in the Rotunda of Adelfia inside the Catacombs of San Giovanni, just near the museum.

17.2.2.1. 360° virtual tours of archaeological selected objects

The Museum staff has selected 12 objects along the path between the two levels, which can be linked as points of interest placed on the Museum map – where the remote user can identify sectors, plans and POI – with virtual 360° tours equipped with labels with captions and descriptive texts.

Here are the selected objects:

From Sector A:

1. A foot-cup dated to the 15th century B.C., relevant to the facies of Rodì-Tindari and coming from Vallelunga, in the province of Caltanissetta.

From Sector B1:

2. A red-figured wedding lebes, attributed to Painter of Siracusa 47099, dated to 360-340 B.C. from Lentinoi.

From Sector B2:

3. A proto-corinthian oinochoe, dated to 670 B.C., coming from the excavations in Piazza Duomo;
4. A plastic Corinthian vase in the form of a lion, dated 610-590 B.C., from the Garden Spain Necropolis;
5. An Attic black-figured calix-crater, by the Antimene Painter in 520 B.C., coming from the Garden Spain Necropolis;
6. An Attic black-figured Panathenaic amphora, dated to the middle of the 6th century B.C., coming from excavations in Viale Paolo Orsi;
7. A terracotta bidder statuette, dated to the 4th century B.C., coming from the sacred votive deposit in Piazza della Vittoria.

From Sector C:

8. A red-figured bell-shaped krater, coming from Camarina, produced in the workshop of the Athenian painter Polignoto, around 440-430 B.C., decorated on the principal side with the Delphic triad (Apollo, Artemis and Latona);
9. An Attic red-figured lekythos, coming from the necropolis of Capo Soprano near Gela, dated to 470 B.C. and realized according to the manner of the London painter E342;
10. The Ephebus of Adrano, a small bronze athlete, dated to the first half of the 5th century B.C., generally thought to be a scaled-down copy of a large bronze original by the famous Greek sculptor Pythagoras.

From Sectors D:

11. A small Hellenistic terracotta boat in the shape of a pistrix (sea monster), from the Fusco necropolis in Syracuse.

From Sector F:

12. The Nassiane inscription Fig. 4, a curious marble disk, from the Catacombs of San Giovanni.

Fixed on tripods the reflex camera with a quadrangular lens, the objects have been photographed flipping them on a graduated portable rolling disk. Each 360° object virtual tour took a number of about 88 shots, for a total of 1.062 shots, mounted with specific software. In this way the remote user, clicking on the preview pictures, can admire the selected object in all its sides, by moving the mouse on the right and left and zoom in-out.

17.2.2.2. 360° virtual tours of Nassiane inscription

The last selected object we present here is a disk from Sector F: it is a marble disk, discovered by Paolo Orsi in the Catacombs of San Giovanni in 1894 (Orsi 1895), decorated by a wreath of laurel leaves on one side; the other side was reused in the 4th century A.D. for the funerary inscription of Nassiane, woman who died at age 32 in God faith.

This object, which the remote user can observe with a 360° virtual tour, has been selected both for the peculiar reuse and because it documents the religious syncretism of the early centuries of Christianity. Re-using of architectural is well documented in the catacombs of Syracuse (Sgarlata 2013). It was found shattered in front of a burial, distinct from others, known as “the Saint’s Tomb” (Sgarlata 2004, 40-44).

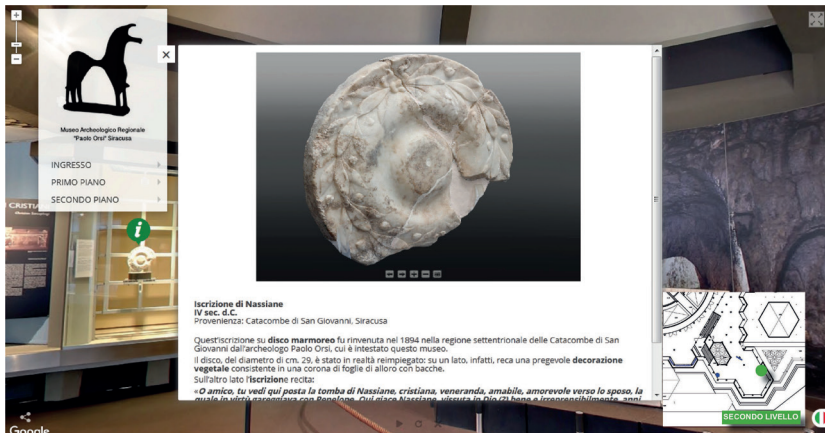


Fig. 17.5. 360° tour of the Nassiane inscription.

This is the Greek text:

chrismon ς χριστ< ι>ανῆς σεμνῆς ἀγανόφρονος [ῆδ] ἐ φιλάνδρου
 Νασιανῆς τύμβον εισσοῶς, φίλε, κίμενον [ὦδε ἦ] τις σεμνοσύνησιν
 [ἐριζε]το Πηνελοπή palma chrismon ἐνθάδε κίτε [Νασσ]ιανή,
 ζήσασα [ἐν Θ(ε)ῶ] καλῶς καὶ ἀμέμπτως ἔτη λβ', μῆνας ι'.

The inscription says: “Oh friend, you see here the tomb of Nas-
 siane, Christian, ripe, sweet, fond of her husband, who competed for
 virtue with Penelope. Here lies Nassiane, she lived well and blame-
 lessly in God (?), 32 years and 10 months”. This inscription documents
 such as epigraphic formulas affected by religious syncretism (syncre-
 tism generally means that a complex of phenomena and concepts de-
 rive from the meeting and fusion of different religious forms) between
 Pagans and Christians, for which a Christian like Nassiane could have
 competed in life with Penelope, the hero Odysseus’ wife and symbol of
 marital devotion. Its circular shape suggested that it was a table for the
 ritual of refrigerium, the funeral feast that symbolically was consumed
 with the dead, even this syncretic practice dates back to the pagan
 world (Sgarlata 2013; Scandurra 2014).



Fig. 17.6. The Nassiane inscription, recto (courtesy by the “Paolo Orsi” Museum).

17.3. Conclusions

As discussed elsewhere (Bonacini 2013; 2014), Google is undoubtedly the most active entity in the world committed to preservation, dissemination and promotion of cultural heritage, well above any public institution, through an unparalleled campaign of digitization open to users' collaboration. This could happen because Google itself has an incomparable capacity of economic investment. Even large international projects of digitization (such as Europeana itself) are not able to compete with Google.

Therefore, after initial hesitation towards these Google's initiatives, now most of museums and cultural institutes in the world have seen in Google a partner that enables them to progress in the online visibility and in the process of heritage digitization.

Regarding the project here presented, which concerns one of the two selected sites, we can rightfully say that it is the first archaeological museum in the world – needless to say, the first museum in Sicily – entirely browsable on Google Maps platforms with a virtual tour in all exhibition halls and 360° virtual tours with integration of captions and full description of artworks.

In the near future we hope to allow 360° visualization of a greater number of objects, with their accompanying captions translated at least in English and in audio version.

Thanks to this project we hope that Google itself could realize how the time has come to “rejuvenate” the Google Maps Street View system, allowing enabled users to apply additional content on the maps.

However, the wide interoperability between Google software the development of new solutions and the integration of geo-referenced results in the page results on the search engine continues unabated: the “Paolo Orsi” Museum – and with the museum, the city of Syracuse and the whole of Sicily – will surely take advantage of this new tool for its visibility.

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This publication has been made on concession of the Regional Minister of Cultural Heritage and Sicilian Identity; archaeological findings and plans presented here are exclusive property of the “Paolo Orsi” Regional Archaeological Museum in Syracuse and are not allowed to be copied or duplicated by any means.

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18. Latin epigraphy for the visually impaired. New technologies to favour universal accessibility

*Francesca Licordari**

Abstract

The problem of accessibility to works of art for the visually impaired can be extended to a system such as Latin epigraphy, which presents great difficulties since the engraved letters are not clear to the touch. The technology of 3D printing allows the creation of materials that make it easier to read epigraphic texts in following the “design for all” principle demonstrating an economic, rapid technique that is easy to implement and reasonably robust.

Keywords: accessibility, visually impaired, 3D printing, design for all, Braille, epigraphy

18.1. Introduction

The Declaration of the Rights of Deaf-Blind Persons, adopted by the UN in 1979, provides that every blind or deaf person has the right to enjoy the same privileges, guaranteed to all people and to have their aspirations and abilities recognized and respected. These principles are reaffirmed by the UN Convention on the Rights of Persons with Disabilities of 2006, which states (Art. 30) that the Member States must recognize

the right of persons with disabilities to take part on an equal basis with others in cultural life and should take all appropriate measures to ensure to persons with disabilities:

a) enjoy access to cultural materials in accessible formats;

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- b) enjoy access to television programs, films, theater and other cultural activities, in accessible formats;
- c) enjoy access to places of cultural activities, such as theaters, museums, cinemas, libraries and tourism services, and, as far as possible, to monuments and sites of national cultural importance.

The problem of accessibility and enjoyment of works of art by the visually impaired has long existed. Sculptures, which are sometimes designed to be touched, and sometimes are permitted to be touched, provide the possibility for blind viewers to benefit directly from the experience of the original artwork. For two-dimensional paintings this is of course not possible. It is necessary to create three-dimensional resin reliefs. This same issue has recently been understood to exist also in other artistic disciplines, including that of archaeology. This of course includes epigraphy, which is the study of all those materials which have written inscriptions. Most relevant to this is Latin Epigraphy, simply because it is the one closest to our language and which uses the same graphic signs of our own writing.

The bibliography in this area of study is unfortunately not very comprehensive, especially as regards the epigraphic field; but advances are even now being made. In Italy, the most important studies are conducted by the "Museo Tattile Statale Omero" in Ancona, which, being a museum of statuary, is mainly engaged with reproductions and the accessibility of tactile sculptures. The same work, involving the reproduction of paintings, is being carried out by the "Museo Tattile Anteros" in Bologna. It is no coincidence that Italian studies in this field are the most important done at the international level. This is mainly due to the fact of Italy's great artistic and epigraphic heritage, which makes it the country where the problem is most profoundly felt.

The results of this paper are derived primarily from field studies, and also through various assistance and support provided in partnership with people of both limited vision and complete visual impairment who tested the strengths and weaknesses of the materials which will be referenced in this paper.



Fig. 18.1. Sculptures are permitted to be touched in the National Etruscan Museum of Villa Giulia in Rome.



Fig. 18.2. Resin relief of the Anteros Museum: Mona Lisa.

18.2. Problems in understanding epigraphy

The field of epigraphy, always considered highly specialized, can be of great fascination to people with visual impairment. Some may have studied ancient languages at school, especially Latin, and so feel the need to have practical examples for the understanding of the subject; and some may be attracted out of curiosity. It is obvious that accessibility to the inscriptions for such people involves a number of difficulties, and not just that of understanding the texts, which are often full of abbreviations. There is, as well, a certain percentage of the blind who never learned to read and write. Not infrequently, they may only know capitals, but not cursive characters. The inscriptions, which appear so sharp to us that we are often tempted to touch them with

our hands to follow the course of the incisions, actually create complicated problems for the blind.

In this regard it should be noted that the sense of touch is neurologically and physiologically more suited to perceive what is protruding from a surface, rather than to what is engraved upon it. This is a fundamental difference from the sense of sight, which is suited to perceive contrasts in color and between light and shadow, regardless of the technique used to create them (reliefs or incisions). The groove of a letter, even if deeply incised, is not always easily distinguishable to the touch, while a written relief almost always is. Therefore, to allow for the visually impaired the proper accessibility to an inscription, the original needs to be touched while, however, exploiting resources to make transliterations in relief and Braille.

The creation of panels and captions in Braille can help in the understanding of a text, but it can not be the only solution, as only a percentage of the blind understand Braille. A prerequisite for this is the instruction be given at a young age, something that unfortunately does not always happen. With widespread computer usage, the majority of blind children learn to write on the computer, which supplies speech synthesizer without the need for Braille. In this way, the art work is losing its esthetic value.

A visually impaired person, however, has normally never learned Braille because with the right font size and adequate lighting he can read standard writing – albeit with difficulty. In many cases, their blindness occurs in advanced age, or as a result of illness or accident. In such situations, the writing that is understood had been taught in their school years.

As Braille graphically occupies comparatively more written space, there are distances and dimensions that must be met and therefore their characters cannot be made smaller as can be done with printing presses or computers. It follows, then, that the explanations in Braille accompanying museum art works need to be more concise, in large part because their reading needs to be done with both hands, making it uncomfortable to stand reading the texts for very long.

In the case, then, of writings on mosaics, of paintings and designs, it is not even possible to perceive the form and the depth of the ductus. The surface appears completely flat to the touch.

The best solution to make the epigraphic media available to the visually impaired turns out to be, therefore, one that involves more

visitors who can better understand the artwork. In this regard, understood that the chance of touching an original work wherever possible is a uniquely fascinating act, it becomes necessary to propose reproductions that can make the material accessible by following the concept of “design for all,” which is adaptable to all types of art. As rightly noted by the scholar and educator Enzo Tioli (AA.VV. 2006), this principle can be defined as “identical, whenever possible, equivalent when that is not possible.” All that can be touched and seen in the original work constitutes the “identical”, the use of a copy constitutes the “equivalent”.

18.3. The techniques of accessibility

In the world of epigraphy, casts of inscriptions are often used, both to facilitate their study by specialists, and also to replace those exhibits that had been located outside and brought indoors to protect them from weather conditions. These casts, if used by the visually impaired, present the same problems of accessibility as the original in terms of the difficulty of understanding the incision’s grooves. It is necessary, therefore, to have a reproduction of a different type, upon which the letters can be transliterated in relief.

At this time of experimentation in this direction, there are not as yet many constructed, the reason being that works of touchable statuary without additional aids are given more importance; and masterpieces of painting in art history are made accessible by means of a process of conversion to relief.

A remarkable attempt, albeit with many limitations, is the one created in Rome’s Capitoline Museums that, for their epigraphic collection, the Lapidary Gallery, created in 2007 a touch accessible project, in collaboration with the NGO Museum - Voluntary Association of Museums. Here, works with the most significant inscriptions of the largest sizes and preferably with reliefs were selected and availed in a way as to give the visually impaired a sense of the monument as a whole, rather than only of the text itself. The technique utilized led to a Braille book entitled *Messages from Stone*, published by Silvio Zamorani, who has specialized in Braille publications. The book was created with images in relief; but unfortunately this technique is not very perceptible to the touch and quickly becomes outdated.

The just mentioned reliefs, in fact, hardly stands out from the outline of the exhibit and we opted for the choice of reproducing the epigraphic texts only in print with overlapping respective Braille letters. For reasons of the problems of adequate space previously mentioned, the transliteration into Braille is not always complete nor accurate, as in the case of the relief dedicated to Silvanus and to the Genius of the *Equites Singulares*. In the latter instance, the missing transliteration of certain words was somewhat justified by the lack of space; but such a choice deprives the blind of the total understanding of the work.

The dedicatee, Marcus Ulpius Fructus, is shown in Braille without praenomen and nomen, thereby omitting an important element of dating and contextualization. In the caption, the text in Braille and in writing does not coincide, thereby losing the abbreviation's clarity and the translation's exactness.

The technical device for this publication and the panels presented in the museum gallery is that of graphic Braille print, a special printing technique of simple and rapid implementation, capable of reproducing text and drawings using closely spaced Braille dots. This means that sometimes the difference between the signs of writing and those of the drawings is imperceptible to the touch. Moreover, the device was also forced to work on only one level of relief. Having multiple levels available to distinguish the different elements of the object, is similar to that of using different tones of different colors. It is in this way possible to recognize the design of one level and the writing of another – the differences of only a few millimeters would be sufficient.

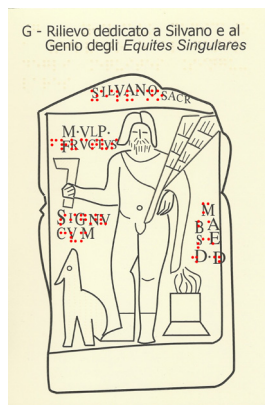


Fig. 18.3. The technical device of graphic Braille print for the panel of Marcus Ulpius Fructus.

A technique which solves this problem is that of the Thermoform, that is a relief obtained from a plastic material, formed in a metal matrix. This type of technique is the one most used for the creation of teaching aids in schools for the blind (in this regard see www.prociechi.it). But the technique proves to be very expensive in the creation of the original matrix, as well as for the reproductions of individual pieces. The costs come down significantly when multiple copies are derived. The ease of obtaining new copies compensates for the rapid deterioration of the material.



Fig. 18.4. The technique of the Thermoform with caption in Braille.

An additional system of reproduction, which is still in use but is gradually disappearing, is the Minolta Heater with printing granules. This enables the quick printing of designs and writing on a paper little thicker than that of normal stationary. It has never been used in reproduction of inscriptions for the blind and there would be nothing that could prevent that. But based on experiences and tests made by people with visual disabilities, it can be said that the resulting relief is not very pronounced to the touch, to this should be added the poor resistance of the characters, which often, after prolonged use, tend to become damaged or completely lost. The Minolta system is therefore a still utilisable technique useful in creating images for brief exposure, but it must be avoided for reproductions intended for permanent collections.



Fig. 18.5. Reproduction with printing granules (Minolta Heather) of the Cortona Triptych by Fra Angelico.

18.4. 3D Printing

The new frontier in the understanding of works of art for the sight impaired is provided by 3D printing, which proves to be both economical, fast, easy to implement, and durable. It is a single technique, which gathers together the advantages of the techniques already highlighted and overcomes the defects of poor durability. Moreover, as the name implies, it allows the introduction of the third dimension, which until now had never been possible, allowing the blind person to be able to better perceive objects in space. This problem maybe not obvious in the case of inscriptions on plates, but presents itself when we deal with sculptured monuments containing inscriptions.

Precisely from this technology in 2007, coordinated by Prof. Massimo Bergamasco and the Perceptual Robotics Laboratory (Percro), was developed the project PURE-FORM, which led to the creation of a virtual museum, which gives visitors the chance to see and “touch” objects, in particular digital sculptures, belonging to different historical periods and from different contexts. All of this is based on a digital scan of the artworks stored in a database, thus offering a wide choice, and reproduced on a touch screen display. In this project the focus was also placed exclusively on sculptures, which already possess the third dimension, while the epigraphic content has been completely omitted. The creation of a display, in practice a computer, allows on the one hand more accessibility to artworks, but on the other deprives the user

of the opportunity to travel to a place where they could personally experience the work's features. It must not be forgotten that a museum or an archaeological site are not just warehouses and storage sites.

The great advantage of 3D printing is that it materially allows more types of reproduction fundamental to human comprehension that can be joined together and be touched and perceived as if real:

- Original
- Original with fractures and abrasions and signs of aging
- Integrated original
- Reproduction with transliterated reliefs
- Reproduction of the original with Braille overlay.

A copy could be thought of in its original 1:1 scale, that can be regularly handled to give an idea of its dimensions; to another with letters in relief, rather than etched, for a better understanding of the texts; the realization of individual fragments of inscriptions that could then be put together like a puzzle, just as the epigraphist does. Very often, in fact, the inscription is the result of a recombination of the fragments. Moreover the inscription may be created, by modeling it in a different way to the touch where the integration between the fragments is clear. In this way the visually impaired would be able to approach epigraphy in almost the same way as any sighted person. This is notwithstanding the need for explanatory captions accompanied by transliteration and the noting of the abbreviations, which of course may not be clear to the layman.



Fig. 18.6. Small model in 3D printing of the Sarcophagus of the Spouses.



Fig. 18.7. The clone of the Sarcophagus of the Spouses (scale 1:1) starting from the digital tridimensional scan of the original Sarcophagus, Italdesign Giugiaro.

This technique would be very valid when used in the case of reproduction of mosaics and inscriptions in the mosaic. These reproductions make for the best situation where the user can differentiate between the various levels. The background can be made on one level, while the drawn design can be made on another upon which it is possible to write. The use of 3D would obtain a result similar to that by the Federazione Nazionale delle Istituzioni Pro Ciechi (National Federation of Institutions for the Blind) NPO in the Square of the Corporations of Ostia Antica. In this area, paved with many squares of mosaics, which bear witness to the intense commercial activity of ancient Ostia, the reproduction of Ostia's famous lighthouse was created with different levels of elevation of a mosaic in black and white, which allow the user not only to understand the image, but also to understand the technique of its realization. In this case, though, the reproduction does not contain writing, because the chosen image contained no inscriptions. But nothing prevents the use of the same technique using written entries, notwithstanding the need for an additional explanatory panel. The disadvantage of this technique is the high cost of implementation, given that it is a reproduction created exclusively from a specific work, and requiring a rather high level of craftsmanship since it is not merely modeled from a metal matrix.



Fig. 18.8. The reproduction of the mosaic of Ostia's lighthouse by the Federazione Nazionale delle Istituzioni Pro Ciechi NPO in the Square of the Corporations of Ostia Antica.

A thesis paper, of the Postgraduate School of Archaeological Heritage in Latin Epigraphy (Licordari 2015), which supports an exhibition project for the dissemination of Latin Epigraphy to the public, proposes 3D reproduction of two mosaics of the stations of that square in Ostia, with images and writing – that of the Libyan boatmen of Sabratha and of the Carthaginian boatmen. The first, with the inscription *STAT. SABRATENSIVM* [CIL 14, 4549.14], is characterized by the image of an elephant, the symbol of the Sabratha ivory trade. The second contains the inscription *NAVICVL. KARTHAG. DE SVO* [CIL 14, 4549.18] along with two ships. The paper's original idea was based on the fact that not only should there be brief and easy to understand inscriptions, but that the understanding could be made easier by the presence of drawings presumably known to blind people. Certainly the case of Ostia Antica is a particularly simple one as it involves mosaics of only two colors. A more complicated case would be a polychrome mosaic which attempts to assimilate all the aspects of a colored painting. It is obvious that the sketched designs and writing can be configured and presented on different levels.



Fig. 18.9. The mosaic of the Libyan boatmen in Ostia Antica.

3D printing has the great advantage of allowing the reproduction of colors. But to be made adequately perceptible by the visually impaired, they should have a marked color contrast.

In the thesis mentioned above was proposed the use of 3D printing for the reproduction of other artifacts containing inscriptions. It presented the case of a portable timepiece and an Italic mirror, both objects containing images with a few written words. The inspiration to utilize the mirror came from the creation of a computer model by the former Superintendence of the Archaeological Heritage of Southern Etruria. Achieving the goal required the difficult extraction from the print of a mirror with correct reproductions of the images and the script. According to the officer in charge, it would have been enough only to deepen the furrows of the incisions in order to construct an object that could be accessed by the blind; but this obviously does not solve the problems already analyzed. The idea in principle is good, but modifications need to be made to the relief of the writing and the images. Given the small size of the object in this case, provisions would need to be made for reproductions of larger scale originals in order to enlarge the space available for the user to engage in tactile perception. It is obvious that in cases involving a different scale from the original, it is absolutely necessary to accurately render the differences so as not to create a false perception.

A further advantage of 3D printing is that its process is not a stranger to digital epigraphy, since its starting point is the obtaining of a virtual model of the inscription, which is then easily printed. While the processes of thermo-formed and Braille prints require the contacting of the respective authorities in the specialized industries or in publishing houses, it is much easier to buy and to utilize a 3D printer in a museum, in a superintendence or in a university. It is important to remember that whatever technique is used, it is always necessary to consult an appropriate expert to secure the necessary guidance in the preparation of materials. It is not enough to simply take a photo or to draw a picture and print it in 3D. The technical support of someone experienced in this field, someone who knows the psychological and physiological characteristics of the experiential perception in the context of its tangible modeling is absolutely necessary.

Although in the Epigraphy is a marginal aspect, it is worth mentioning the problem of material, which of course does not solve the issues involved in 3D printing. A reproduction in resin will never give the feeling of actually touching stone, marble or bronze material, even if treating it's surface in a way as to give an antique effect and feeling. The technique of reproduction is therefore very useful to facilitate experiential understanding, but only as support to the actual experience of the original. One should of course not think that a copy can completely replace the experience of the original object.



Fig. 18.10. A mirror from Praeneste in the National Etruscan Museum of Villa Giulia in Rome.

18.5. Conclusions

As can be seen, the studies in this field as well as the examples of works on which to experiment with seeing impaired users are as yet few in number. We hope that this essay will lead to inspire a dialogue among the relevant experts, and that more work will be done in the field of epigraphy to make it increasingly accessible for persons with visual disabilities.

The use of 3D technology for the reproduction of epigraphic material is in our opinion very promising. But it requires a substantial amount of materials to be physically touched by the blind and visually impaired, so as in this way to increase our knowledge of how to further improve the current techniques of modeling and reproduction.

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19. Teaching (Digital) Epigraphy

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Federico Ponchio**

Abstract

Although having the experience of directly manipulating an ancient text-bearing artifact is important for developing the skills of an epigrapher – an experience that books and photo cannot replace – such access to primary sources is often problematic. In this article we present our experience with teaching students to transcribe and interpret Roman inscribed lead tags, using a Digital Autoptic Process (DAP) in a Web environment, so to develop basic competences in epigraphy and digital epigraphy.

Keywords: educational project, digital epigraphy, epigraphy, Open Access, primary sources

19.1. Introduction

Although undergraduate students are naturally attracted to inscriptions and epigraphy affords them an important window on the past, they are seldom given the opportunity to study inscriptions directly. This is because epigraphical work is seen as the specialist's domain: the analysis of such material generally requires a rather high level of expertise, normally acquired during graduate studies and beyond. Lacking sufficient skills and knowledge to comprehensively understand often complex epigraphic data, undergraduate students are

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simply unable to offer the expert opinions sometimes sought by a project manager. Thus, offering undergraduate students the opportunity to tackle tasks usually reserved to their senior colleagues is certainly not a common occurrence. In our small project “Pedagogical, Scholarly & Technical Experiment in Digital Epigraphy: the Study Case of the *Tesserarum Sisciae Sylloge* (TSS) through a Digital Autoptic Process (DAP)” we aimed to challenge this state of affairs. Using digital methods and a custom-designed course of rapid study, we offered undergraduates the opportunity to tackle epigraphic tasks usually reserved to their senior colleagues. We made use of newly-digitized epigraphic material: Roman commercial lead tags from the ancient city of Siscia.

19.2. Epigraphic primary sources of information

The Roman Department of the Archaeological Museum in Zagreb (AMZ) contains close to 1200 of these inscribed lead tags found in Sisak (Siscia), one of the largest urban centers in south-western Pannonia. Most of them were found during the dredging of the Kupa river before WWI. Since the dredging was localized in the very centre of the town, i.e. in front of the old Roman port quarter, it would seem that all the tags come from a limited area. All of those tags are small lead tablets, of a more or less rectangular shape, pierced with a hole so that the tag could be attached to the bags containing the merchandise or to the merchandise itself with a small rope or a metal wire. They all carry an inscription, most of the time on both sides. Those inscriptions are always, up to now, written in capital letters or the older Roman cursive, sometimes even in a mixture of both. Most of the tags were reused several times and thus they carry traces of older inscriptions (palimpsests). Those inscriptions usually follow the same model: one side of the tag carries personal names, the other side carries an inscription mentioning the merchandise, most of the time in an abbreviated form, as well as a price – normally expressed in *denarii* or fractions of the *denarius* – and quite often an indication of quantity or weight.



Fig. 19.1. No. 12582, obverse and reverse.

A traditional print photograph, such as Fig. 1 (No. 12582), drawn from the archives of the AMZ, limits the student's opportunity to learn to decipher these tags. Even if a professional photographer took this picture with a good quality camera in a fully equipped photographic studio, the reading of the inscription stays riddled with uncertainties and a researcher would have to check the tag *de visu* in order to offer a plausible transcription.

Most of the tags, if not all, are linked to the wool trade and the textile industry. Words like *LANA*, *PAN(N)UM*, *TVNICA*, *SAGVM*, *P(A)EN-VLA*, *PAL(L)A*, *PALLIOLUM*, *LODIX*, *BANATA*, and *ABOLLA*, appear regularly enough without being abbreviated and thus the interpretation of common abbreviations like *L*, *LA*, *LAN*, *PAN*, *T*, *SAG*, *PAENV*, *PAL*, *LO*, *LOD*, *LODI*, *BANA*, *AB* is not in doubt. The other abbreviations are mostly related to terms of colour. The prices on those tags are an important information: they indicated the value of the goods or the cost of a given service (e.g. cleaning, fulling, dyeing). It would also appear that they were used by fullers and dyers as ownership tags. By noting the name of the client as well as the type of cloth or service and the price on the tag which was subsequently attached to the item to be processed (i.e. cleaned or dyed), shop owners could easily return their property to the clients as well as charge them the correct fee¹.

¹ Radman-Livaja 2007, Radman-Livaja 2011, Radman-Livaja 2013a, Radman-Livaja 2013b, 165-172, Radman-Livaja 2014, for analogous tags see: Mócsy 1956, 97-104; Egger 1967, 195-210; Frei-Stolba 1984, 127-138; Frei-Stolba 2011, 331-334; Schwinden 1985, 121-137; Schwinden 1993, 215-222; Römer-Martijnse 1990; Römer-Martijnse 1997, 5-48; Feugère 1993, 301-305; Weiss 1991, 211-220; Paci 1995, 29-40; Bassi 1996, 207-216; Bizzarini 2005, 121-135; Buchi and Buonopane 2005, 43-51; Cresci and Pettenò 2010, 42-110; Jacques and Hoët-Van Cauwenberghé 2010, 295-317; Wedenig 2013, 237-246.

Some of the genuine difficulties of the autoptic process are already solved by a static picture in a print publication. The tag has a given position, it is illuminated from one direction only and therefore it already suggests a reading direction. A DAP should be able to confront the students to some of those difficulties and to overcome them alone.

In order to consider the value and usefulness of the DAP in this particular case study, the fact that some of the students had not yet a real background in Latin paleography was actually more of an asset. Indeed, if untrained students with few basic skills can use the digital edition as a specific medium without too much difficulty, albeit under supervision of specialists (Digital Epigraphy, Ancient History, Archaeology, Epigraphy, Computer Graphics and Digital Humanities) then the whole concept would appear as convenient and appropriate for similar case studies and research.

19.3. Digital epigraphy

In fact, the transcription and interpretation of Roman inscribed lead tags are often challenging, and so we ignored how far we could go with these students if useable results would ensue. First we made a selection of forty tags to be subjected to the adequate digitization process we chose to work with: Reflectance Transforming Imaging (RTI). It is a small but nevertheless representative sample of the whole corpus. The students had at their disposal different kinds of inscriptions, including both easily readable specimens and more challenging graffiti (e.g.: Fig. 1, no. 12582). One may also profit from the assistance of undergraduate and graduate students, which could not often be the case before². This experiment showed that their contribution can be useful, because technology may compensate for their lack of knowledge although the final conclusions have to remain in the domain of scholars familiar with the subject. In any case, this experiment shows how the digital edition may allow both scholars and students to have an open access to what is basically a primary source of information for humanities (presented as a digital facsimile)³.

² The Laboratorio di Cultura Digitale, lead by Prof. Salvatori, at the University of Pisa, applies the didactic model DIGICRAFT. This means that undergraduate students might share their skills, especially the digital one, in order to allow an entire team to reach its goal. For more information see: <http://www.labcd.unipi.it/laboratorio>.

³ Terras (2015) writes about some of the OA issues: "While digitisation is not a pre-requisite

Of course, learners could train themselves on the drawing of the tag, but they would not confront the difficulty of interpreting the numerous ambiguities and the responsibility of deciding what is on the tag.

From a digital epigraphy standpoint, this consists of an online DAP modeled, in Lamé 2015a, Lamé 2015b, on a dispositive analysis and the three fundamental systems of an inscription: writing system (wSystem), textual system (tSystem) and contextual system (cSystem). Three tools compose the DAP: RTI Web viewer, TSS viewer and Mark-Out tool. The last two were specifically designed for the digital edition of the corpus TSS. The following paragraphs present those three DAP tools. Due to the material properties of the lead tags, it is impossible to capture the appearance of the letters with a single image. When holding a tag it is necessary to change the light angle to enhance the different marks on the surface. RTI is a computational photography technique that enables the interactive re-lighting of the observed object from any light direction. This is accomplished combining into a single compact data structure a set of fixed camera photographs taken under many different illumination conditions. The acquisition process is inexpensive and does not require labor intensive steps, unlike 3d model acquisition. RTI visualization allows the user to virtually 'tilt' the object and recreate different lighting conditions, mimicking part of the autoptic process. Another advantage is the magnification provided by the high resolution camera employed. The widespread adoption in browsers of WebGL (Khronos group 2009) recently enable RTI visualization on the Web. We used the RTI Web viewer developed by Visual Computing Lab, ISTI-CNR. High resolution re-illuminable images allow the selection of the best view for each mark, thus allowing the user to obtain an adequate readability of the lead tags through an intuitive interface. Another important advantage of having the tags available online is that the students can easily compare a tag with any other tag already in the database and compare occurrences of a letter in other already transcribed tags. Finally, the Web access facilitates the discussion amongst students and experts worldwide.

to gaining access to material (...), and while digital surrogates of cultural heritage objects do not have to be openly shared once created, just as the sciences are calling for publication of source data as part of the Open Access movement, opening up access to primary sources in the cultural heritage sector and encouraging them to be published in a way which is as accessible as possible has the potential to change the nature of research outputs in the Humanities and Social Sciences, as well as the nature of research itself in these areas."

The TSS viewer is used to give access to the raw and genuine data (115 photograms with different lighting angles) and also to pick the best photo to be used in the linking tool MarkOut, while the RTI viewer can be consulted in parallel to interactively relight the tag and examine problematic spots.

The drawing process consists in associating some heterogeneous elements of the wSystem and the tSystem. MarkOut is the linking tool that allows to represent the graphico-textual (g/t) relationship between those two systems. MarkOut allows the students to work on the wSystem of the inscriptions by drawing the signs over an image of the tag using the mouse. The line is converted in a curve that can be later fixed using handles. Each mark, that represents a phenomenon of the wSystem of the inscription, is assigned to some textual information such as a letter or a symbol (Unicode and/or XML encoding), that represents a textual phenomenon of the tSystem of the inscription. This assignation creates inside the MarkOut the g/t relationship used for query processing. The final result is an SVG file that can be easily parsed to recover the linking information between wSystem and tSystem (e.g. browsing by glyph's shape and interpretation, identifying glyph's position), and easily shared with anyone with a browser (e.g.: Fig. 2). The linking tool MarkOut is one of the editing components of the modular DAP. They fit into communication workflows⁴ such as crowdsourcing, editing inscriptions, dialoguing with experts, preserving and promoting cultural heritage and, as here, teaching some skills in epigraphy.



Fig. 19.2. MarkOut Assisted screenshots (detailed part of tag no. 12563) showing the association, expressed in red, of the Unicode Latin characters with the position and the shape of the writing: U+0045 with II (identified as E2 by students) and U+004C with L (L1 or L5).

⁴ This raises, of course, questions, most of them outside the purview of this article, about the relationship that evolves between research and our modern societies. We invite the reader to peruse various initiatives such as Sabattini 2006 on the « valeur d'ancienneté » of cultural heritage, that participates to social well-being, the Civic Epistemologies <http://www.civic-epistemologies.eu> and its Berlin charter, as well as Public History approaches <http://public-history-weekly.oldenbourg-verlag.de>.

Students were involved for a very short period of time: on average two hours per day over a couple of days only (in Spring 2014 and in Fall 2015). This training was delivered in three steps (“Readings”, “Writings”, “Test & Taste a DAP”) during which there were given some academic documentation about the lead tags, and basic knowledge about digital epigraphy (epigraphic message in a computer, dispositive analysis, existing projects, digital tools, XML and Unicode encoding, DAP, and issues regarding digital representation of artifacts).

Students encountered their first epigraphic challenges with tag no. 12582 (Radman-Livaja 2014, cat 03.13, 347), found in the Kupa river in Sisak and offered by Andrija Colussi to the Archaeological Museum in 1898. It is a rather typical lead tag of an irregular rectangular form, pierced with a hole. Its size (22.7x22.8x2.4 mm) corresponds fairly well to the average size of other specimens found in Siscia. Although its surface is rather damaged and shows clear traces of erasure, the most recent inscription remains quite readable. However, many traces of an older record (or several older records?), complicate significantly the transcription and the interpretation. The last inscription can be read, nevertheless, but it demands a certain effort and quite a lot of experience in Latin palaeography:

Obverse

Ater
ius

(palimpsest)

Siixti
i onis n
i.ni

**Reverse**

la(na) p(ondo) i
cor(ticea)
XEX

(palimpsest)

...s
..v
iir



The inscriptions on the obverse and reverse may not be contemporaneous and we may not affirm with confidence that the individual named Aterius has something to do with the small quantity of wool mentioned on the obverse. The price is rather low, since the value of the transaction appears to be only 1 sestertius and 1 dupondius, i.e. 6/16 of a denarius.

Traces of older inscriptions are hard to read and interpret but several personal names may be surmised. Such a tag was particularly interesting for our experiment. It is quite a challenging inscription, even for a skilled epigraphist and paleographer; we therefore were anxious to find out how efficiently the students would tackle it. Thanks to the DAP, the transcription was not utterly difficult for most students. Obviously, in the first instance, the interpretation was beyond their means, but we were nevertheless impressed by their abilities to read it far more easily than expected.

The DAP definitely offers the possibility to work on such material online, without the obligation to inspect it personally, at least in the first stage.

Thus, students had to face similar issues as scholars who first tackled those epigraphic finds. However, the students had one significant advantage, despite their lack of experience and skill. This major advantage was allowed by DAP technologies, which considerably improved their odds. Despite their lack of elaborate knowledge on the subject, we managed to train them to develop some necessary skills in order to be able to read the inscriptions as well as offer meaningful transcriptions, thanks to the help of digital facsimiles. It was indeed really gratifying to observe their enthusiasm during the experiment as well as their delight when they realized they could do it. Naturally, despite the DAP, whatever the information technology may be, such scientific analysis still requires skilled scholars, but with the help of technology, digital editions may be thoroughly checked and amended far more easily. Besides giving an opportunity to further study the primary source of information and amend the paper editions and publications, it also allows university teachers to train future scholars and specialists, wherever their geographic location may be. In this particular case, the epigraphic material is in Croatia but the analysis was done online by scholars and students from Canada, France, and Italy. We therefore believe that digital epigraphy has a role to fulfill in university teaching

but that one needs to establish right protocols and rigorous methods in order to warrant access to documents and ensure further development of such teaching methods aiming to improve the formation of future specialists.

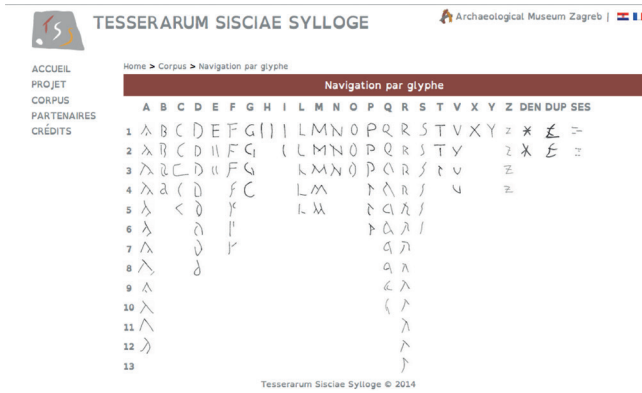


Fig. 19.3. Glyph Browser: quick access to all the label associated with the glyph's form.

19.4. Practicing epigraphy

Once alone, students were asked to ignore the monetary symbols then to decipher (with or without the help of transcription and drawings) and to classify the written signs according to the following chart (see: Fig. 3). Such preliminary classification gives a first idea of the main general shapes one can find on a lead tag. It is not a paleographical study, which has yet to be done, but it is efficient enough to train students at a first level of deciphering.

19.4.1. Drawing with Hints (No. 12563) with mark out assisted

Obverse

Aeli(i)

Tasti



Reverse

lodicem

murtiolam

p(ondo) vi s

X vi s



The tag no. 12563 is a rectangular lead tag of irregular form with a badly damaged and scratched surface. Nevertheless, the most recent inscription is clearly readable while one may still discern traces of older inscriptions. An older inscription might be visible on the obverse, perhaps series of numbers but its meaning remains unclear. Students have transcriptions and drawings (see Fig. 4 and Fig. 5).

12563 (OBV)	A	E	L	I	T	A	S	T	I
STUD. 1	A10	E2	L1	I1	T1	A10	S3	T2	I1
STUD. 2	A10	E2	L5	I1	T2	A10	S4?	T2	I1

12563 (REV)	L	O	D	I	C	E	M						
STUD. 1	L2	O3	D3	I1	C2	E2	M5						
STUD. 2	?	O3	D5	I2?	C2	E3	M5						
	M	U	R	T	I	O	L	A	M	P	V	I	S
STUD. 1	M3	V3	R7	T2	I1	O3	L2	A10	M2	P1	V3	I1	S5
STUD. 2	M3?	V4	R6	T2	I1	O3	L5	A10	M5	P2	V4	I1	S5

Tab. 19.1. No. 12563.



Fig. 19.4. No. 12563 Obverse: students' drawings of the most recent inscription.

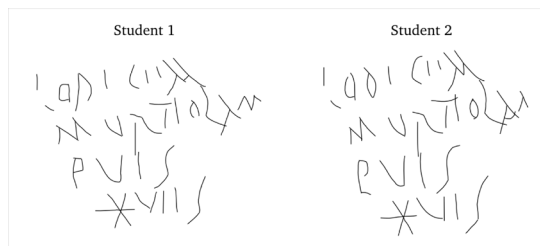


Fig. 19.5. No. 12563 Reverse: students' drawings of the most recent inscription.

19.4.2. Drawing & deciphering without help (obv. No. 13053)

No. 13053 is an irregularly shaped rectangular lead tag with a damaged surface as well which makes the reading rather uncertain. Besides the last, most recent inscription, one still discerns traces of older inscriptions. The reverse is ignored. Students do not have neither transcriptions nor drawings (see MarkOut Expert Fig. 6).

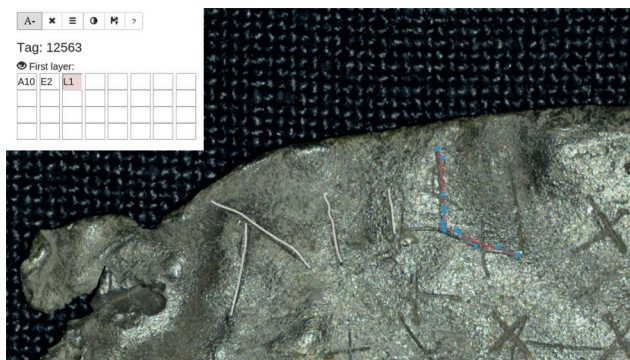


Fig. 19.6. Markout Expert allows free interpretation, specification of the type of glyph's form without providing extra information.

Vale
 rius lis
 Martia

(palimpsest)
 X yi
 tiir ꝛ i



Fig. 19.7. No. 13053 Obverse: students' drawings of the most recent inscription.

The RTI file was presented to the students in an unusual reading position in order to reproduce the epigrapher's initial challenge of determining the proper orientation in which to read the lead tag. Students overcome this difficulty quite quickly (<5 mn).

The last line, MARTIA, gave the student a hard time. Particularly the tail of the damaged S (end of the second line) generates noise on the last letters (see Fig. 7).

13053	V	A	L	E	R	I	U	S	M	A	R	T	I	A
st. 1	V2	A10	L3	E3	R7	I2	V1	S6	M5	?	R7	T3	?	Ignored
st. 2	V2	A10	L3	E2	R7	I1	V1	S6?	M5	A10	R6?	T3?	?I1	A2

Tab. 19.2. No. 13053 (obv).

The older, erased layers, on the obverse of tag No. 13053, drawn with dashed lines on the drawings of the academic edition, are more difficult to read. No g/t relationship between wSystem and tSystem was asked to students (see Fig. 8).

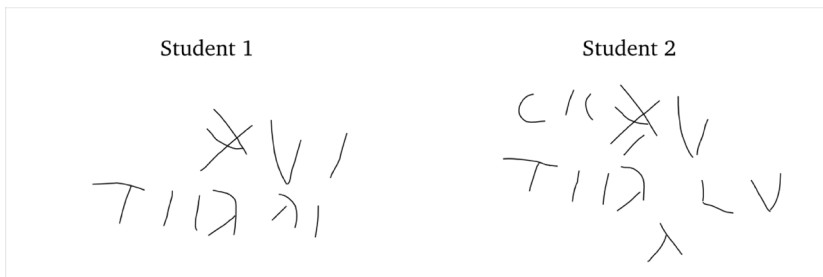


Fig. 19.8. No. 13053 Obverse (palimpsest): students' drawing of some palimpsest inscriptions.

19.5. Pedagogical considerations

From the educational standpoint, this pilot project succeeded tremendously. The Canadian students who undertook this transcription in place of the usual research essay were, on average, far more motivated than their peers, and took great pleasure and pride in their work.

One student, whose cumulative grade at university to this point was below average, excelled in this project and said that this was what he imagined university studies were going to be like. Two others prepared a presentation based on this effort, and it was accepted as a 15 minute lecture at the university's annual undergraduate research seminar. Three students are currently working on an exercise of online edition and publication (*Épigraphie en Réseau* - ISSN: 2108-7156) of a lead tag using the Markout file created (SVG).

Some of the uncommon qualities of these materials made them particularly able to be studied by undergraduate students with little or no Latin. The transcription of the tags' oddly shaped letters was a skill that any person literate in a Latin-script language (but not necessarily in Latin) could acquire. Indeed any additional understanding of Latin grammar and syntax afford a reader little additional advantage, given the tags' copious abbreviations. The tags' frequent and regular use of symbols and numbers meant that the latin-less student could nevertheless quickly begin to 'read' the tags, or at least glean information from them.

However much the student researchers' enthusiasm compensated, there were some impediments which will need to be removed before a large number of students can undertake this work. To unilingual Anglophone students, the research materials on the tags are daunting because little of it is available in English. Our volunteers were mostly bilingual Canadians who could read French as well as English.

19.6. Conclusion

Gaining expertise with material remains requires time. When a museum trains students, this time is often limited due to constrained facilities and personnel. In addition, the epigraphic material may be fragile and delicate: the less these are manipulated by hands the best it is for their preservation. We believe that a process similar to the one described here will allow us and others to train far more, wherever they may be in the world, while well preserving the materials. It will represent a useful intermediary step that develops both epigraphic and digital skills. However, adding such a step will require us to renew, in some regards, the way we train learners and to reconsider who teaches what and how. The benefits of this renewal, though, would be many:

it would ensure the transmission of epigraphic tradition and the acquisition of good digital skills, whether to train eminent specialists or to allow access to the roots of societies to the greatest number.

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20. Epigraphy in Italian High Schools

*Enrico Zuddas**

Abstract

The paper focuses on the possible uses of Epigraphy when teaching Latin to Italian High School students. Inscriptions (especially from the school's territory) make Latin "come to life" because even the simplest of texts is real. Inscriptions are an excellent tool to internalize declensions, but they can also broaden the horizons offered by the literary sources. The Eagle databases offer ready-to-use materials to teachers who are less familiar with the traditional supports.

Keywords: High School Education, Latin Grammar, Lexicon, Translations, EDR Database, Roman Asisium

20.1. Introduction

High school students often feel that Latin is not a "real" language. Every attempt to use Latin as a modern language, by the creation of words from the contemporary world or by using it in a conversation, makes Latin seem even more artificial.

In this framework, for a Latin teacher the first two years of high school are the most challenging. This is when students have to acquire the grammar, but hardly see the point of learning so many rules by heart (even if the prescriptive approaches have now given way to descriptive linguistics). However, when students start studying Literature and reading literary texts, they generally realize that it was worth making the effort. Hence, one can imagine the frustration of *Liceo Linguistico* (Foreign Languages High School) pupils, who only do Latin for the first two years, and will never see the results of such hard work.

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One could object that in the first two years teachers should mix grammar and culture: but with only two lessons per week, and classes with a high number of students, there would simply be not enough time. Moreover, the approach to unedited literary texts is arduous because they contain too many unknown structures and often need to be at least partially translated.

Inscriptions can be an effective solution to this problem: they make Latin authentic. They are often short and therefore quite easily readable. They exist in reality, they can be seen and even touched – which should never be forgotten in a society where visual communication is so important. Through epigraphy the Classics become, in a way, “multimedia”: this is what scholars mean by the expression “words on stone”. Even if generally, when visiting a museum, inscriptions are not of such interest as the statues or mosaics, they do strike students as something concrete and, in a certain sense, “alive”. That is why they are a good tool to improve the ability to read, understand and translate Latin.

The use of local materials, which can be checked out personally, may more easily arouse the learners’ attention. That is why in this paper I will mainly refer to inscriptions from modern Umbria (*regiones* VI and VII, from *Perusia*) and especially from *Asisium*, used at school during my experimental lessons. The local museum, best known as the “Foro romano”, hosts a huge collection of inscriptions that were catalogued in 2008 by pupils of the *Liceo Properzio*, under my supervision, with details of the type of inscription, material, place of origin and chronology. Previously a booklet about Roman Assisi had been written,¹ both in Italian and English, comprising a page about the famous tetrastyle with a translation of the inscription on the base (CIL 11, 05372 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025323, later inserted in the MediaWiki page), which recalls the official inauguration of the aedicule: at the time, as was the Roman custom, money was given to *decurions*, *seviri Augustales* and the common people. Thanks to these few lines, the class is taken on a journey to ancient *Asisium*, and gets a lot of feedback about religion, architecture, social life and economy in the first century A.D.

¹ http://www.liceoassisi.it/index.php?option=com_content\&view=article\&id=47:assisi-romana\&catid=6:i-nostri-risultati\&Itemid=34.

20.2. How to use inscriptions

Inscriptions in high school can be used in a variety of ways, but particularly in the following fields:

- elements of Latin grammar, syntax and linguistics;²
- culture and history;
- and also, to a lesser extent, lexicon.

20.2.1. Lexicon in context

Although the acquisition of lexicon is essential in order to access the conceptual categories of a culture, it is extremely difficult to learn words without using them actively, and it is a terrible mistake, often made by school textbooks, to provide long lists of terms, especially if de-contextualized and only based on the frequency with which they are used.

Many manuals, influenced by modern languages, offer lexicon in concrete fields (such as food, clothing or education), but this does not necessarily entail that the students will be more attracted by these topics. There is also the risk of reducing culture to anecdotes. Experience shows that with a limited amount of time and taking into account the selective memory of teenagers, you have to choose what your priority is. The main reason why a school-level student should do Latin is because of the deep impact of Roman cultural and linguistic heritage on our world: therefore, in my opinion, the words that students need to learn the most are:

- the ones that are relevant for their Italian derivatives (e.g. *os, oris*);
- the ones that belong to the most significant semantic fields (always keeping in mind that some words are more important than others: for instance, knowing the difference between *bellum* and *pugna* helps to develop the comprehension of the two different categories; on the contrary, a non-specialized student does not need to know who a *primus pilus* was);
- the abstract ones that are fundamental to understanding the Roman way of thinking (e.g. *imperium, virtus, fas*).

² Hartnett 2012; McCarthy 1992.

Accordingly, a teacher should concentrate on those aspects of Roman society that are still pre-eminent for us: archaeology (Roman buildings, domus, theatres, roads), myths and religion, politics (Empire, war and globalization). Inscriptions certainly offer a less varied lexical repertoire than a literary text, but can still help to give substance to these contexts.

In an inscription such as CIL 11, 05400 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025350:

P(ublius) Decimius P(ubli) l(ibertus) Eros / Merula, medicus / clinicus, chirurgus, / ocularius, VVir. / Hic pro libertate dedit ((sestertium)) (quinquaginta milia). / Hic pro seviratu in rem p(ublicam) / dedit ((sestertium)) (duo milia). / Hic in statuas ponendas in / aedem Herculis dedit ((sestertium)) (triginta milia). / Hic in vias sternendas in / publicum dedit ((sestertium)) (triginta septem milia). / Hic pridie quam mortuus est / reliquit patrimoni / ((sestertium)) - - -

not only does a student make contact with the technical lexicon of medicine and words related to building activities (*statuas ponere, vias sternere*), but he can also perceive the “evergetic spirit” of an ancient society: a physician was usually a freedman coming from the East, who could be very rich and spend his money for public utility; whenever a person obtained a priesthood, he used to pay a *summa honoraria*. The text can also be used for linguistic purposes (prepositions like *pro*; partitive genitive; deponent verbs).

This does not mean that inscriptions are not useful for seeing specific abstract words in their context: when talking about Roman virtues and *mos maiorum*, the famous *Clipeus* from Arles (AE 1952, 0165 = AE 1994, 0227) is a perfect complement to chapter 34 of the *Res Gestae* (formally an inscription, too):

Senatus / populusque Romanus / imp(eratori) Caesari / Divi f(ilio) / Augusto / co(n)s(uli) VIII dedit clupeum / virtutis, clementiae, / iustitiae, pietatis erga / deos patriamque.T

20.2.2. Grammar

One of the biggest problems in teaching Latin to young students is that they find it really difficult to understand declensions. In the preliminary lessons the sentences used are very simple and can be understood and even translated without really acquiring the syntactic function of the words.

For instance, if I say *Iulia rosas amat*, even an Italian who knows no Latin can get the meaning of the sentence. Problems are encountered when the texts to translate become more complex: only when it is too late does an ill-prepared teacher realize that the class has not internalized the language system and the patterns.

In funerary inscriptions the value of cases is essential. The texts can be simple, but if you want to understand who is dead, who is the dedicant and what the relationship between them is, you have to distinguish dative and nominative cases. Moreover, the concordance of the different elements of the onomastics (especially *praenomina* and filiation) is a good way to encourage (and, for a teacher, to test) the learning of declensions not in a merely mnemonic, but also in an active way.

Examples:

- CIL 11, 05501 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025449:

Noniae / Privatae, / C(aius) Propertius / - - - - -

You can use an inscription as easy as this one to revise first and second declension, and at the same time to teach the structure of a Roman name.

- CIL 11, 05461 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025411:

A(n)noru(m) XIX. / Calventia / C(ai) filia) Polla, / L(ucius) Vistinius vir, / Gavia mater / posuer(unt).

This inscription offers the chance to get feedback about mistakes in the use of language, or to reflect on mortality and marriage.

- CIL 11, 05399 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025349:

P(ublius) Decimius P(ubli) l(ibertus) Eros / Merula Vivir / viam a cisterna / ad domum L(uci) Muti / stravit ea pecunia / - - - - -

With an inscription like this you can address different topics, both historical (the importance of freedmen, the imperial cult) and linguistic

ones (indirect complements, uses of *is ea id* as an adjective and to introduce a relative clause that, in this case, has evidently been lost).

At the beginner's level, the sentences used for exemplifications, exercises and translations are often fictitious and banal. They give a false image of antiquity: for instance, when you start with the first declension you get the wrong impression of a "female" world simply because the masculine nouns are rare. Students are unimpressed; these sentences have no significance for them. Those provided by inscriptions may be equally easy and short (without any editing), but they are not banal because they are a mirror of a society, they offer a historical perspective; there is always a story behind them. Even the simplest ones can give us precious information.

Let us consider a famous inscription from the Cathedral in Assisi (CIL 11, 05390 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025340):

*Post(umus) Mimesius C(ai) f(ilius), T(itus) Mimesius Sert(or)is f(ilius),
Ner(o) Capidas C(ai) f(ilius) Ruf(- - -), / Ner(o) Babrius T(iti) f(ilius), C(aius)
Capidas T(iti) f(ilius) C(ai) n(epos), V(ibius) Voisienus T(iti) f(ilius) mar-
ones / murum ab fornice ad circum et fornicem cisternamq(ue) d(e) s(enatus)
s(ententia) faciundum coiravere.*

The text is plain, especially with the abbreviations solved. Even so, many considerations can be made:

- for grammar: third declension nouns such as *maro* and *fornix*; complements of direction; gerundive to express purpose; subject/verb agreement; use of the form *-ere* in the perfect tense personal endings;
- for history: the use of the Latin language prior to the Social War, as proof of the intense Romanization of the area at the end of the II century B.C.;³ the presence of elements in the names that are not Roman but of Umbrian origin;
- for archaeology: the building of terraces to create public spaces in a town like Assisi established on a hill; the identification of the area around San Rufino as the "acropolis"; the incorporation of the Roman wall into the left nave of the church (the inscription being still *in situ*).

³ Coarelli 1991.

Schoolbooks rarely seize these opportunities offered by inscriptions, so the main problem for a teacher is to access appropriate material.⁴ Holding a PhD in Roman History, I am fortunate enough to already know many sources. However, a graduate may not have enough knowledge in epigraphy, may not be familiar with the *Corpus Inscriptionum Latinarum*; that is why the EAGLE project can offer tools for further insights. It also goes without saying that the multimedia approach is very suitable to students.

Here are some examples taken from manuals where you can see the different attitude of authors towards the epigraphic material:

- Barbieri 2015, 39: the inscription of the architect C. Vettius Gratus (CIL 10, 03392 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr160781) is merely a decorative element on the page, without any relation to the topic (phonetic changes from Latin to Italian);
- Domenici 2012, 40: *programmata* from Pompeii are introduced to explain the Roman naming system;
- Gambis Meini and Roffi 2013, 269-270: *tabellae defixionum* are used for different purposes (demonstrative adjectives, functions of subjunctive); the subject (magic in the ancient world) may not be relevant in a school context (the possession of such knowledge is not required), but sounds very intriguing to students.

20.3. Translations

Translating inscriptions is a difficult task for everyone and especially for high school students.

First of all, they will not find any help elsewhere: every other Latin text can easily be found – even if not always correctly translated – on student internet sites and in blogs (such as *Splash Latino*). But we all know very well that the Internet still lacks many Italian translations of inscriptions.

Secondly, the style and the structures are different. Even when all abbreviations and integrations are explained (a teacher should at least show the meaning of round and square brackets but should not ask a pupil to solve an abbreviation, except the easy ones), the word order cannot immediately be reconstructed, especially in decrees and *carmina epigraphica*.

⁴ See the observations made by Carpenter 2006. One of the most successful attempts to teach Latin through Epigraphy comes from the Anglo-Saxon area: LaFleur 2010.

School dictionaries are not intended for interpreting epigraphical lexicon: some words may not be present (such as *maro*, seen above), their meaning may not always be explained (e.g. *centonarius*, *sevir*). A lot of institutions and *formulae* which are clear to a specialist (e.g. *quattuorvir iure dicundo*) may be hard to understand or to translate. It is, however, also the case that a teacher cannot dedicate too much time to introducing these words to the class because his ultimate aim is different; so it is better to focus on materials that do not contain much specific lexicon.

Examples:

- CIL 11, 04431 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025160:

[Inf]austo, levis umbra, tuo mihi flebilis hora / sorte tua certe tempus in omne fuit.

This funerary inscription from *Ameria* contains two verses, but the position of the words is tricky; *infausto* may be taken as an adjective (as it is most commonly) and its meaning is basically the same as *sorte tua*; students who are not used to poetry may not recognize the anastrophe *tempus in omne*.

- CIL 11, 04391 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025123:

*Iuliae M(arci) f(iliae) Felicitati, / uxori C(ai) Curiati Eutychetis / IIIIvir(i),
magistrae Fortu/nae Mel(ioris), coll(egium) centonarior(um) / ob merita eius.
Quo honore / contenta sumptum omnem / remisit et ob dedic(ationem) ded(it)
sin/gulis ((sestertios)) XX n(ummos) et hoc amplius / arcae eorum intul(it)
((sestertium)) V m(ilia) n(ummum) / ut die natalis sui (ante diem) V Id(us)
Mai(as) / ex usuris eius summae epu/lantes imperpetuum divider(ent), / quod
si divisio die s(upra) s(cripta) celebrata non / fuerit tunc pertineb(it) omn(is)
summa / ad familiam publicam.*

Specialists are well used to an inscription like this. A high school student may find unexpected difficulties in understanding the meaning of *magistra* (not teacher but priestess), but also *centonarius* or even *hoc amplius*; not to mention the Roman calendar system, which always takes too much time to explain!

Nevertheless, this kind of challenge is exactly what makes inscriptions the perfect tool to fully appreciate what the art of translation is.

The article published by F. Bigi in the Proceedings of the First EAGLE International Conference⁵ includes many observations regarding the problems that may be encountered, for instance when translating names and titles. In particular, I find the suggestion that round brackets should be used in the translations to provide further explanations about specific offices rendered with the technical derivative word, or for concepts omitted in the original Latin text, very useful. It might be worthwhile to provide a few more tips from personal experience:

- CIL 11, 04213 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025123: *Interamna Nahars* should be further qualified as “Terni” to help those readers who are not familiar with Umbrian cities;
- CIL 11, 01925 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr142701: the names of the emperors *M. Aurelius Antoninus* and *M. Antoninus Pius Germanicus Sarmaticus* need to be explained (Caracalla and Marcus Aurelius) to avoid confusion. It should be noted that in my classes proper names, and not only those of emperors but also of other people, were generally translated into Italian, even if it is advisable to transcribe them in the nominative case;⁶ the same thing was done with *cognomina ex virtute*, considering that they are intuitively interpretable for an Italian. We are also faced here with a case of nouns that do not exist in our language (*abnepos, adnepos*), which makes the translation less fluent than the original.

This type of activity works better with *Liceo Classico* (Grammar School) pupils, who do translations from Latin and Greek almost every day and who are more at ease with the use of dictionaries. However, there are still hurdles to overcome. The ministerial syllabus set out for the course focuses on Literature and culminates in a specific exam requirement, the translation of a piece of literary prose. Is this “epigraphical” activity helpful? Does it take up too much of the time which should be employed in translating the Classics? The answer to both these questions is “yes”. On the one hand, as I said, students have to “jump into translating” without a net (the Net, in fact). On the other hand, if at the end of the final year pupils are required to translate

⁵ Bigi 2014.

⁶ http://www.eagle-network.eu/wiki/index.php/Guidelines_for_Translators.

a passage from certain authors, then clearly it would be more appropriate for them to concentrate on this activity as much as possible during the months prior to the exam. For this reason, epigraphy can only be a supplement to traditional assignments; the Italian national *curricula* are apparently very free, but at the same time they are very rigid. Yet, a few forays into epigraphy can be stimulating, because the class perceives them as an intriguing novelty, especially if not subject to assessment. After all, it would probably be too difficult to prepare a test with grades and scores on this subject and could deprive this activity of its extemporaneous and enjoyable aspect.

20.4. Inscriptions and literature: a few samples

On a more advanced level, inscriptions may also integrate certain aspects related to the study of Latin Literature. The most typical example could be a comparison between the *Tabula Claudiana* (CIL 13, 01668) and Tacitus' account (*Annales*, XI, 23-24):⁷ reading the original document is a privileged occasion to determine how reliable the historian is when using his sources.

Highly original suggestions have been provided by Mauro Reali (who is also the author of different school manuals), in a paper published online.⁸ Being an expert on the subject, he offers a comparison between the “noble” form of the political-philosophical *amicitia* presented in Cicero's *Laelius* and the term *amicus* mentioned in inscriptions from the lower levels of society, such as CIL 05, 05300 from *Comum* (a funerary stela made by a freedman for Pliny the Younger) or CIL 05, 05923 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr124245 regarding a strange case of “friend deletion” long before the Facebook era.⁹

An interesting example from Umbria can be found in AE 1992, 0560-0561 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr150659 and http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr150784. The first gravestone recalls the acquisition of a tomb — which had previously

⁷ On which see Jahn 1993.

⁸ <http://mediaclassica.loescher.it/nuove-e-93vecchie94-forme-di-multimedialita.n2799>; see also Reali and Turazza 2015.

⁹ <http://www.laricerca.loescher.it/lingue-classiche/327-un-amico-o-amicus-e-per-sempre.html>.

been despoiled — by an heir of the founder, who then installed another *cippus* for 40 friends (*amicis meis*, i.e. freedmen probably belonging to the same association):

Viator, resiste et rogo / te et lege. Post annos XXVII ven[i] / Hispellum, in patriam meam. Scio / me oportere colere hunc locum / ubi ossa meorum requiescunt et mea / et amicorum meorum. Ex hoc sepulch[ro] / cippi perierunt duo et frontes duae. Sciun[t] / qui surupuit et acturi simus et legimus, / satis est testium etqs.

As for the Augustan age, Reali suggests showing some monumental inscriptions of the *princeps* (he impressively goes so far as to compare the qualifications *Imperator Caesar Augustus* to a modern logo or even a *hashtag*). On this subject, the altars *Augusto sacrum* put up by *Perusia restituta* (CIL 11, 01923 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr142666, http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr142667, http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr142668, http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr142669), even with a simple text, offer the opportunity to deal with an aspect as crucial as the imperial cult. Traditionally, we read that Augustus was worshipped directly only in the Eastern provinces, but not in Rome and Italy. The inscriptions from *Perusia* testify that things are effectively more complex; these documents also offer remarkable information about the *restitutio* of the town, destroyed at the end of the *bellum* in 40 B.C. A few years later *Perusia* would become *Augusta*, as you can read on the city gates, especially on the newly restored Etruscan Arch (CIL 11, 01929 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr142706).

Teaching, as I do, in a school named after Propertius, I always stress the importance of reconstructing the origin of the poet through the epigraphical data of the *gens Propertia*, the greatest number of written documents of the family having been found in Assisi.

For more than two hundred years, beginning with the *Vois(ienus) Ner. (filius) Propertius* mentioned among the Umbrian magistrates of the late II century B.C., this *gens* stands out in the town for its social influence and wealth.¹⁰ It is always very exciting to combine

¹⁰ Forni 1986; Zuddas 2006.

the information on *Passennus Paullus Propertius Blaesus* given by CIL 11, 05405 = http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr025355 and that contained in two Letters by Pliny (VI, 15 and IX, 22). Pliny, showing great concern for his friend's illness but also great esteem for him as an elegiac poet, asserts that he is a descendant and fellow citizen of Propertius; the inscription (the front of an honorific base), providing the full name, with the tribe Sergia typical of the inhabitants of *Asisium*, is indirect, but clear, evidence that the Augustan poet was born there. The information provided by the inscription and the literary text integrates perfectly. Students find it fascinating to look for traces of the poet inside the town, especially when they read the following graffito on an interior wall of a Roman house underneath the church of Santa Maria Maggiore (http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&id_nr=edr028769):¹¹

[- -]*ovino consulibb(us) (ante diem) VIII Kal(endas) Martias domum oscilavi Musae.*

This house was still visited in the fourth century A.D., which really supports the theory that it used to be the poet's residence, and remained an object of reverence for centuries. Through the stories of *Passennus Paullus* and *Sextus Propertius* macro-history and local history meet to make the past come alive in every corner of the modern town.

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¹¹ Boldrighini 2014, 244–246.

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PART IV

DIGITAL APPROACHES TO CROSS DISCIPLINARY STUDIES
OF INSCRIPTIONS

21. Romans 1 by 1. Documenting a population database for the Roman world

*Rada Varga**

Abstract

The present article briefly documents the epigraphic division of a developing online population database for the Roman Empire, accessible at www.romans-1by1.com. The paper presents the motivation of constructing the database and its envisioned architecture, in relation with the various sources, while emphasizing on the steps and procedures required in order to transpose epigraphical information into an ancient population database.

Keywords: Epigraphy, middle classes, provincial society, occupational inscriptions, prosopography

Romans 1 by 1 database and afferent website were created for filling in an existing gap in the study of Roman-era population. The database tries to begin answering to the need of properly cataloguing all attested inhabitants of the Roman Empire. Of course, this is a tremendous task and www.romans1by1.com is only a first step, circumscribed for now to a very specific category of sources.

21.1. Motivation

But why would an ancient population database be essential? Because a digital resource focused on individuals would reveal linkage possibilities that otherwise elude us, it would finally give us the complete and accurate image of the Roman attested population and, through codifications, it would open the way towards computer-assisted

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in-depth analyses on all relevant aspects imagined (epigraphic patterns, religiosity, migrations, onomastics, occupations, family data, etc.). A complete, aggregate database will allow a longitudinal (diachronic) view on the attested Roman population from a certain area and ideally from the whole Empire, while also opening transversal (a section in time) perspectives.

The database in itself would have three components (see below Fig. 1), following the best practices in the field (Mandemakers and Dillon 2004): the *sources database* (with “facsimile” transcription of the sources’ text), the *central database* (the complete, corrected, integrated, standardized and coded form of the sources database) and the *data releases* (destined for on-line usage, allowing easy extraction of data in view of analyses).

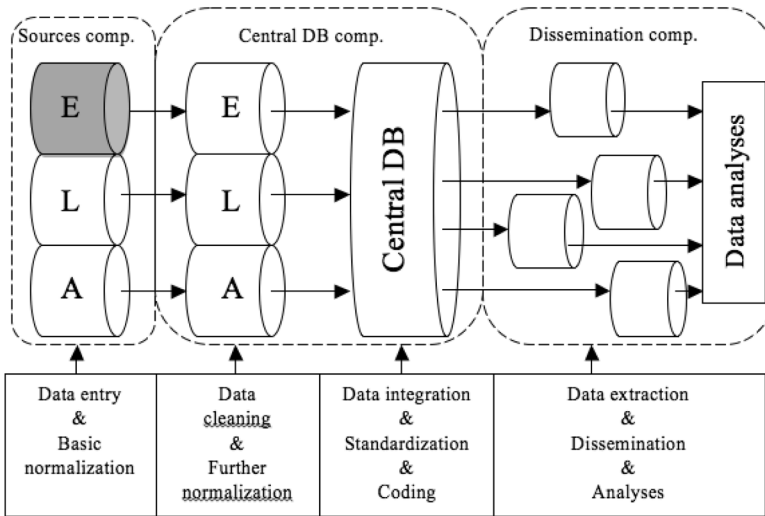


Fig. 21.1. Schema of the database.

Alongside these components, which actually represent various steps in the data preparation process, a population database for the Roman Empire should be built on three pillars, which we might call units or divisions of the database: epigraphic, literary and archaeological, each of them requiring different expertise, different approaches and different standards for the individual recording forms. In the end, of course, all three types of individual records will have to be integrated

in a central standardized component, whose structure is to be developed by merging the three aforementioned divisions; consequently, its configuration will ideally take shape only after all three units enjoy a stable architecture at least in the sources component of the database. The construction of the database will follow a series of steps imposed by best practices: creating a repository of sources; introducing, integrating, standardizing, coding and storing the information; enriching and disseminating the information. The codifications hold an essential part, not only in the individual linkage procedures, but in the analysing process as well. At the point when the database will comprise enough data, properly recorded and with all codifications undertaken, the usage of statistical software in order to identify trends and run comparisons over large scale geographical and administrative units might result in a better than ever understanding of Rome's social history.

21.2. The sources

Within this theoretical frame, whose amplitude implies a gradual and long-term approach, we have chosen to start by building the epigraphical division of the database. Thus, we began developing a project on the middle classes of the Low Danube provinces and their epigraphic attestations. The database created in this context together with the platform www.romans1by1.com represent the skeleton of the future population database of the Roman Empire. For now, we are solely focusing on characters attested epigraphically – thus on inscriptions as sources. As constructing a metadata suitable for all social and professional categories of the provincial world is very complex, our database is created for accommodating all information epigraphically provided on members of the provincial middle classes. Terminologically, we consider all those who manifest themselves epigraphically, without being members of the imperial or provincial elite, as member of the middle socio-economical layers. Likewise, we have excluded active militaries (but not their families), as their appurtenance to the army creates their social status. Regarding the data entry, we are trying to remain faithful to the source and to record, during the first phase, only the minimum of deduced information (gender, juridical status, ethnicity of the name). At the same time, we operate some conventional onomastic transcriptions (AEL will be *Aelius* from the start, etc.).

All these basic normalization procedures are being thoroughly explained and documented in the data entry manual, and the reason why we chose to apply them is to speed up data standardization, run analyses and publish results on small samples, whose standardization procedures would otherwise be overwhelmingly time-consuming in relation with the results.

21.3. Database architecture

The core of the database's epigraphical division is formed by a table used for recording personal individual data (labelled *Personal data*), around which the entire network of components needed to ensure proper information recording is built. However, when starting data entry, one must begin by recording information about the source in use.

The first table to be filled in is the file of the source – *Inscriptions*. First of all, each inscription gets a source code, formed of 5 digits and a symbol/acronym of the province's name (D for *Dacia*, MS for *Moesia Superior*, DAL for *Dalmatia*, etc.) – so we have, for example 00001MS. The *Inscriptions* table has text fields, as well as value lists. Then, we have text strings for: *Relevant expressions*, *Stylistic details*, *Atypical features*, *Observations*, *Place of discovery*, *Place of provenience*, *Ancient name provenience*, *Timestamp/Timeframe* and *External links*. Although we are aware that some of the data (*Timestamp/Timeframe*) could have benefited from a standardized form, at this point we opted for vaster possibilities of expression and adaptation. Other information will be filled using value lists, as standardization is more suited: *Type of inscription*, *Language*, *Material*. For these we will use the Eagle vocabularies,¹ because they offer an already standardized language.

The *Coordinates* table links each inscription with the latitude and longitude of its place of provenience, in order to place it on a map.

The *Inscription bibliography* was conceived so that extracting complete or selective bibliographical lists would be possible. Thus, a normalization table includes all bibliographical titles referred to and from it; through a value list, one can select the *Bibliography abbreviation*. The exact reference is presented and detailed in the *Details* and *Comments* text strings.

¹ <http://www.eagle-network.eu/resources/vocabularies>.

Of course, all data are linked to the *Inscription code*, selected as well from a value list.

Only after properly documenting the source one can access the main and most complex table, *Personal data*, where basically the individual file of each person is created. At this point, each new entry represents a singular epigraphic attestation of an individual, and a unique ID is generated, which will help link the respective character throughout the various components of the database and with other database entries. The person is also manually linked to the source using a value list of the inscriptions' codes. In the event of one person being attested in multiple epigraphs, each attestation will represent a new entry, and it will be assigned a new unique ID, which will be doubled, during linkage procedures, by a common ID for all instances of the same person.

The *Personal data* table was built to host a large variety of information offered by epigraphs, and its structure has proved, up to this day, rather stable. However, if need be, it can always be extended in order to accommodate any new kind of information. A first set of its variables are name-connected: *Praenomen*, *Nomen*, *Cognomen/Personal name*, *Father/Master name*, *Agnomen*, *Signum*, where each also has a drop-down associated for *Ethnicity* and the *Agnomen* and *Signum* an *Observations* string. While we believe the possibilities of actually identifying *signa* for members of the middle classes, during the Principate period, is rather reduced, we opted for facilitating their correct registration, in case they are discovered. Other data regard *Natione*, *Ethnicity*, *Origo* and *Domus* – if and how they are mentioned in the inscription. As acknowledged above, some information will be recorded, even if they are deductive and not literally written in the source: *Gender* and *Juridical status* (though the servile one often is literally recorded). For the latter, we have opted for a check box, which, if checked, opens all the available possibilities. The rest of the fields accommodate supplementary information, when and how there is the case: *Occupation*, *Collegium*, *Deities*, *Age* (at death), *Details of life/death* and *Observations*.

The *Occupation* field requires some special attention, as it has the *Occupation code* associated with it; as we are trying to propose a codification of Roman occupations/professions, based on and adapting the HISCO classification model². While a raw classification and codification based on HISCO might only be a slight challenge, finding

² <http://historyofwork.iisg.nl/>.

a theoretical model might prove to be a more elaborated task. What we aim at is constructing the “metadata” for the codification of Roman professions attested on stone and analyse how deep the classification can realistically go. Much alike other normalization fields present in the sources component of the database, *Occupation code* was implemented because it helps dealing faster with small and medium size samples (up to hundreds of people) in view of publishing preliminary results which are vital for dissemination and further financial support of the project. Two important variables, for statistics and working with the data, are *Dedicated by* and *Dedicated for*, which state the relation of the recorded individual with the epigraph and with other persons mentioned by it. Both appear in the simple form of check boxes.

Another particular check box, in need of supplementary explanations, is *Later*. The database was conceived for attested civilians from the middle classes, but sometimes they are associated in inscriptions with militaries or representatives of the elites. In this case, we have to register a minimum of data on the later as well, in order to build a wider image of the characters that we focus on. When checking *Later*, it opens *Status*, which at its turn opens the following options in the form of check boxes: *Senator*, *Knight*, *Local magistrate*, *Decurion*, *Imperial priest*, *Imperial slave*, *Imperial freedman*, *Military personnel*. If checked, each of these boxes opens a *Details* text box; additionally, *Local magistrate* and *Decurion* open a *City/Town* value list, while *Military personnel*, opens *Rank* and *Unit* value lists. While elite members and military personnel will at some point be added to the database, for the currently running project purposes, their social and professional status, together with a minimum of relevant details and relation with the recorded individuals represent enough information.

FIELD LABEL	FIELD ID	DATA TYPE
Praenomen	rperson_praenomen	Text
Ethnicity praenomen	rperson_eth_praen	Value list
Nomen	rperson_nomen	Text
Ethnicity nomen	rperson_eth_nom	Value list
Cognomen/Personal name	rperson_cognomen	Text

Ethnicity cognomen/ personal name	rperson_eth_cogn	Value list
Father/Master name	rperson_father	Text
Ethnicity father/master name	rperson_eth_fth	Value list
Agnomen	rperson_agnomen	Text
Ethnicity agnomen	rperson_eth_agn	Value list
Observations agnomen	rperson_remark_agn	Text
Signum	rperson_signum	Text
Ethnicity signum	rperson_eth_sign	Value list
Observations signum	rperson_remark_sign	Text
Natione	rperson_nation	Text
Ethnicity	rperson_nat_ethnicity	Text
Gender	rperson_rgender_id	Value list
Juridical status	rperson_jstatus	Checkbox. Opens checkboxes: Citizen, Libertus, Peregrine, Slave Veteranus (opens Unit/ Rank - valuelists)
Tribus	rperson_rtribus_id	Text
Origo	rperson_origo	Text
Domus	rperson_domus	Text
Collegium	rperson_collegium	Text
Occupation	rperson_occupation	Text
Occupation code	rperson_occ_code	Text
Deities	rperson_deity	Text
Age	rperson_age	Text
Details of life/death	rperson_death_details	Text
Dedicated for	rperson_dedicated_for	Checkbox
Inscription code	rperson_rinscription_ ids	Value list
Later	rperson_now_stat	Checkbox. Opens checkbox: Status

		Checkbox. Opens checkboxes: Senator (opens Details – text), Knight (opens Details – text) Local Magistrate (opens Details – text, City – value list), Decurion (opens Details – text, City – value list), Imperial priest (opens Details – text), Imperial lare (opens Details – text), Imperial freedman (opens Details – text), Military personnel (opens Details – text, Unit/Rank – value lists)
Status	rperson_status	
Observations	rperson_observation	Text

Tab. 21.1. Metadata of the Personal data table.

Based on the personal ID given to each individual, the *Relationship* table will solely name the relationship between individuals (A to B and B to A), choosing from a drop-down menu. The relationships have been encoded from the start, in order to make processing quicker; thus first-degree relationships have 10-codes (101-Husband, 102-Wife), second and third degree relations 20- and respectively 30-codes, non-family relations were given 40-codes and 50-s for the unspecified/unreadable relations. Male relations were given odd numbers and female ones – even numbers.

21.4. Conclusions

Romans 1 by 1 is a first step towards a comprehensive and exhaustive electronic resource for the attested population of the Roman Empire. The following normal steps for expanding and enriching the database is elaborating the fitted metadata for provincial elites and military personnel epigraphically attested.

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22. Towards a Universal Facebook of the Ancient World

*Yanne Broux**

Abstract

Facebooking the past. The idea grew while developing a database of all people mentioned in texts from Greco-Roman Egypt (350 BC–AD 800). Thanks to Trismegistos' role in EAGLE, Named Entity Recognition can now be applied to almost 500,000 Latin inscriptions from the Roman Empire, and some 400,000 clusters containing personal names can be extracted. This collection of names will lead to a large-scale study of naming practices in the ancient world, and how these reflect changes in society at large.

Keywords: Latin epigraphy, Trismegistos, Named Entity Recognition, Social Network Analysis, Onomastics, Prosopography

22.1. Trismegistos: the early years

Facebooking the past. The idea grew a couple of years ago, while developing a database of all people mentioned in texts from Greco-Roman Egypt. While probably not exactly considered Big Data by those who actually work with BIG data, the 500,000 or so attestations of individuals in Trismegistos open up some prospects for quantitative analysis, something historians still tend to shy away from. One of the approaches I have been exploring is Social Network Analysis [SNA]. SNA was developed in the 1960s in mathematics, anthropology and sociology and measures structural forms of relations between individuals, places and/or events. Over the past couple of decades, it has found its way to numerous other fields, such as physics, neuroscience, and recently also (modern) history. Within ancient history, however, SNA still needs to obtain a firm footing.

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To reconstruct proper social networks, a decent prosopography is indispensable. In a traditional scholarly setting, this implies time-consuming and painstaking manual labor. Fortunately, in a digital environment, there are other ways, and Trismegistos (www.trismegistos.org) forms an ideal starting point. Trismegistos grew out of a long tradition of databases and prosopographies (structured lists of people), as well as various other Ancient History projects at KU Leuven. The original idea of Trismegistos was to foster interdisciplinarity in the study of Ancient Egyptian society by creating a central database with metadata about published papyrological texts from Greco-Roman Egypt, in a first instance written in Greek, Latin and Egyptian (including hieroglyphic, hieratic and demotic). The inclusion of Egyptian soon dissolved the disciplinary boundary with epigraphy, broadened the chronological window, which was eventually set to 800 BC – AD 800, and led to the inclusion of further languages such as Coptic, Aramaic and Arabic.

Apart from texts, since 2008 Trismegistos also intensively deals with places and people. Building on open access to the full text in repositories, Named Entity Recognition procedures are used to create lists of toponyms and anthroponyms that occur in the ancient sources. This was first applied during the socio-onomastic project ‘Creating Identities in Graeco-Roman Egypt’ (KU Leuven OT project 2008-2012), on a corpus of about 50,000 papyri and ostraca in the Duke Databank of Documentary Papyri (papyri.info). With the additional support of a Hercules Grant, (‘An Interdisciplinary Database of Proper Names in Late Pharaonic, Graeco-Roman and Byzantine Egypt (ca. 800 BC – AD 640)’; 2008-2014) the work on the core data could be finished in just over two years, resulting in a database with almost half a million references to people (Trismegistos People) and an additional hundred-thousand or so place names (Trismegistos Places) mentioned in texts from Egypt.

On the basis of Trismegistos People, several studies on naming practices, modes of identification and identity issues in Greco-Roman Egypt have been published. Two PhDs focused on the longstanding tradition of double names: the first dealt with the Ptolemaic period, when this form of polyonymy served to cross ethnic borders (Coussement 2016), the other with the Roman period, when the practice was adapted by the local elite to distinguish themselves from the *hoi polloi* and to resemble Roman nomenclature (Broux 2015a).

The data of the fourth century AD provided new insights into the spread of Christianity in Egypt (Depauw and Clarysse 2013). The development of a standardized identification cluster, consisting of a person's name, patronymic and metronymic (Broux and Depauw 2015), as well as the use of fixed expressions to denote illegitimacy (Broux 2015c), name change (Broux 2013b) and official identification (Broux et al. 2010), were all related to the legal reorganization of the population under the Romans and the ensuing tax reform (Broux, 2013a). Most recent studies focus on the influence of Roman socio-linguistic practices on Greek and Egyptian conventions (Depauw, 2017) and how network analysis can provide us with new insights regarding onomastic habits and what they say about cultural identity and social status (Broux 2015b).

22.2. Going global: an encompassing source guide for the ancient world

22.2.1. Expanding Trismegistos Texts

Like Facebook, however, Trismegistos wants to grow, and get the entire ancient world on board. To achieve this goal, Trismegistos' core database, the text database, must first be expanded by broadening its chronological and geographic horizon. Since 2013 the team has been actively working toward the inclusion of all texts from antiquity in Trismegistos. This implies including Latin and Greek inscriptions, an estimated 700,000 texts. Contacts with the Latin epigraphic database in Heidelberg resulted in Trismegistos' participation in the Europeana EAGLE project, coordinating the disambiguation across all partners. This added about 150,000 new texts to the Trismegistos database. The remaining 300,000 will be integrated from another source (Claus-Slabby: www.manfredclaus.de), so that the coverage of Latin will soon be exhaustive. For Greek, good contacts have been established with the main players in the field (PHI: epigraphy.packhum.org/inscriptions/; DC3 [i.e. Duke, SEG, Claros]: blogs.library.duke.edu/dctthree/), and the aim is to become partners in a project dealing with the 250,000 or so inscriptions during the next year. At the same time Trismegistos is also working towards a complete coverage of indigenous languages and scripts, which are often separate fields, isolated from the 'classical' world. New partnerships for Etruscan have been set up, and soon also for Punic (CIP: <http://cip.cchs.csic.es/>) and South-Arabian

(DASI: <http://dasi.humnet.unipi.it/>), while for the Italic languages, for Gallic, Lepontic, Venetic, and Messapian information has already been digitized on the basis of existing corpora.

22.2.2. Expanding Trismegistos People

With the experience obtained during the extraction of names from the Greek papyri, Named Entity Recognition will be applied to the Latin inscriptions incorporated in Trismegistos so far. This will result in the addition of an estimated 500,000 or more new references to names / individuals to Trismegistos People. Network analysis will be used to help with the disambiguation of individuals.

22.2.2.1. Named Entity Recognition

The collection of references to people and their names in the inscriptions will be carried out by applying Named Entity Recognition [NER] to the clusters of capitalized words extracted from the full text repositories of Greek and Latin inscriptions.

NER was originally developed by computational linguists in the 1990s to detect and classify pre-defined elements in texts, but quickly spread to other fields, such as biology and genetics, and is now gaining momentum in the Digital Humanities (Van Hooland et al. 2015). The problem with NER-systems, however, is that techniques designed for one genre or field do not necessarily work for others, due to specific text properties (some follow strict writing constraints, e.g. scientific or news articles, while others, such as email or tweets, are more informal), or due to language-related grammatical and syntactical formats.

For ancient Greek and Latin, the languages of the inscriptions under scrutiny here, there were no ready-to-use NER solutions. In a case language, proper names are more variable; the different accents on vowels make letters less easily recognizable; and in particular the onomastic system and the way people are identified is completely different from modern languages. Therefore a strategy needed to be developed to cope with the multilingualism of the sources and the declensions of the inflected languages.

Trismegistos opted for a combination of a gazetteer and a rule-based approach. For the gazetteer a three-tiered onomastic database structure was developed in Trismegistos People, dealing with names, name variants, and declined name variants respectively. The first database, NAM, currently has 34,106 entries, e.g. the name Isidoros.

Each name is connected to a set of variants in all possible languages. As a rule, only very minor dialectal or orthographical variation is allowed in the ‘native’ language, in this case Greek (e.g. Εἰσίδωρος and Ἰσίδωρος). Many of the variants are actually created by renderings of a name in other languages, e.g. Ἰsytrs, be ʒysydwrš or ʒcɪΔωρε in Egyptian and Coptic. In all there are 177,290 variants in the NAMVAR database. Finally, for each of the variants, the declined forms were created, e.g. Ἰσίδωρου) or Ἰσίδωρῶι (dative). This NAMVARCASE database is the largest with 667,677 entries, and this set is used as a gazetteer for NER. It was developed on the basis of the set of names of some 40,000 individuals with titles listed in the *Prosopographia Ptolemaica* (KU Leuven) and was supplemented with new names collected during the ‘Creating Identities’ project (Depauw and Van Beek 2009). Through cooperation with the *Lexicon of Greek Personal Names* (Oxford University) the names of some 300,000 individuals can now also be integrated.

Apart from this gazetteer, rules were developed to cope with the combination of names, or more correctly declined name variants, as well as with the combination of names with non-onomastic introductory terms (e.g. ‘son of’) in the identification of individuals. For Greek texts, this is pretty straightforward, as people were identified by their name (generally a single name, in some cases a double name) followed by genealogical identifiers (in the genitive form) only. The onomastic habits encountered in Latin inscriptions differ significantly, however. Here the majority of the individuals follow the Roman naming system. This consists of a fossilized praenomen, a nomen gentilicium (the equivalent of our family name), and a personal cognomen. Often the patronymic was inserted between the gentilicium and cognomen; sometimes even the papponymic and the voting tribe, e.g. *Marcus Tullius Marci filius Marci nepos Cornelia Cicero* (‘Marcus Tullius Cicero, son of Marcus, grandson of Marcus, [of the] Cornelia [tribe]’). A completely new set of rules is therefore being developed to apply to the Latin inscriptions.

22.2.2.2. Human quality control and prosopographical identifications

Once the clusters of capitalized words have been extracted and have been matched to the onomastic gazetteer and rules for name combinations, a human check will be performed. This includes tasks which are not easily automated: interpreting declined name variants as attestations of a specific case where the mere form is ambiguous;

deciding whether some ambiguous entries are toponyms or anthroponyms; and reviewing the results of the cluster interpretation rules and adding relevant information where necessary.

All this could be labeled ‘quality control’, but we will also rely exclusively on humans for the logical next step when developing a prosopography: the identification of namesakes as attestations of the same person. Since the systematic review will be performed text per text, only intratextual identifications can be implemented at this stage.

22.2.2.3. Social Network Analysis

Social Network Analysis [SNA] was developed in the 1960s in mathematics, anthropology and sociology and measures structural forms of relations between individuals. It has huge potential for future historical research, not only by applying ‘traditional’ network analysis for the study of social interaction, but also by developing new, non-conventional techniques.

In the wake of the automatic extraction of individuals from Greek papyri during the ‘Creating Identities’ project, people appearing in more than one text could not be identified and were therefore entered in Trismegistos People under multiple records. The identification of these doubles is a difficult and time-consuming process, not in the least because of the high degree of homonymy: in village communities, similar names were common, and in families, names were often passed down every other generation. This makes it difficult to distinguish between one person and another. Broux and Vanbeselaere therefore developed a new procedure to identify individuals with the help of graph visualization and SNA (Broux and Vanbeselaere forthcoming). By linking people based on co-occurrence in the same texts, an overview of all the data is presented in a single network, where one can “zoom in” on specific individuals and compare their “surroundings”. When specific clusters of names reappear, these are likely the same individuals mentioned in different texts (see Fig. 1: each circle [or ‘node’] represents an individual; some of these need to be merged, since they actually refer to the same person).

Additionally, the developed identification method enables us to discern family components. Mapping genealogical relationships is often problematical, especially when individuals are attested in different capacities. Someone who is mentioned as the father of an athlete in a victory list is not easily recognized as the state official in a petition.

In other words, social and professional links do not always overlap with family ties, and these need to be synced to provide a complete picture and to prepare the data for the next step: analyzing networks of names.

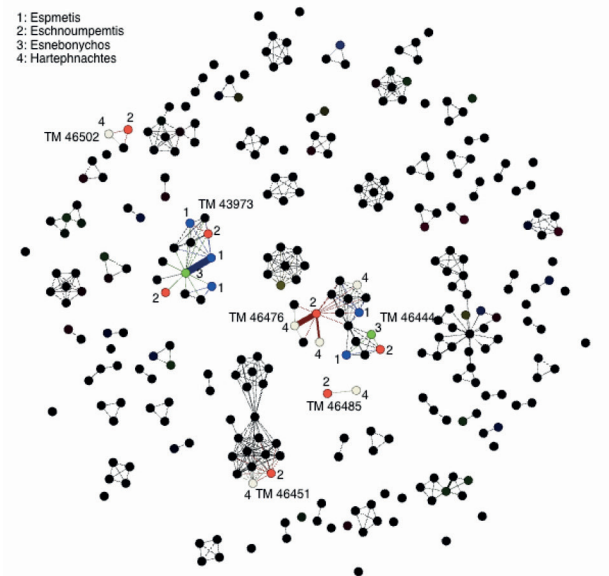


Fig. 22.1. Visualizing individuals co-occurring in texts.

The application of SNA to onomastics is another avenue that has not yet been explored. By linking names on the basis of genealogical relations (since names are the result of conscious choices made by parents), the co-occurrence of names in communities can be mapped, which opens up new possibilities for quantification and interpretation (Broux 2015b). A name's popularity can be calculated by means of its in-degree (i.e. how many other names point to it), while the density of the network, the number of reciprocal links and the weight of these links can tell us something about the social motives behind these naming patterns. For the local elite of Roman Egypt, for example, descent was of prime importance, since membership was strictly hereditary, and by limiting themselves to a specific collection of names, they could express family and community ties. Moreover, networks like these can help us evaluate the perception of names in antiquity, as well as determine the linguistic origins of undefined names, on the basis of their location in the graph.

22.3. Goals

22.3.1. Study of naming practices

The collection of names from across the entire Mediterranean will lead to a large-scale study of naming practices in the ancient world, and how these reflect changes in society at large. A major transition point is of course the steady integration of regions and states across the Mediterranean and Western Europe into the Roman Empire. The focal point will therefore be the impact of the Roman occupation on traditional naming and identification conventions in different provinces. Regions where pre-Roman material is also available (e.g. Gaul, Magna Graecia, Asia Minor) are especially significant when mapping aspects of continuity and change chronologically. Moreover, results from both eastern and western provinces will be compared to study uniformization, whether imposed from above or spread out from below.

22.3.2. Towards a Facebook of the ancient world

Eventually, the goal of Trismegistos is to recreate a prosopography of the Greco-Roman world. Reconstructing social networks of the past will help us gain a better understanding of the mechanisms of interaction in the ancient Mediterranean, not only on the micro level (individuals), but also on the mesa (communities) and even macro (regions, empires) levels. At the same time connections and communication across these different levels can be analyzed: how individuals, as members of local communities, were integrated into larger political structures (top-down approach), and how these communities responded to impositions from above (bottom-up approach). Social models, such as the six degrees of separation theory, can be tested, to check whether our 'small world' perception is indeed the result of present-day technology and mass-communication, or if similar structures of interconnectivity existed, and, if so, what the conditions for this ancient globalization were back then. Mark Zuckerberg out. Enter Trismegistos.

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23. Epigraphy and onomastics in the Hesperia databank

Noemí Moncunill, Javier Velaza***

Abstract

The first part of this work provides a general overview of the features and advantages of the digital epigraphic corpora on the basis of the experience gained in the last years within the Hesperia project. The second part of the paper provides a detailed presentation of the new sections available in the Hesperia databank devoted to indigenous personal names and divinity names.

Keywords: Hispania, epigraphy, onomastics, digital corpora, Palaeohispanic languages and writings

23.1. Introduction

The aim of this work is to do a general overview of the computer-based epigraphic corpora, to think about their features and advantages, taking the experience gained in the last years within the Hesperia project as a starting point.¹

The first thing that necessarily needs to be highlighted is that traditional epigraphic corpora have certain limits that are imposed by their morphology and format. If summarizing, there are three main and most evident limitations:

- a) One-dimensional format. The monument's description, the textual edition, the critical apparatus and remarks are displayed one

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after another, with no wider possibility to link one to another than through some indices, which by the way are rarely detailed enough. Not even in the most extended indices, as those in *CIL*, the connexions between inscriptions through such relevant data as their date, palaeography or onomastics are set clear. Obviously, those connexions can be made by the users in their mind, but when the corpus displays thousands or tens of thousands of inscriptions, it looks too optimistic to take for granted that most readers will have the aptitude such work takes.

- b) Ephemeral usefulness. It looks also obvious that a traditional corpus will necessarily be always ephemeral for many reasons: new inscriptions cannot be added, mistakes cannot be corrected, text editions cannot be improved and modifications based on new evidence or knowledge cannot be introduced, among other limitations. Of course some of these problems have hardly been solved by publishing some supplements, but it is widely known that these are partial solutions only.
- c) Authoritative work. In a traditional corpus, editors impose their knowledge in a large range of features, and thus they interfere in the utility of other views, to the extent of depreciating them too much. When it comes to an epigraphic corpus that is written in a wide-known language, such as Latin, this *auctoritas* becomes particularly powerful regarding the reading of the epigraphic text, its checking being not possible all the time for users, particularly for those who are not experts on the subject. But when it comes to fragmentary languages, with very low or even no language deciphering at all, and with many doubts on decoding, the truth is that the influence of the editor is extremely high and involves some risks that they do not always come to terms with successfully.

In our opinion, these limitations can be solved or, at least, diminished by a proper and efficient use of the tools IT puts to our disposal. Although this is no longer anything of new, many attempts to use them so far have brought to an output too close to the traditional, non-innovative epigraphic corpora, considering the features of such new tools. To get over one-dimensional formats, an open, adaptable digital structure must be created that shall take the most out of every single datum in the database. Besides, getting over an ephemeral usefulness requires the possibility not just to keep adding new data, but also

to connect the database with any other tool with a similar structure and to extend the platform with any new or advisable features. Finally, the authoritative temptation must be also avoided, particularly through systems that shall bring to users the possibility to take their own decisions in certain issues of an open debate and, at the end of the day, to customize their own corpus.

Along with the above-said, some other advantages any digital edition shall bring must be taken into account, although it looks unnecessary to discuss them: for instance, an online building of the corpus shall allow cooperation and simultaneous work of interdisciplinary teams that will not only contribute to speed up the work and check the achievements, but also to enrich the views in such studies and the analysis of the monuments and their texts. The open-access format of the corpus means also a big leap for research in this field, along with an important service of transferring knowledge to society. However, it must be recalled that every corpus shall be adapted to the specific features of the documents and their epigraphic culture (and other sources, eventually) has left to us. And such terms require a constant dialogue between epigraphists and technicians since the very beginning of the project, in spite of the fact that they do not always come to understand each other. Those projects that had any of these groups prevailing at the start of the project have proved to have insuperable lacks through their stages.

23.2. The Hesperia project

All above-mentioned principles have been taken into account in Hesperia project, its main goal being to gather all linguistic evidences from Palaeohispanic languages, that is, pre-Roman languages in the Iberian Peninsula². First of all, we need to recall these are very different materials as for their quantity, quality and reliability. Ancient Hispania left us epigraphic texts in at least four languages: Tartessian, Iberian, Celtiberian and Lusitanian — the possibility there are also some texts in Palaeobasque language is still *sub iudice*³ —, mainly written in four epichoric writing systems — Tartessian, southeastern-Iberian, northeastern-Iberian and Greek-Iberian script.

² General presentations of the project can be found in Orduña forthcoming, Orduña and Luján forthcoming, and Velaza 2014.

³ Concerning this subject, see Velaza 2009.

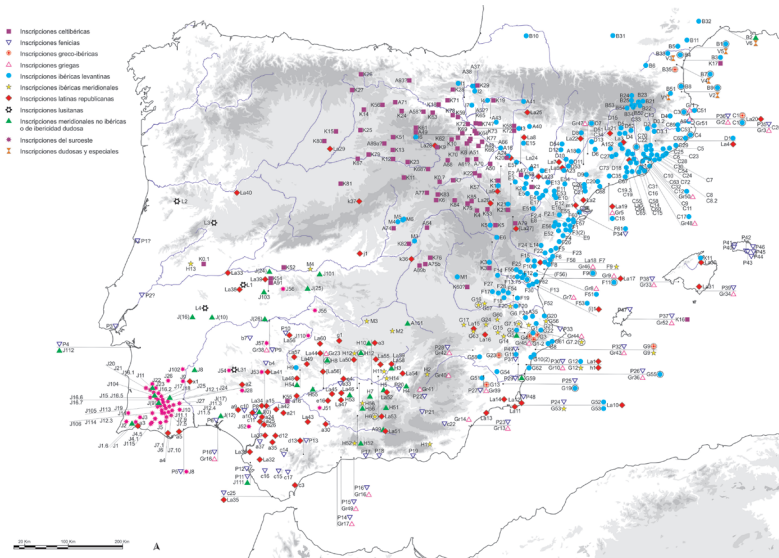


Fig. 23.1. Map of the Palaeohispanic inscriptions attested in the Iberian Peninsula.

The current knowledge of each of these scripts is in very different stages, just as when it comes to their languages deciphering. Along with the epigraphic texts there are also other evidences, as those from onomastics — anthroponymy and theonymy preserved in Roman inscriptions found in these territories, and toponymy from Classic sources — and some notes transmitted by several authors.

Hesperia was born as a natural successor in the digital era of the main corpus for Palaeohispanic languages, that is *Monumenta Linguarum Hispanicarum*, published between 1975 and 2001 by Jürgen Untermann. The project conception is due to Javier de Hoz and its digital platform has mainly been developed by Eduardo Orduña. Nowadays it is coordinated by an interdisciplinary and interuniversity team with researchers from the Universidad Complutense de Madrid, the Universidad del País Vasco, the Universidad de Zaragoza and the Universidad de Barcelona. There are currently several sections open for searching (<http://hesperia.ucm.es/>).

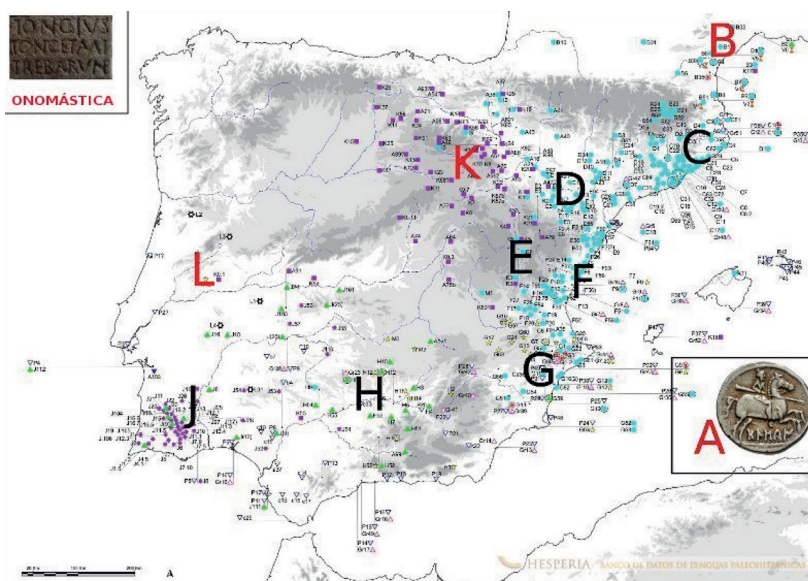


Fig. 23.2. Dispersal areas of Palaeohispanic inscriptions and sections available in Hesperia databank.

- I. Partial epigraphic corpora from B zone (Iberian inscriptions from the south of France), K zone (Celtiberian inscriptions) and L zone (Lusitanian inscriptions). All of them follow the same data form made of six tabs corresponding to “general features”, “text”, “epigraphy and paleography”, “pictures”, “archaeological context” and “bibliography”. The databases are linked between them through a powerful engine for simple and complex searches, and pdf documents as well as maps can be created with the resulting outcomes. Work is currently being focused on C and D zones (Iberian inscriptions in Catalonia), which is scheduled to be open for search by the end of 2016.
- II. A numismatic database with its specific four-tab structure: “general features”, “inscription”, “language and writing” and “bibliography”, where all Paleohispanic mints are gathered, no matter their scripts or languages.
- III. An onomastic database, with a specific search engine allowing combined searches with any of the elements from the identified onomastic formulae.

Beyond finishing, checking and updating the already-open sections, the team currently works on transversal fields, such as lexicon, as well as on creating several kinds of tools, as the possibility of displaying the corpus according to alternative readings — which turns out to be essential in epigraphic contexts with a lower level of decoding, as in Tartessian, although its applicability to other fields is still being tested —.

Besides, the team has also decided to consider the potential applicability of this corpus structure to other cultures of the western Mediterranean. With such aim, prof. Francisco Beltrán leads the AELAW (Ancient European Languages and Writings), with the participation of researchers from ten different countries to build in future a single corpus with the evidences from all fragmentary languages documented in the western Mediterranean for the Ancient times.

23.3. The new sections on onomastics

The Hesperia databank has been recently extended with a new resource on indigenous onomastics.⁴ More specifically, the new sections now available are devoted to the anthroponymy and theonymy, leaving for the near future the data referring to toponymy and ethnonymy, which are not yet available in open access.

In this new section we have compiled all the pre-Roman personal names and divinity names attested both by direct and indirect tradition. This represents, so far, a total of nearly 6,000 records. Names attested in direct sources are those that can be identified in epichoric epigraphies; the second group, in its turn, contains the names that can be identified in the so-called colonial epigraphy, as well as in literary sources. Regarding the chronology of the epigraphic material, the oldest texts are the Iberian, which can be dated back to the 5th century BC, whereas the most recent ones are the Latin inscriptions from the high-imperial age. Thus, the processed information can be classified into one of these groups:

- Indigenous names in Iberian inscriptions
- Indigenous names in Celtiberian inscriptions
- Indigenous names in Lusitanian inscriptions
- Indigenous names in Greek inscriptions
- Indigenous names in Latin inscriptions
- Indigenous names in ancient authors

⁴ See Vallejo 2016 and Moncunill 2016.

The Greek and Latin epigraphy group mainly contains inscriptions from the Iberian Peninsula; nevertheless there are also a few exemplars coming from outside this territory, but which clearly refers to individuals of Palaeohispanic origin. The most significant document that fits into this category is the Ascoli bronze, which displays a long list of Iberian equites to which the Roman citizenship was given. As a matter of fact, this artefact has become the most important document for the study of Iberian personal names.

As said above, the database contains about 6,000 records so far; each of them reports a divinity name and/or the whole onomastic formula of individuals whose complete name presents at least one indigenous element. This means that each item is devoted to a concrete person, whose onomastic formula might be composed by several indigenous names. The information of each record is completed with a bibliographical apparatus, and the find-spot coordinates, together with a map. Moreover, the database allows using this geographic information to create new linguistic maps, which represents one of the main strengths offered by this new tool of the Hesperia databank.

The following (Fig. 3) could be a good example of one of the above-described records. This Latin inscription from southern Spain mentions a woman with a Latin nomen, *Aelia*, followed by an Iberian cognomen, *Belesiar*, as well as the name of an indigenous divinity, *Betatun*. Thus, a single table records an indigenous personal name together with an indigenous god. The lower part is reserved for the bibliographical references, the geographic information and, last but not least, the map.

ANTROPONIMIA Y TEONIMIA (CORPUS)

Secuencia onomástica: **Aelia Belesiar**

Teónimo: **Betatun {Betatun}**

Nomen: **Aelia** Cognomen / Nombre único: **Belesiar**

Filiación: Unidad suprafamiliar:

Bibliografía: (Pase el cursor sobre las zonas en azul para ver la referencia completa)

[Ordúña 2009, 359-362](#)

Localidad: **Fuente del Rey (J)**

Provincia:

Observaciones:

Primerο

Último

Siguiente

Anterior

Buscar

Generar PDF

Filtrar:

Filtrar

Registro actual: 1338 de 9841

(Click para ampliar)

Fig. 23.3. Personal-names and divinity-names record in Hesperia databank.

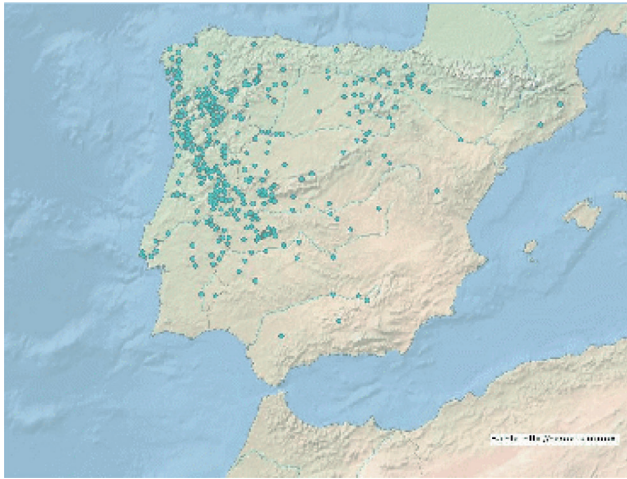


Fig. 23.6. Dispersal area of indigenous divinity names.

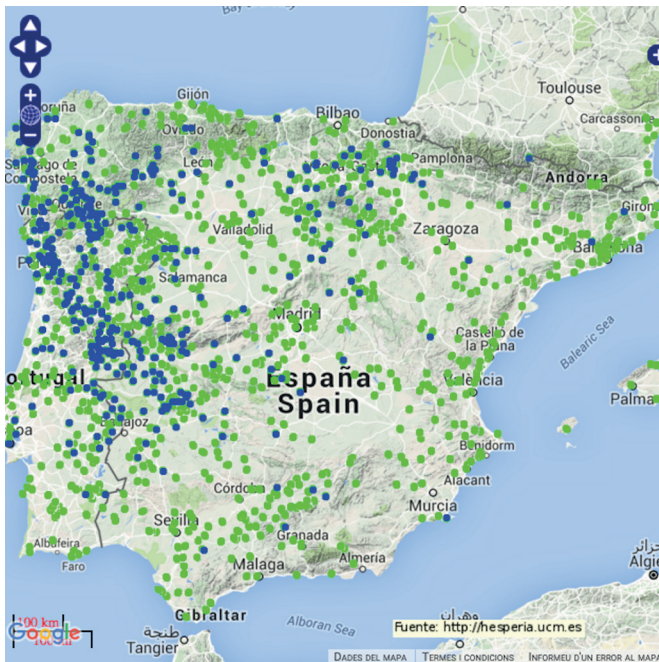


Fig. 23.7. Dispersal areas of indigenous divinity names and personal names.

Thanks to the search engine, all these points can then be redistributed into smaller groups to draw linguistic areas or isoglosses, on the basis, for instance, of the attestation of a well-known anthroponymic element or the dispersal area of significant phonetic features. In the following maps it is displayed, in the first place (Fig. 8), the attestation area of names containing the element *biur*, which clearly corresponds to the Iberian area, that is, the non indo-European half of the Iberian peninsula; and, in the second place (Fig. 9), it is displayed the dispersal area of the name *Tancinus*, which clearly corresponds to the indo-European part.

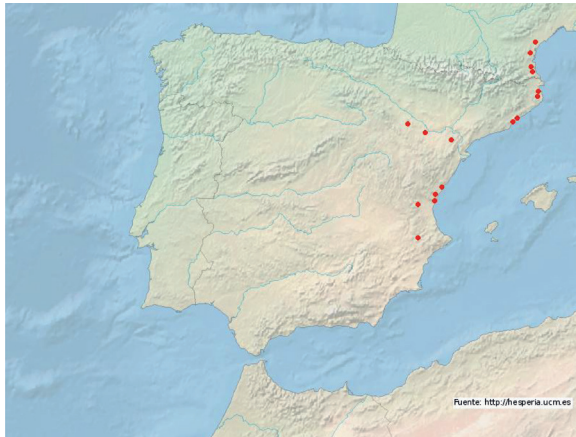


Fig. 23.8. Dispersal area of the anthroponymic element *biur*.

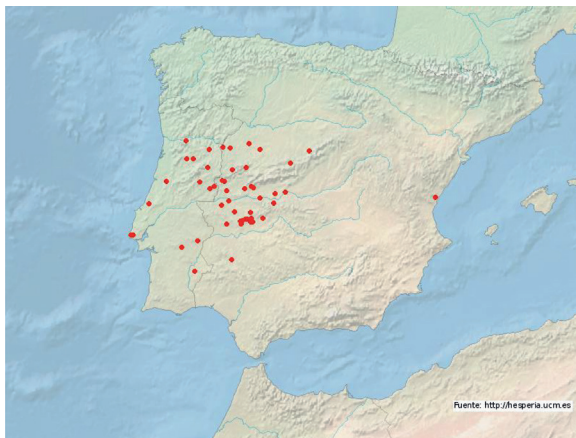


Fig. 23.9. Dispersal area of the name *Tancinus*.

It must be pointed out that the Hesperia project is, in general terms, following the main standards for epigraphic databanks and text editing, and we are now exploring ways to interact with the linked open data ecosystem (tagging persons for compatibility with SNAP, places for compatibility with Pelagios/Pleiades, text references for compatibility with IDEs, citations with CTS, object metadata with EAGLE, etc.).⁵

The example below could provide an easy way to show to what extent the interrelationship between different open-access databanks might be useful even in the present stage of the Hesperia project, where prosopography and toponymy have not yet been fully developed.

The following file (Fig. 10) contains information on a person's or god's name observed in an Iberian rock inscription in the Pyrenees. Nevertheless, the structure of the word as well as its phonetic features show no possible interpretation in Iberian. In consequence, other possibilities have to be considered, such as it could actually be an adaptation of a Greek name. As a matter of fact, the same name is attested as a mythological character in literary sources (Parthenius of Nicaea XXX 1; Ovid, *Ibis* 434), as well as recorded as a personal name in open-access databanks such as LGPN (V5a-20577) or Trismegistos (Per 222620). Therefore, in this particular case, the linking between open-access data could be helpful for the linguistic analysis itself.

The screenshot shows a web interface for the Hesperia databank. At the top, it says 'ANTROPONIMIA Y TEONIMIA (CORPUS)'. Below this, there are several input fields and buttons. The 'Secuencia onomástica' field contains 'teleus'. To the right, there are navigation buttons: 'Primero', 'Último', 'Siguiente', 'Anterior', 'Buscar', and 'Generar PDF'. Below the main form, there is a 'Bibliografía' section with a citation: 'Abelant 1976, 81'. There is also a 'Localidad' field with 'Osseja (PYO)' and a 'Provincia' field with 'PYO'. A map of the Iberian Peninsula is visible on the right side of the form. At the bottom, there is a note: 'No parece ser un antropónimo propiamente ibérico. ¿Quizás adaptación del griego (cf. LGPN 5a, 20577; TM Per. 12612)? Según una interpretación dual, sería teleus.' and a '(Click para ampliar)' link.

Fig. 23.10. Record of a possible Greek name attested in an Iberian inscription.

A similar consideration might also apply, for instance, to another important document in the Palaeohispanic epigraphic landscape, namely the III Botorrita Bronze plaque, written in Celtiberian language

⁵ We thank Gabriel Bodard for his observations at this regard.

and script but containing a considerable amount of foreign names, such as Latin or Greek.⁶ This could be the case for *markos* (*Marcus*), *bolora* (*Flora*), *kinbiria* (*Cimbria*), *antiokos* (*Antiochus*), *bilinos* (*Philinus*), *bilonikos* (*Philonicus*), *tais* (*Thais*), *tiokenes* (*Diogenes*), and so on. We could finally mention, in this same regard, the Gaullish names observed in some Iberian inscriptions from southern France: *ásatile* (*Adsedilus*, CIL III 5373), *tesile* (*Tessillus*, CIL III 14368.28), *uasíle* (*Vassil(l)us*, CIL XII 2286), *katubaře* (*Catumarus*, CIL 3, 4263), etc.

To sum up, the new dynamic sections of Hesperia provide an essential boost to a field of study, the detection of anthroponymic areas, which, thanks to the previous work by M. Gómez Moreno and J. Untermann, has been proved to be very productive for the comprehension of the linguistic diversity of the ancient Iberia. The study of the indigenous languages on the basis of the distribution of their personal names is actually essential, sometimes even the only available means, for the definition of these areas that remained anepigraphic in pre-Roman times (see the map in fig. 2, with the dispersal areas of Palaeohispanic inscriptions). Obviously, one of the main advantages of the digital format is that it offers the possibility to regularly update the corpus with new data. However, the most remarkable difference from a traditional corpus is that it allows the user to connect and freely cross the information, and to project the results automatically on a map, which makes this a powerful resource for new research and new results.

CTS = Canonical Text Services (protocol to cite digitally-available texts in a canonical way).

EAGLE = The Europeana network of Ancient Greek and Latin Epigraphy:
<http://www.eagle-network.eu/>

IDEs = Integrating Digital Epigraphies project.

LGPN = The Lexicon of Greek Personal Names:
<http://www.lgpn.ox.ac.uk/>

Pleiades = A community-built gazetteer and graph of ancient places:
<http://pleiades.stoa.org/>

SNAP = Standards for Networking Ancient Prosopographies project:
<http://snapdrgn.net/>

Trismegistos = Interdisciplinary portal of papyrological and epigraphical resources formerly Egypt and the Nile valley (800 BC-AD 800):
<http://www.trismegistos.org/>

⁶ Vid. Untermann's proposal in MLH IV, K.1.3.

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24. The Power of Images at Aphrodisias: How Digital Resources Can Transform our assessment of Palaeography

*Abigail Graham**

Abstract

This paper will consider how the publication of a large digital corpus The Inscriptions of Aphrodisias Reynolds et al. (2007) has shaped the assessment of inscriptions, particularly regarding palaeography and the dating of inscriptions. A case study of dedicatory inscriptions from the Temple of Aphrodite at Aphrodisias will explore how our approach to palaeography and dating has evolved with digital resources, identifying areas where challenges remain and considering how improvements could be made in both our approach to and in publication of epigraphic materials.

Keywords: Dating, Palaeography, Ordinatio, Letter forms, Aphrodisias, Context, Recarving

24.1. Introduction

24.1.1. Caveat Lector: Defining Palaeography and traditional approaches

As the co-ordinator and lecturer on three graduate level courses of Roman Epigraphy, I am invariably asked the same question: how do you use letterforms to date inscriptions? My answer is always the same: “very carefully”. Studying palaeography within the discipline of ancient epigraphy can be a journey into thorny hedge where one can easily “fall into that category of human endeavor known as stylistic attribution and inevitably involve subjectivity”.² Stephen Tracy advises that palaeographic surveys should be carried out with caution:

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² Tracy 1995, 3-4.

“Caveat Lector must needs be our motto”. The study of palaeography is problematic, as demonstrated by W. Eck and C. Roueché during the conference, on a number of levels, both in the way it is defined and the ways in which it is employed. Many scholars dismiss lettering as a means of dating and they make an important point: dating by a single criterion, especially a stylistic one, is somewhat precarious. When studied in isolation, letterforms present stylistic variations that may be characteristic of a specific individual, workshop or an urban area. While observations about carving techniques can be helpful in specific case studies, they are more problematic when applied generally on a broader scale (e.g. to larger geographical areas or time frame) where archaisms, local styles, and variations can create distortions.³ Similar caution would be applied in dating a sculpture on the basis of a hair fragment. Analysis of statues considers a number of factors, material, hairstyle, drapery and/or context. Inscriptions are doubly difficult, as they fall into categories of both text and an object. While there is potentially more information, there is also a greater chance that it will be contradictory. Thus the use of lettering, an “imprecise science”, is better used in combination with a number of different factors.⁴ Despite the aforementioned limitations, a number of informative palaeographic studies have been produced. The success of these is based on detailed commentaries on a specific corpus of material, a transparent methodology and the incorporation of numerous high quality images.⁵

A second issue in the study of palaeography involves the access and publication of epigraphic materials. Access to large corpora of inscriptions has traditionally been limited to a small audience of scholars and site visitors. Apart from a few museum collections, which happen to have inscriptions arranged in roughly chronological order,⁶ there are few places where one can visually experience the development of carving styles over time. For the lucky few who attain access (and permission)

³ Susini 1973; Petrucci 1993; Di Stefano Manzella 1995, 163-181; Cooley 2012, 433; Bruun and Edmondson 2015, 122-125.

⁴ Harris 1989, 26-9; Bodel 2001, 3-5; Di Stefano Manzella 2007, 393-418 and Cooley 2012, 432-435.

⁵ For example: Gordon and Gordon 1957 offers more than 50 plates and figures, Di Stefano Manzella 1987 provides 218 illustrations, Tracy 1990, 1995, 2003 uses over 60 plates and figures in each volume.

⁶ Perhaps the finest example of a museum in which one can gain an understanding of palaeography (and inscriptions as whole) is the Museo Epigrafico Nazionale, Roma.

to study a large corpus of inscriptions, publishing these texts with supporting images can be challenging and expensive. Studies of palaeography in ancient inscriptions have often been, by necessity, selective with images making it difficult for both the author and readers to develop a detailed understanding of carving trends and practices. In this traditional format, inscriptions were also separated from their archaeological context and the accompanying artwork while the reader, viewing only the lettering, was often removed from the visual elements of the inscription (e.g. the type of stone, use of spacing and decoration, letter size). This is a suboptimal way of assessing epigraphic evidence. The advent of online corpora have increased both the access and the development of discussions regarding epigraphic monumentality, including new methodologies, approaches as well as attempts to redefine genre classifications and terminology.⁷ A number of recent studies have used changes in the appearance of inscriptions over time, such as the use of different media, decorative and paratextual elements⁸ (e.g. ivy leaves as interpuncts (*hederae distinguentes*),⁹ abbreviations¹⁰ and spacing between words¹¹ alongside lettering, as dating criteria.¹² Panciera's recent article, in particular, advocates the significance of the public context and visibility of inscriptions.¹³ In this vein, it is worth considering how the physical characteristics of an inscription belong within a broader assessment of a culture of writing. Is palaeography the study of letterforms alone? Was a focus on letterforms a deliberate choice or a product of the traditional constraints in accessibility and publication of epigraphic materials? The following case study from Aphrodisias will explore these questions further.

⁷ Woolf 1996, 22-39, Eck 2010, Panciera 2012, 1-10, Graham 2013, 1-17. For a recent collection and analysis of epigraphic databases, see Elliott 2015, 78-85.

⁸ On marks in the text see Susini 1973, 26 and Cooley 2014, 143-155.

⁹ Hommel 1970, 293-303.

¹⁰ Gordon and Gordon 1957, 111.

¹¹ On using space to reconstruct inscriptions see Alföldy 1995, 195-226, Grasby 2002, 151-176.

¹² For an extensive list of dating conventions cf. Di Stefano Manzella 1987, Chapter 20.

¹³ "I would propose to regard as an 'inscription' any particular type of written human communication of the sort that we would today call unidirectional...not being addressed to a person or to a group but to a collectivity, and for this reason is made with the location, writing technique, graphic form and impagination, mode and register of expression chosen because they are most suitable to the attainment of its intended goal." Panciera, 2012, 8.

24.1.2. Outline

The focus of this paper is a series of rather unimpressive column dedications from the temple of Aphrodite at Aphrodisias. While the information recorded in the texts is unremarkable, the journey of these inscriptions from a paper epigraphic corpus to their recent publication as a digital corpus reveals an epic transformation in the format and approach to these materials. This study will begin with brief overview of previous published editions (e.g. Calder and Cormack 1962) followed by an assessment of the information available on the current Inscriptions of Aphrodisias (2007) website. Through careful assessment of text (including formula, vocabulary and spelling) and its presentation (the arrangement of the text, use of decoration and spaces, as well as lettering) in the images provided, this survey will demonstrate how the availability of published images and inclusion of dating criteria have increased the amount of information available whilst also adding clarity to the process of dating an inscription. By examining how we define and use palaeography to evaluate inscriptions on the Inscriptions of Aphrodisias website (Reynolds et al. 2007), we can observe how the discipline has evolved and what changes may be possible in approaches and the publication of epigraphic material.

24.2. Publishing inscriptions: a case study of Column Dedications from the Temple of Aphrodite at Aphrodisias

24.2.1. A brief introduction to the inscriptions IAph 1.4 -1.6

Three inscriptions, each of which record the dedication of a column at the Temple of Aphrodite, will be the subject of this survey. The first two texts were noted as early as the 18th century and copied in a notebook by the British Architect Deering in the early 19th century. A third version of the text, was uncovered during excavations at the temple site by the French Engineer Gaudin in the early 20th century.¹⁴ The inscriptions are recorded on tabella ansata (0.745 x 0.465m) as part of fluted marble columns of the peristasis, some of these have been reconstructed in modern restorations on the site.

¹⁴ A comprehensive history of the history and bibliography, as well as a description of the resources can be found on the IAph website: <http://insaph.kcl.ac.uk/iaph2007/iAph010006.html>.

These texts can be dated through a number of different criteria. Contextual association with construction of the temple, dates between the end of the 1st century BC and the early 1st century AD, though the land was clearly in use well before this time.¹⁵ This is corroborated by coins depicting the temple, which date from 2 BC- 14 AD.¹⁶ Prosopography is also informative: Gaius Julius Zoilos (freed by Caesar or Octavian), who dedicated the theatre at Aphrodisias ca. 28 BC, also dedicated the naos of the temple (IAph 1.2), perhaps posthumously.¹⁷ The benefactor of the columns in this case study, Eumachos Diogenes, also comes from an established family that flourished well into the 2nd century AD.¹⁸ Finally, the formula of the text the inscription and the vocabulary, particularly the term *philokaisar*, suggest a late Republican or Augustan date.¹⁹ Before encountering the inscriptions face to face, the dating, function and meaning of these inscriptions appears to be quite straightforward. So let us examine the experience of viewing these inscriptions various published formats.

24.2.2. Publishing IAPH 1.4 and 1.5 in MAMA VIII (nos. 347 & 348): A series of copies?

Cormack published the first comprehensive catalogue of inscriptions from Aphrodisias as part of his *Monumenta Asiae Minoris Antiqua* volume VIII in 1962. This was a great undertaking that included texts as well as images. Two of the three texts (IAph 1.4 & 1.5) were

¹⁵ Roueché and Smith 1996, 41-42 and Reynolds 1990, 37. References to Sulla's dedications are in Appian BC 1.97. Caesar and Augustus' acknowledgements of the sacred space are evident in IAph 8.27, 8.31 and 1.1.

¹⁶ Coin type 41 depicts Augustus (OBV) and the temple of Aphrodite (REV) in MacDonald 1992, Plate V R131.

¹⁷ The titles on the architrave inscription, *soter* and *euergetes*, are absent from Zoilos' other inscriptions and may imply a posthumous dedication, perhaps by the *boule* and *demos* (Reynolds 1990, 38).

¹⁸ The success of Eumachos Diogenes' family, which included the first known Aphrodisian to hold a procuratorship in the 2nd century AD, reveals an enduring significance for his family monuments in the city (Reynolds 1999, 327-334).

¹⁹ The formula of the dedication, which lists the benefactor first is evident throughout the Hellenistic period in Aphrodisias (and Asia Minor) until the early Imperial Period, after which a new formula, beginning with recipients (e.g. Aphrodite and Imperial recipients), is predominant (cf. Graham 2013, 387-390). The Augustan and early Tiberian uses of the *philokaisar* are known from a dedication at Ioullis dated ca. 27 BC - AD 14 (SEG XLVIII (1998) no. 1129) and in a monument to Ti. Cl. Drusus in Patara (SEG XLIV (1994) no. 1205). For significance and date of the title see Buraselis 2000, 101-105.

published here as MAMA 437 and MAMA 438 respectively, while the third text was merely mentioned as a further copy.

MAMA 437

Εὐμαχος Ἀθηναγό-
ρου τοῦ Ἀθηναγόρου
τοῦ Εὐμάχου Διογένη-
ς φιλόκαισαρ καὶ Ἀμιάς
Διονυσίου φύσι δὲ Ἀδρά<σ>του
τοῦ Μόλωνος Ὀλυμπιάς
τὸν κίονα θεᾶ Ἀφροδίτη
καὶ τῷ δήμῳ.

MAMA 438

Εὐμαχος Ἀθηνα-
γόρου τοῦ Ἀθηναγό-
ρου τοῦ Εὐμάχου Δι-
ογένης φιλόκαισαρ
καὶ Ἀμμιάς Διονυσί-
ου φύσι δὲ Ἀδράστου
τοῦ Μόλωνος Ὀλυμ-
πιάς τὸν κίονα θεᾶ
Ἀφροδίτη καὶ τῷ
δήμῳ.

Translation by author:

Eumachos Diogenes, son of Athenagoras, the son of Athenagoras, the son of Eumachos, devoted to Caesar, and Ammias Olympias, daughter of Dionysius, the natural daughter of Adrastus, the son of Molon, (dedicated) a column to the goddess Aphrodite and the People.

The two published texts reveal similar inscriptions with a few variations.²⁰ I Aph 1.4 (MAMA 437) has a slightly less impressive ordinatio, particularly in line 4 with an odd line break, a misspelling of Ammias (as Amias) and Adrastus (line 5) with a sigma omitted. It is difficult to determine how or why these errors occurred without indications of spacing or an examination of the stone. One could argue that spelling

²⁰ MAMA 437 and 438 are represented in their digital format as published the Packhum website (Aphrodisias 108 and 109). <http://epigraphy.packhum.org/inscriptions/main?url=oi\%3Fikey\%3D256987>.

and arrangement of the text were not important to a broader audience at Aphrodisias, however, this is negated by a second copy of the dedication (IAph 1.5, MAMA 438), which portrays a more skillful execution and arrangement of the text. Spelling errors are rectified and the arrangement of the text creates a distinction in Line 5 between Eumachus and Ammias, and for the demos, which is isolated on the last line. These subtle variations only emerge with a close reading of the text, and it would be easy to overlook them. The published format of the texts also makes them appear similar in lettering and arrangement (e.g. left indentation).

The small (thumbnail) and low quality image provided in MAMA 437 provides a basic understanding of the appearance of the inscription, though it does not allow for a critical assessment of the lettering or arrangement of the text. The image reflects lettering that is recognizable (to the trained eye) as late Republican/ early Augustan at Aphrodisias with deep incisions, small serifs, as well as varying letter heights, but it is not sufficient for a detailed study. MAMA 438 is not published with a photograph, so one must rely upon a comparison of the texts alone.

The third text version of this text is mentioned in the commentary and based on the information provided (two similar texts and a reference to a “copy”) one would expect that it was very similar. The same editorial practice is employed in the parallel column dedications from a different benefactor (I.Aph 7 & I.Aph 8), where 2nd version of the text is noted (IAph 1.8) but only one (I.Aph 1.7, MAMA 450) was published. The apparent verisimilitude of the column dedications is corroborated by the published images, which depict two inscriptions (MAMA 437 and MAMA 450) with similar late 1st c. BC/early 1st c. AD lettering. When publishing a large corpus of inscriptions, referring to copies is understandable. However, treating texts as “copies” as opposed to individual monuments can, and in this case will, prove problematic.²¹ While MAMA VIII offered a broader audience access to the inscriptions at Aphrodisias, the approach to the inscriptions and the quality of the images also imposed limitations that made it difficult to analyse the physical elements of the inscription or to question the proposed texts and restorations.

²¹ For another study of “copy” inscriptions at Aphrodisias Graham 2016.

24.2.3. Living in a digital world: the publication of Column Dedications in I Aph 2007 (I Aph 1.4)

The Inscriptions of Aphrodisias project was a groundbreaking endeavour both for publishing epigraphic materials and employing Epi Doc conventions with XML for marking up the text of an inscription. Its success has inspired a number of significantly larger projects with international scope and collaboration. The approach to the materials is detailed with categories covering physical characteristics, history of discovery and bibliography (which is important given the wealth of superlative scholarship).²² In addition to search functions, the page is more interactive, the texts have been revisited, translations added, as well as commentary with weblinks to parallel texts. The organization of the inscriptions by context allows the reader to view the inscriptions in context and to gain a better understanding of the area's "epigraphic habit" (Fig. 1).

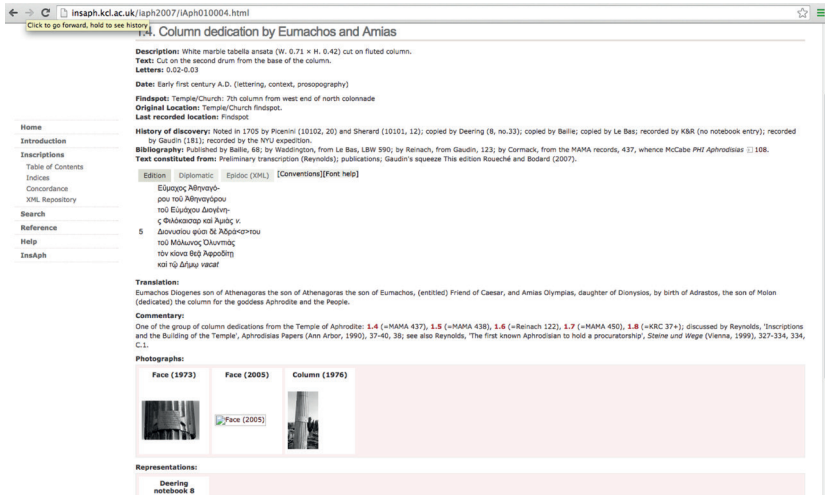


Fig. 24.1. Screenshot of I Aph 4 webpage.

²² It is worth noting that websites, however they develop, will remain supplementary to published scholarship such as J. Reynolds wonderfully detailed *Aphrodisias and Rome* (1982).

In addition to the format of the webpage, a number of images have been published along with a drawing from Deering's notebook from the early 19th century. These resources provide an opportunity not only to view the inscription but to see how it has been studied over time. The dating of the inscription includes a list of the criteria upon which it was based: lettering, context, prosopography, adding a degree of transparency to the dating process. While the lettering is not subject to further description, the inclusion of weblinks to parallel texts allows the viewer to compare and contrast different inscriptions, developing his/her understanding this element.

The published texts of I Aph 1.4 and MAMA 437 present one significant variation: the inclusion of space indicators within the text. This practice allows the reader to see how the use of space relates with the text of the inscription, particularly in the case of line 4, where challenges in the text (misspelling of Ammias and carrying over of a single letter from the previous line), can be observed in the inclusion of a vacat at the end of the line.²³ The indentation on the last line also reveals a left orientation of the line which is more common in Late Republican/Augustan texts at Aphrodisias (e.g. I Aph 1.1, 1.7, 1.8 and 1.38), as opposed to the "justified" approach (indentations on both sides of the text to accentuate a name or word), which is more common in later Imperial inscriptions at Aphrodisias.

MAMA 437

Εὐμαχος Ἀθηναγό-
ρου τοῦ Ἀθηναγόρου
τοῦ Εὐμάχου Διογένη-
ς φιλόκαισαρ καὶ Ἀμιάς
Διονυσίου φύσι δὲ Ἀδρά<σ>του
τοῦ Μόλωνος Ὀλυμπιάς
τὸν κίονα θεᾶ Ἀφροδίτη
καὶ τῶ δήμῳ.

²³ Vacats, more sparingly employed in late Republican and Augustan inscriptions at Aphrodisias, usually serve a grammatical and/or decorative function (e.g. giving distinction to a name or key elements/individuals in the text (cf. building dedications at the Sebasteion I Aph 9.1, 9.25, 9.112). This vacat serves little grammatical function, and is likely to be a result of the arrangement of the text/ omission in Ammias' name.

I Aph 1.4.
 Εὐμαχος Ἀθηναγό-
 ρου τοῦ Ἀθηναγόρου
 τοῦ Εὐμάχου Διογένη-
 ς Φιλόκαισαρ καὶ Ἀμιάς ν.
 Διονυσίου φύσι δὲ Ἀδρά<σ>του
 τοῦ Μόλωνος Ὀλυμπιάς
 τὸν κίονα θεᾶ Ἀφροδίτη
 καὶ τῶ Δήμῳ vacat

High quality images on the website facilitate connections between the published text and the inscription. In the image of I Aph 1.4 (Fig. 2), one can observe how descriptive elements manifest themselves in an inscription: how varying letter sizes (2-3 cm) represent a lack of uniformity and crowding as space becomes more cramped, and how, after the beautifully spaced upper lines (lines 1-3) the carver struggled (line 4) to fit the letters in, possibly noticing his spelling error only when there was extra space at the end of the line.

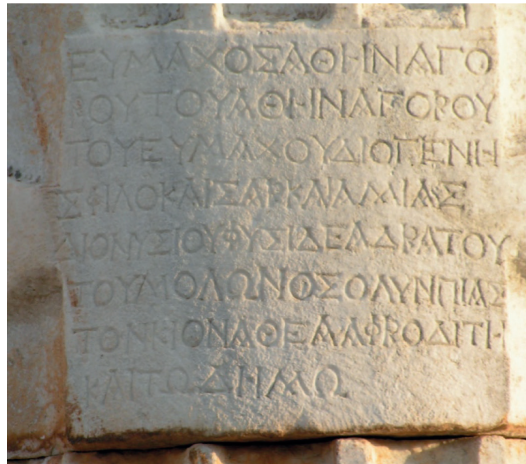


Fig. 24.2. Photograph of I Aph 1.4.

Alongside spelling and the arrangement of the inscription, Letter-forms are more readily observed. Overall, the lettering is less uniform than later Imperial dedications, serifs are small and the strokes are both thick and deeply incised. Letter height varies significantly as does the size of omicrons (though this can be seen in a poorly rendered text throughout the Roman period). Angular forms such as alpha, lambda,

and mu all intersect at the top meeting at sharper angles than the more square versions of these letters that predominate in Imperial (post Augustan) inscriptions.²⁴ Letters also bear stylistic elements of the time: epsilons have a connected middle bar (this is often disconnected in Imperial versions of this letter), the rhos have small legs, making them appear more like their Latin counterpart, and the omicron has an oval shape with serifs only at one end of the lower bars.²⁵ Comparing these letterforms with parallel dedications at the temple (IAph 1.1, 1.2 - Zoilos' dedications, 1.7 and 1.8) reveals many similarities. Letterforms alone are not diagnostic but when combined with other elements, they can add to our understanding of a date.

24.2.4. Looks can be deceiving. When Inscriptions defy our expectations: IAph 1.5 and IAph 1.6

Based on the publication of these inscriptions in MAMA VIII, one could easily come to the conclusion that all the column dedications at the Temple of Aphrodite looked quite similar. However, upon visiting the site of Aphrodisias in the summer of 2004, I was (yet again) to be denied a simplistic interpretation of an inscription. Courtesy of the IAph2007 website, a broader audience can now bear witness to complex nature of these inscriptions. The first disparities between the two inscriptions (IAph 1.4 and IAph 1.5) can be observed in a comparison of letter sizes. IAph 1.4 records letters between 2-3 cm (with a variation of 1 cm), while IAph 1.5 varies only between 2.5- 2.75 cm (a variation of .25cm). The reductions in variation of letter size are part of a general standardization in letterforms during the Julio-Claudian period at Aphrodisias.²⁶ While significant variations in letter size can be observed in poorly executed inscriptions throughout Aphrodisias' history, one may not expect such a significant variation between two "copies".²⁷ The published text of IAph 1.5 also indicates indentations on both sides of the word *demos* in the bottom line. While double indentations are not unknown in Augustan inscriptions at Aphrodisias, they are more common in later Imperial inscriptions.²⁸

²⁴ Compare with Hadrianic Lettering in the next section of the paper.

²⁵ "Legged" rhos are observed primarily in Augustan and Julio-Claudian dedications and also on coins (cf. note 15). This style letterform is increasingly less common after Flavian period at Aphrodisias.

²⁶ These Julio-Claudian texts record little if any variation in the size of letter forms.

²⁷ Graham (2015) illustrates a further case study of "copy" inscriptions at Aphrodisias.

²⁸ Double indentations in an Augustan text are attested (IAph 12.301, dating to 23-25

These discrepancies, which suggest that the two inscriptions may have been less similar in appearance, illustrate the importance of reading the descriptive elements of an inscription carefully.

MAMA 438

Εὐμαχος Ἀθηνα-
γόρου τοῦ Ἀθηναγό-
ρου τοῦ Εὐμάχου Δι-
ογένης φιλόκαισαρ
καὶ Ἀμμιάς Διονυσί-
ου φύσι δὲ Ἀδράστου
τοῦ Μόλωνος Ὀλυμ-
πιάς τὸν κίονα θεᾶ
Ἀφροδίτη καὶ τῶ
δήμῳ.

IAph 1.5.

Εὐμαχος Ἀθηνα-
γόρου τοῦ Ἀθηναγό-
ρου τοῦ Εὐμάχου Δι-
ογένης Φιλόκαισαρ
καὶ Ἀμμιάς Διονυσί-
ου φύσι δὲ Ἀδράστου
τοῦ Μόλωνος Ὀλυμ-
πιάς τὸν κίονα θεᾶ
Ἀφροδίτη καὶ τῶ
vac. Δήμῳ vac.

A high quality image (Fig. 3) illustrates further differences between the appearance of this inscription and the comparative materials from the site (IAph 1.1, 1.2, 1.4, 1.7 and 1.8), revealing regular letterforms (e.g. omicrons are less oval and more precisely rendered throughout) with a clear contrast between slender strokes and large deep triangulate serifs. There are no legged rhos, the middle bars of the epsilons are separated from the stem, and the omegas are circular with two large bars that are heavily serified on both ends (e.g. compare the omega on the bottom line of IAph 1.4 with its counterpart of IAph.1.5).

BC), but the practice is more common in Julio-Claudian dedications (Sebasteion: 9.34, 9.36, 9.37, 9.38, 9.39, The city wall 12.515 (Claudian).



Fig. 24.3. Photograph of IAPH 1.5.

These traits along with others (e.g. letter size and use of spacing noted above) are commonly attributed to late 1st /2nd c. AD inscriptions at Aphrodisias, and are absent from comparative Augustan materials on the site (e.g. IAPH 1.1, 1.2, 1.4, 1.7 and 1.8, including a Julio-Claudian dedication 1.102). Although one must be careful with stylistic factors, especially when archaisms can be used, it is worth noting when a number of features that are attributed to a later period, seem to suddenly emerge nearly a century early.²⁹ Any one of these features, letter variations, stylistic letterforms, use of serifs, indentations in the text, correction of errors in a previous text, would not stand well alone, but taken together, a more compelling case can be made for the reassessment of this inscription's date.

The website records the date of this inscription just like IAPH 1.4: citing "context, lettering and prosopography." For those trying to gain an understanding of letterforms at Aphrodisias, this is somewhat confusing and it is not the only example in which the lettering and organization of the inscription do not match date provided.³⁰

²⁹ Archaising and imitation of earlier lettering is evident in at least one inscription (IAPH 13.116) Reynolds and Erim 1982, 155-166.

³⁰ Honours for Zoilos (IAPH 8.203) is dated by "prosopography" to the 1st c. BC but the letters are square Imperial forms and do not match Zoilos' other dedications (8.1, 1.1, 1.2). Honours for P. and M. Vinicius (IAPH 3.101) are dated as "Augustan" and "Tiberian" by "lettering" though prosopography is known (there is some controversy cf. Reynolds 1982, 175). Stylistic elements (arrangement, spacing and decoration), particularly in M. Vinicius' base, reflect qualities of Claudian-Flavian

The date of the text is not incorrect, insofar as it was originally inscribed at this time and the prosopography as well as the formula of the text support this. However, one struggles to see how the lettering and/or the arrangement of the text corroborate this date. An answer may be found in further examination of the inscription's context and prosopography. In addition to a number of earthquakes, new temenos of the temple was added under the emperor Hadrian, a time during which Athenagoras' descendants were alive and prospering in Aphrodisias.³¹

One benefit of the website is that it facilitates searches for parallel texts in this context and this period. A Hadrianic building dedication from the temple, IPh 1.174 (Fig. 4) reveals similarly rendered letterforms with little variation in size and a number of stylistic similarities: thin strokes with deep triangulate serifs, the omicron with double serif bars, an epsilon with a separated crossbar. Similar observations can be made on a number of Trajanic and Hadrianic texts at Aphrodisias (IPh 4.308, 5.9, 5.208 in the Hadrianic Baths). A theory of later recarving would reconcile a number of disparities in this inscription.



Fig. 24.4. Photograph of IPh 1.174.

This is not to say that IPh 1.5 was definitely a Hadrianic recarving, but to observe that, contrary to what is recorded in the IPh2007 dating criteria of this inscription, the lettering and arrangement of text on the stone do not reflect an inscription that is an obvious contemporary with the other column dedications at the temple. The context and prosopography of the inscription do not rule out a later date

period inscriptions (which is not excluded by prosopographical dates). In both cases, conflicting dating criteria are omitted.

³¹ Smith and Ratté 1995, 43. For an analysis of the temenos plan, see Doruk 1990, 66-74. For Athenagoras descendants, cf. note 17 and Reynolds 1999, 327-334.

and the text, which rectifies issues in both organization and orthography of IAPh 1.4, reflects an inscription that may have responded to an earlier monument.

The entry for IAPh.1.6 represents a different response to a similar problem. It demonstrates that scholars are willing to use letterforms to support a recarving when the case is sufficiently extreme. The text, only mentioned in MAMA VIII as a “copy”, presents a number of irregularities, repeating some errors, correcting others, and making quite a few new ones. Whilst maintaining the first 3 lines of the arrangement in IAPh 1.4, this inscription compounds the error on line 4 by reduplicating two letters in the name Diogenes. Line 5 repeats the misspelling of Ammias, corrects the misspelling of Adrastos (line 6), but creates two new errors in line 7, missing out the nu on Molon and Olynpias, then repeating the column phrase in lines 9- 10.

IAPh 1.6.

Εὐμαχος Ἀθηναγό-
 ρου τοῦ Ἀθηναγόρου
 τοῦ Εὐμάχου Διογε-
 {γέ}νης Φιλόκαισαο καὶ
 Ἀμιᾶς Διονυσίου φύσι
 δὲ Ἀδράστου τοῦ Μό-
 λω<ν>ος Ὀλυ<ν>πιάς τὸν κί-
 ονα θεᾶ Ἀφροδίτη {τὸν}
 {κίονα} καὶ τῶ Δήμῳ

Reading this inscription is even more of a challenge (Fig. 5), one can suffer vertigo as the lines run up and down and the letters run into the margins. There is no use of spaces or decorations to clarify or distinguish sections of the text and there are quite a few inadvertent errors to make it difficult, even to the trained eye. Although the prosopography and context support an earlier date, the entry suggests that this “ineligant” text was “recarved?” The entry does not, however, propose a date or explain why, in this instance, recarving is a viable conclusion. While a methodology is evident in the IAPh2007 dating format, it is not employed consistently or transparently in this case.

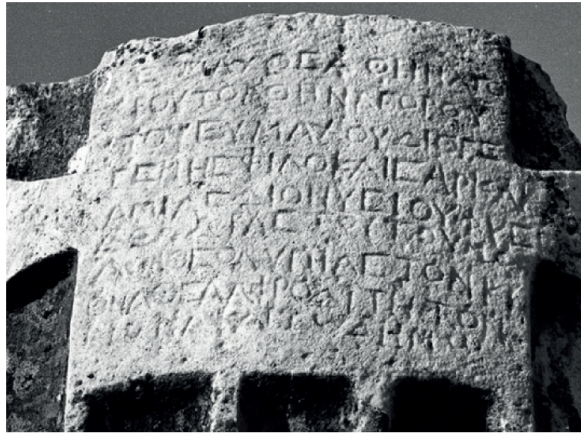


Fig. 24.5. Photograph of I.Aph 1.6.

The inclusion of numerous images proves crucial here, where moss now covers parts of the text that were legible in the 1970's. The lunate omega on the bottom line (barely visibly in the recent photo) along with the lunate sigmas indicate that the inscription is from the late Antique period at Aphrodisias, possibly after an earthquake in 359 BC (for parallels see ALA 29 and 30), before the conversion of the temple into a Christian church (after 450 AD).³² Acknowledging that the text was reinscribed centuries later affords further insight into both the inscription and act of recarving as a process that often changed an inscription but did not necessarily improve it.

³² Roueché and Smith 1996, 41-42.

The three inscriptions betray fundamental differences, which reveal a rich and complicated tale of a column's life at Aphrodisias. While minor differences in the text do not change our translation of the words, a close analysis of the resulting inscription informs our understanding of the arrangement of the text, the potential dating of the inscription, as well as the relationship between text and monument. Recarving was not a highly unusual phenomenon in the ancient world but by minimizing the conflicting elements of these inscriptions, one potentially overlooks this aspect of an inscription.³³

24.2.5. Conclusions on the case study

This survey of column dedications has demonstrated how a series of inscriptions, which were represented as a series of similar texts in MAMA VIII can be seen in a fundamentally different way in IAPh 2007. The digital publication has a number of advantages: it applies a more rigorous approach to the text in XML thus illustrating the arrangement of the inscription more clearly, the date is given some transparency through a list of applied criteria, and the descriptors, such as the lettering size of the inscriptions, provide more information. The images of the inscription in drawings and its context provide an invaluable resource that allow the reader to better understand the relationship between text, inscription and context, including references and better accessibility to parallel inscriptions. In terms of experiencing an inscription in a digital world, this is probably as close as a person can come to assessing the face value of an inscription. It is a tremendous step forward in addressing the longstanding limitations inherent in the publication of epigraphic evidence, though some challenges remain. The final section will consider how we might further use this information, in terms of adding clarity and transparency to the dating process, as well as in our approach to these materials.

³³ Thomas and Witschel 1992, 135-177.

24.3. Palaeography in a digital world: monumental problems & solutions

24.3.1. Digital Epigraphy. New method: new methodology?

For students and academics alike, dating by letter forms is an almost “mystic” practice: something upon which experts often comment but more rarely explain or demonstrate in practice. Recent epigraphic handbooks keep the term palaeography at arms length, using it interchangeably with discussions of letterforms.³⁴ The caution of these scholars is justified and understandable: conclusions based on a single element of an inscription are precarious and, perhaps more importantly, they represent a mode of scholarship that views inscriptions in a fundamentally different way than they were viewed in antiquity. Writing, both ancient and modern, is a product of a number of factors, all of which functioned together in the image of writing (margins, lettering, indentations punctuation).³⁵ As few would look at a document today and say “that’s a fine Helvetica 10 point!,” we should be cautious in an assessment of palaeography that excludes the visual elements which were inextricably linked an inscription’s appearance (e.g. alignment, margins, spacing, punctuation). Modern definitions and studies of manuscripts suggest a broader scope of inquiry, which includes handwriting together with decorations and spatial organization as well as subsequent comments in the margins.³⁶ These practices suggest a discipline with an interest not only in the evolution of lettering but in the appearance and development of a culture of writing.

While traditional text-based modes of publication such as MAMA VIII have, at times, constrained the study of hands to an analysis of lettering, digital corpora offer new opportunities to view, analyse and incorporate broader scope of visual elements in the interpretation of an inscription. This is not to say that the traditional methods or charts of letterforms development should be abandoned, merely that

³⁴ In the index (Bruun and Edmondson 2015, 880) “palaeography” is cross-referenced with “Letter forms” and though used by O. Salomies (chapter 9), the word is not defined in the preceding chapters (Bruun and Edmondson 2015, 155). Letterforms are described generally with charts of figure numbers rather than images to directly illustrate changing styles (Bruun and Edmondson 2015, 123-4). Cooley’s manual offers a more detailed assessment of lettering with case studies to illustrate the limitations of using lettering (Cooley 2012, 423-33).

³⁵ Woolf 1996, 25-27, Bodel 2001, 3-5, Cooley 2012, 433-437; Panciera 2012, 1-10.

³⁶ Buonocore 2015, 21-37.

the methodology could be expanded, as it has been in this case study, to include aspects of textual organization (spacing, use of decoration and punctuation, letter size). The question arises: how do we achieve this through the website materials?

24.3.2. Employing change: how we might improve presentation of materials on the website

One difficulty of the current site, observed in the assessment of I Aph 1.5 is that despite the clear criteria for dating, the terms do not reflect a consistent methodology in dating, or the contradictions in the process. This is dangerous for those who simply accept the dates provided, and confusing for those who try to apply or develop a sense of letterform development. When a recarving is suggested I Aph 1.6, there is little to explain how we know it was recarved (letterforms) or when the recarving took place (use of parallel texts), though both resources are available on the website. The wealth of visual, textual and contextual information in I Aph 2007, offers an opportunity, not only clarify, but to add greater transparency to the process of dating and how lettering is used in an inscription. This could be achieved by adding a few pages to explain and illustrate elements dating criteria (each with a significant *Caveat Lector* on the use of these elements). Firstly, one could add a page outlining the dating criteria, providing a brief description of each (e.g. context, lettering and prosopography) together with a sample case study (or two) of how these factors are applied in an inscription.

Further improvements, could be made with additional pages on lettering and context. While lettering is undoubtedly employed in dating inscriptions at Aphrodisias, one must also consider how this dating is represented in the published materials. Epigraphers, who have described monumental lettering as ‘Augustan’, ‘distinctively Julio-Claudian’ or ‘Domitianic’ have already acknowledged that such distinctions exist at Aphrodisias, but the classifications remain undefined.³⁷ While such definitions are often problematic, so is a situation in which a broader audience accepts and uses a series of dates, without understanding how certain criteria have been used in formulating a date.

³⁷ Studies of inscriptions describe lettering as “distinctively Julio-Claudian” (Reynolds and Erim 1982, nos. 2&3, 317-318), “Triumviral or Augustan” (Reynolds and Erim 1982, docs. 35-37, 159-163), and ‘Domitianic’ (Chaniotis 2004, no. 14), suggest that such distinctions are evident at Aphrodisias.

Undertaking a detailed palaeography for a site is a massive endeavor, and one that can prove contentious on a number of levels. However, a page about lettering (together with aforementioned element of textual organization) could be added with brief descriptions of trends (periods of ca. 60-70 years) and references to a few inscriptions as illustrations. This could be supported by a single case study, such as this one, to show how these elements are used as well as how they can be problematic.

Finally, while inscriptions are given a good deal of context in IPh 2007, the epigraphic information remains separated from the archaeological studies. Both of these are factors in the dating process and, as we observed in IPh 1.5 and 1.6 can often facilitate the study of an inscription, both in reconciling discrepancies and searching for parallel inscriptions. With inscriptions grouped by context and an excavation history that is referenced (but not explained) it might be helpful to have a brief building history for each context. In the case of Aphrodisias, these materials and further bibliographies are available on NYU excavation websites and could be easily connected with weblinks.³⁸

The benefits and the challenges observed in the IPh 2007 digital publication are applicable to a number of digital resources. As we attempt to bring corpora of unprecedented size to a digital realm, we must consider not only how we represent this information but how we engage a wider readership in epigraphic materials. It would not take a great deal of work to augment the scope of IPh 2007 from an academic resource into one that also achieves a didactic aim of illustrating how we use different elements of an inscription (including letter forms) to suggest a date for an inscription. The point is not necessarily to establish a firm date, but to provide greater transparency to process by which we formulate dates. We have the potential now, to present inscriptions at face value, not only as texts but as contradictory objects whose stories, whether conveyed on stone or a computer app, are subject to the same conventions, complexities and imperfections as the humans who created them.

³⁸ NYU website. <http://www.nyu.edu/projects/aphrodisias/home.ti.htm>. Recent excavation reports are reference here as well: <http://www.nyu.edu/gsas/dept/fineart/academics/aphrodisias/aphrodisias.htm>.

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25. Deixis and Frames of Reference in Dedicatory Epigrams. The use of a database with an interdisciplinary approach

*Flavia Licciardello**

Abstract

This paper presents an example of a database designed to combine epigraphic, linguistic and philological data. This database is part of my project on a study of deictic expressions in dedicatory inscribed and literary epigrams. It includes the results of the analysis of around 600 dedicatory epigrams and it will be used to extract information on trends and recurrent patterns in the genre.

Keywords: Greek epigram, dedication, database, deixis, Hellenistic age

25.1. Introduction

For a long time, the study of the Greek epigrams has maintained a clear distinction between ‘epigraphic’ and ‘literary’ epigrams. This distinction, however, fails to understand the complexity and the development of this poetic genre. Only in very recent years have scholars started to highlight properly the important relationship between Hellenistic ‘literary’ epigrams and epigraphic models.¹

My PhD project follows this new exegetic line and contributes to our understanding of the inscriptional component of the Hellenistic epigram.²

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¹ The shift in the attitude towards the history of the epigrammatic genre is well resumed by in Garulli 2012, 5-34. For other works, which consider the importance of the dialogue between ‘epigraphic’ and ‘literary’ epigrams, see e.g. Meyer 2005, Tueller 2008. On archaic and classical epigrams, see Baumbach et al., 2010. Further bibliography in Baumbach et al., 2010, 2.

² The project is developed within the frame of the C-1 group (‘Deixis and frame of reference’) of the Excellence Cluster TOPOI.

In particular, I focus on the use of deictic expressions in dedicatory epigrams, i.e. on the use of all those linguistic elements whose meaning and interpretation depend on the spatial and temporal context where they are uttered.³ The corpus analysed includes inscribed epigrams from the archaic epoch until the end of the 4th century BC, and the Hellenistic epigrams transmitted in the Greek Anthology or on papyrus. The reference editions used are Hansen 1983, 1-2 for inscribed epigrams and Gow and Page 1965 and Austin et al. 2002 for 'literary epigrams'.⁴

In order to deal with this heterogeneous material, I developed a database to register and organise the data obtained from the analysis of the texts. The specific aim of this database is the registration of all relevant linguistic features related to spatial, personal and temporal deixis. In addition to this, I put on record for each epigram other more generic elements, which are related to the dedicatory context, to the linguistic facies and, especially in the case of inscribed epigrams, to the historical and archaeological context. In this way, on the one hand, I can obtain a global picture of the whole corpus, which includes data found both in inscribed and literary epigrams. At the same time, I can keep and easily retrieve all the peculiar features related to each specific text in order to be able to deal with the material properly, without losing sight of their specificity. The possibility of managing at the same time these two levels – the whole corpus and the single text – is extremely valuable. In this regard, the database provides an essential support, since it helps work with complex material on those different levels that must be considered together, but are usually difficult to keep in focus at the same time.

25.2. Greek dedicatory epigrams and the role of deixis

In the Ancient Greek world it was customary to accompany a dedication to the gods with a – usually – short inscription. This was normally chiselled on the dedicated object (or on its support) and it recorded the main information related to the offering. The elements

³ For an overview of the concept of deixis see Diessel (2012, with further bibliography). On deixis in Ancient Greek see e.g. Felson 2004, Edmunds 2008 and Bonifazi, 2014.

⁴ For convenience, I will later on refer to this second group as 'literary epigrams'. The definition simply identifies those epigrams that are transmitted in the Greek Anthology or on papyrus and does not imply any value judgment.

recurring in such inscriptions were the name of the dedicator, the verb of dedication and the name of the god receiving the dedication.⁵ The most common and widespread formula for dedications contained exactly these three elements: ὁ δεῖνα ἀνέθηκε τῷ θεῷ. A frequent variation was ὁ δεῖνά με ἀνέθηκε τῷ θεῷ,⁶ where the speaker is the object itself, as is clear from the employment of the personal pronoun με. It is interesting to note that since their first examples the speaking object was a recurring feature in dedicatory epigrams and it is still frequent in the 4th century BC.⁷ Clearly, the basic scheme here presented could be varied by omitting some elements (as the name of the dedicator) or adding others (as the generic name of the object, like the recurrent ἄγαλμα).

A crucial moment in the evolution of the epigrammatic genre is the beginning of the Hellenistic era, when the genre becomes more and more popular and epigrams started to be circulated autonomously, no longer limited to one inscription alone.⁸ This development led to the composition of literary epigrams not intended for inscription, but which in some way maintained the illusion of a material inscription on a stone. The Hellenistic epigrammatists who worked with inscriptional type of epigrams (and among these dedicatory epigrams) retained the structure, style and traditions of the epigraphic models, yet the translation of these into a book context inevitably means that the communicative strategies employed until then had to be reinvented. The primary reason for such changes is self-evident: the monument intended for inscription and the space surrounding it do not exist anymore – they have to be imagined in the reader's mind.⁹

⁵ On archaic dedications, see Day 2010, spec. 1-14 for an introduction to the genre.

⁶ The formula here presented (with its two variants) was identified by Maria Letizia Lazzarini, in her study on the formulas of archaic dedications (Lazzarini 1976, 58-60). Her analysis is based on both verse and prose inscriptions from the archaic age. However, such basic scheme, with these elements, was normal in epigrams as well and it remained substantially unchanged in classical and post-classical time.

⁷ On the topos of the speaking object, see Burzachechi 1962, Svenbro 1988, 36-52, Tueller 2008, 16-27, Furley 2010, 151-166, Wachter 2010, 250-260, Christian 2015, 29-107.

⁸ This trend may be linked to the custom prevalent in the 5th and 4th century BC to copy epigrams on monuments and then quote them in various texts. See Gutzwiller 1998, 47ff.

⁹ This involvement of the reader can be put in relation with what Bing 1995 defines *Ergänzungsspiel*, i.e. with the process of supplementation of the text deliberately incited by Hellenistic epigrammatists.

This process of reinvention is particularly evident in dedicatory epigrams, which were traditionally chiselled on the dedicated object itself. In this case, the loss of the original context forces the author to re-elaborate traditional models, by adding some elements (e.g. the specific name of the dedicated object) that cannot be retrieved from the surrounding setting.

From a linguistic point of view, this re-elaboration has an impact in the texts on deictic expressions, which were typically used in inscriptions to lead the gaze of the reader towards the dedicated object. In this epigraphic context the deictic expressions point to something in front of reader's eyes (*deixis ad oculos*), whereas in a literary context the readers will have to imagine in their mind the invisible referents of deictic expressions (*deixis am Phantasma*).¹⁰ If on the one hand this change requires a particular attention to the verbal reconstruction of the setting, on the other hand, the loss of the material context allows the poet to play with different and new points of view and frames of reference.

The analysis of deictic expressions can help determine the deictic centre in dedicatory epigrams. The deictic centre, which normally coincides with the origin of the utterance, works as a point of reference for all deictic markers and expression.¹¹ In the case of dedicatory epigrams on stone, the deictic centre in spatial terms is generally understood to be in the place of the inscription itself, which in most cases is the dedicated object. In other words, for all deictic expressions that point to something close (such as the proximal *ὄδε* 'this here')¹² the occasional reader will look for the referents in the space close to the inscription. In the evolution of the epigrammatic genre, the loss of the material context produces an important change, since the strong relation that connects the text with its object starts to fade. In other words, when the epigram is found in a book, the point of reference — or deictic centre — is not immediately clear to the reader, since it is not immediately clear the relation of the text with the spatial setting to which it refers. This means that the deictic centre is somehow released from its traditional

¹⁰ The difference between *deixis ad oculos* and *deixis am Phantasma* was highlighted and described for the first time by Bühler in 1934, see Bühler 1982, 121-126, 133-135.

¹¹ See Bühler 1982, 102f. and Levinson 1983, 63f..

¹² 'Proximal' deictic elements are all those elements that refers to something that is close to the deictic centre: among these demonstrative pronouns or adverbs such as 'this' or 'here' and temporal adverbs such as 'now'. See Diessel 2012, 2408f.

location on the object and the poet is free to consider and bring to the text new, different points of view.

This progressive detachment of the text from its original physical location played a crucial role in the process that led, out of trivial verse inscriptions, to the emergence of the epigram as a full literary genre. Deictic expressions were traditionally employed in epigraphic contexts to strictly and clearly bind the text to its material support. Later on, only the possibility of the separation from a unique location allows the epigram to be circulated autonomously and reach a wider audience. In this passage, poets explore new uses of deictic markers in order to widen the possible references of their text.

My research will try to detect different trends in the use of deictic expressions in order to highlight the similarities and parallelisms between inscribed and literary epigrams and to elucidate the different deictic strategies employed in different contexts.

25.3. The database

In the first step of my research, the analysis of the texts is followed by the registration into a database of all the relevant data related to spatial, personal and temporal deixis. This database is conceived first of all as a tool to organise the data and make them available for the next steps of the research.

The corpus of epigrams analysed includes dedicatory verse-inscriptions collected in Hansen's *Carmina Epigraphica Graeca* [CEG 1-2], as for epigrams on stone. In this case, I selected those epigrams included by Hansen in the section "Tituli dedicatorii". For literary epigrams, I followed Gow's and Page's edition (Gow and Page 1965), to which I added the epigrams attributed to Posidippus and edited by Austin and Bastianini (Austin et al. 2002). In this case, the selection was made according to the contents of the epigrams and I selected all those epigrams that have a clear dedicatory frame.

The structure of the database was designed to include all important data related to the text examined, in order to have for each epigram a complete profile, which includes linguistic, literary, historical and archaeological aspects.¹³ The data were organised in various tables, which are all interconnected (See Fig. 1).

¹³ The software used is FileMaker Pro 13.0v4.

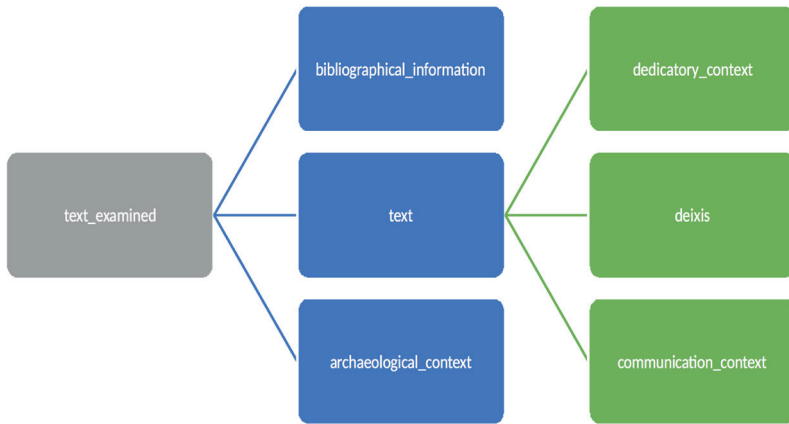


Fig. 25.1. Default.

Alongside bibliographical and historical-archaeological information, the database records the data obtained by a first analysis of deictic forms and linguistic features of the epigram, such as verbal tenses, occurrences of demonstrative and personal pronouns (deixis); speaking subject and addressee (communicative_context); verb of dedication, standard name of the dedicated object (dedicatory_context). Such a structure offers a balance between the need to record a detailed picture for each epigram analysed and the possibility of conducting research on single features within the whole corpus. Since each table contains a restricted amount of data (divided into coherent sections), it is easy to get a simple, clear picture of the recurrence of one specific feature (and its interconnection with other related aspects) within the corpus and to leave out information that is not immediately consistent with the research done. However, the fact that all the tables are interconnected enables the user to formulate queries that combine fields contained in different tables. In this way, for example, it is possible to look for the recurrence of a specific tense for the verb of dedication (in the table 'deixis') and to see if this is associated with the use of a specific verb of dedication (in the table 'dedicatory_context') or with a particular epoch (in the table 'archeological_context').

25.4. An example: the present tense in dedicatory epigrams

The verbal tenses can work as temporal deictic markers and can play an important role in the definition of the temporal frame.¹⁴ In particular, the present tense usually decodes the present time, which is the time of the deictic centre ('now'). Since the deictic centre operates as a point of reference for the spatial and temporal orientation, individuating the deictic centre helps determine the frame of reference of the epigram. This could lie, for example, in the act of dedication celebrated, in the moment of the composition by the poet or in the moment of reading.¹⁵

In the definition of the deictic centre in dedicatory epigrams, the analysis of the verb of dedication is particularly relevant, since this makes clear the relation of the text to the dedicatory act, which is the main piece of information of the epigram. The most common dedicatory formula presents the verb in the indicative aorist (with augment). Leaving aside the formulaic aorist and those cases where the verb is not expressed or lost, we find in the corpus analysed a significant number of cases where the verb that expresses the dedication is in the indicative present.¹⁶

As for the 41 occurrences of verbs of dedication in the indicative present, a clear distinction can be observed between epigrams on stone and epigrams with a literary tradition. In the first group, the present form is much more sporadic. Out of 422 epigrams analysed, we find only 5 clear examples, from different epochs and geographical areas: [CEG 192i] (Athens, ca. 520? BC ἀνακεῖμα[ι]), [CEG 302] (Attica, found

¹⁴ Though the grammatical category of tense does not always coincide with the semantic category of time, it is still possible to retrace in the use of a peculiar verbal form a reference to time. However, such analysis must always consider other linguistic elements, which contribute determine the temporal frame of the text. On temporal deixis and verbal tense see Lyons 1977, 677-690; Levinson 1983, 73-79; Klein 1994, 14-26 and 120-130. For the analysis of temporal deixis in Ancient Greek texts see e.g. D'Alessio 2004 and Edmunds 2008, 8f. (with further bibliography).

¹⁵ On the relation between the temporal frame of the utterance and the deictic centre, see Levinson 1983, 79f. and D'Alessio 2004.

¹⁶ More specifically, out of a corpus of 598 epigrams analysed, for the verb of dedication the aorist appears 379 times, the present 50 times. In 172 epigrams the verb is lost or absent. Moreover, some epigrams contains more then one verb of dedication and these could be expressed in different aspects and moods.

in Ptoion, ca. 540? BC v. 1 εἰμί)¹⁷ [CEG 251] (Athens, ca. 500-480? BC v.1 εἰμί), [CEG 390] (Apollonia Illyrica, found in Olympia, ca. 450-440? BC v.1 ἀνακέιμεθα), [CEG 822] (Geronthrai, 4th cent.? BC v.1 ἀνάκειται).¹⁸ In all these cases, the grammatical subject of the verb is the dedicated object. The use of the present form refers therefore to the present of the object, which, since the dedication, is for the time being in the place of the dedication. As is also clear from the fact that in most of these cases the object is the speaker, the use of the present verb indicates that the deictic centre is the dedicated object. It is also interesting to notice that most of the aforementioned epigrams contain a second verb of dedication, in the formulaic aorist form.¹⁹

For Hellenistic epigrams of literary tradition, the picture is different. First, the occurrence of dedicatory verbs in indicative present is less sporadic. Out of 176 epigrams analysed, the present form appears in 33 epigrams. In some of these cases, the situation is similar to that found in dedications on stone: the subject of the present verb is the dedicated object, which lies in the temporal deictic centre.²⁰ An important innovation is the fact that in some epigrams the subject of the verb of dedication in present form is the dedicator. The present verb refers therefore to the present time of the act of dedication accomplished by the dedicator. This means that the deictic centre is anchored now to the moment of the dedication, when the dedicator is obviously present. More evidently, in [Leon. AP VI 288 (HE 2213-2222)] and [Phan. AP VI 299 (HE 2994-3001)], the dedicator is the speaker and consequently the very deictic centre. Another interesting case is found in [Call. AP XIII 7 (HE 1129-1134)] and [Diosc. AP VI 220 (HE 1539-1554)]. In these two epigrams the dedicator, who speaks in the first person, pronounces the dedicatory formula, and this is reported by the epigram as a direct discourse. Such examples indicate that in the development of the Hellenistic epigram the frames of reference multiply.

¹⁷ For the verb εἰμί in dedicatory formulas, see Lazzarini 1976, 59f.

¹⁸ In addition to these, in [CEG 347] and [CEG 775i], the verbs ἀνακέιμεθα and κοσ]μοῦμεν respectively are supplied. In [CEG 830ii] the verb ἀνάκειται refers to another dedication, not to the one celebrated by the epigram.

¹⁹ The exceptions are [CEG 822] and the fragmentary [CEG 192i].

²⁰ However, as opposed to the examples found in dedications on stone, the object is rarely the speaker. It is also interesting to note that the formulaic ἀνάκειμαι is frequently substituted by the simple form κείμαι. Similarly, in literary epigrams the simple τίθημι is preferred to ἀνατίθημι, which is traditional in epigraphic examples.

The authors explore new point of views, not anymore tied only to the dedicated object.

These figures, which obviously require more in-depth analysis, are an interesting sign of the transformation and development of the epigrammatic genre in the Hellenistic epoch. Though the poets still move along the path of the epigraphic tradition, they include new elements in their celebration of the dedicatory act. Elements already employed from the beginning of the epigrammatic genre are retrieved and renewed, by combining them with new perspectives.

25.5. Conclusion

The database presented here is designed to be a helpful tool in the study of heterogeneous material. This tool will allow us to apply an interdisciplinary approach, which combines epigraphic, linguistic and philological strategies. It not only helps to manage a large quantity of data, it also organises the results of the analysis on the texts in a practical way. The coherent organisation of the data into a database has two clear advantages. On the one hand, the database provides an overview of the whole corpus. This could be used, for example, to detect easily specific trends and recurring elements in the corpus, or to consult and combine the data from different points of view. On the other hand, it is possible to retrieve rapidly the data connected to each specific text. This comprehensive look, on the whole as well as in the particular, would be difficult to obtain otherwise and it makes the database a fundamental tool for dealing with complex materials and applying different levels of analysis. It is important to stress that this database aims to enable many possible, different types of research. The structure is not based on a single, pre-fixed hypothesis of investigation, but is built so as to let the user interrogate the data in different ways, without defining a priori the direction of research. Moreover, the database is a dynamic tool and suitable for further and continual additions. This feature is particularly valuable in the field of the epigrammatic poetry, where continual discoveries of new material (on stone, but also on papyrus) require us to enlarge and re-work the corpora constantly. In this regard, the database presented here is not only a response to the recent need, in the specific field of epigrammatic studies, to create corpora that combine epigraphic and 'literary' materials, it is also open to future additions and new research.

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PART V

PANELS

1. Assessing the Role of Digital Libraries of Squeezes in Epigraphic Studies.

Digitization, visualization, and metadata

*Eleni Bozia**

Keywords: Squeezes, Online Libraries, 3D Visualizations, Contextuality

1.1. Description

This panel discussed issues and research questions regarding the use and efficiency of digital libraries of squeezes of inscriptions—structure of online libraries, nature of the metadata, 3D digitization, and visualization methods. The panel that consisted of epigraphists, digital epigraphists, and computer engineers engaged in a dialogue, addressing the above issues from different perspectives.

Digital libraries of squeezes have become an integral part in epigraphic studies and research. Whether it is the issue of collecting data for more efficient use, increasing their accessibility, or simply digitally preserving them, digital libraries are a new scholarly medium. Such projects confront the challenge of having to determine the types of data that should be included—traditional information, digital metadata, formats and tools for articulating all the specificities of the metadata—as well as decide whether the type of the project should predetermine the ontology of the data.

The aforementioned primary issue begs also the question of the need for interoperability of e-libraries in an attempt to combine, contrast, and comparatively appraise and study the artifacts themselves and their metadata. Thus far several projects, including but not limited to the EAGLE consortium, the Center for Epigraphical and Palaeographical Studies, the Aleshire Collection at the University of California, Berkeley, and the US Epigraphy Project among others feature

digital libraries of squeezes; however, how should one proceed about perusing them? Issues that need to be addressed include: whether their use would be facilitated by means of homogeneity of the libraries, or whether the variegated nature of the material could potentially increase the number of users and the amount of information that is available.

However, one should consider the limitations of e-libraries that focus solely on squeezes. When discussing the nature of the digital libraries' content and the implication that the metadata may have in the interpretation of a squeeze, we need to consider its contextuality—whether the absence of the inscription bearer from a squeeze's record may prove reductive with regards to the holistic approach to the text. However, notwithstanding that high-resolution digitization of squeezes opens the possibilities for enhanced study on a level that until now could not be achieved, techniques that focus solely on the digitization of the squeezes usually fail to deal with the inscription bearer. Furthermore, there are other types of data—geo-spatial, prosopographic, linguistic—that would not only enhance our understanding of any one particular squeeze, but also contribute to our overall apprehension of classical, archeological, and epigraphic studies. This panel discussed how the digital records of squeezes could be augmented to encapsulate their contextual information.

Questions that were addressed:

1. How to preserve the traditional nature of the data—specificity, terminology—while retaining the possibility of keyword search?
2. Have we started thinking/searching/researching differently. Is it the database that determines the type of research that one conducts?
3. Do we create authenticity via our digitization selections? In turn does this mean that we validate?
4. How can computer scientists and humanists communicate to find a common point of reference between creating efficient algorithms and databases while retaining the nature of epigraphic and archaeological studies?
5. TEI has created a common form of expression and advanced the homogeneity of data. Could we proceed with a similar trajectory for other forms of data?
6. Would such a scenario also resolve the issue of contextuality. One database need not be an artifact's concordance, but interlinked

databases could preserve their individuality while advancing search possibilities?

7. What are other aspects of the artifact (inscription bearer etc.) that could enhance the record of the squeeze?
8. What kind of information would produce a more holistic record for the squeezes.

Eleni Bozia gave a brief introduction to the history of online databases of squeezes. She presented the type of data and metadata that they favor and proceeded to furnish the problems that surface when research groups do not opt for interlinked databases or structure the metadata according to the tools available, rather than according to the research needs and the nature of the database. Prof. Bozia also argued in favor of flexibility of databases and projects with the intent to consider the needs of each database rather than favor an existing ontological structure that restricts the content, and contextuality of the database, thus limiting its effectiveness. Adeline Levivier presented the collaboration between Université Lyon 2, UMR HiSoMA & Ecole française d'Athènes and the Digital Epigraphy and Archaeology Project at the University of Florida. The project involves the digitization of approximately 9000 squeezes in 3D as well as the creation of an online library with metadata of the collection. The squeezes date from Archaic Greek period to the Roman Imperial era and originate from Delos, Thasos, Delphi, and Asia Minor. The group pursues dematerialization for long-term preservation, remote consultation of data, standardization for interoperability with other resources related to cultural heritage and digital epigraphy, and creation of a new resource for research: a big data corpus to be queried by advanced systems. Issues of selection were brought forward—how do research groups make choices—as well as the usability of 3D models of squeezes that give the option of advanced visual manipulations and automatic measurements. The major matter in question that the group intends to address in this project is the need to create a database that fits the researcher's needs instead of merely reusing existing expertise and ontology.

Manuel Sánchez and Jose Pablo Suárez-Rivero advanced the discussion by presenting options for the enhancement of the digital libraries of squeezes. They presented their project titled *Epigraphia 3D* in which they perform 3D digitization of the entire artifact/inscription bearer. This admittedly provides a more holistic record of the squeeze

and a context for the inscription itself. Profs. Sánchez and Suárez-Rivero presented their methodology that employs photogrammetry, their results, and their online database with the artifacts. An issue that was brought forward is how one can combine within the same project a detailed 3D digitization of the letters of the inscription/squeeze as well as a large-scale artifact/inscription bearer. The advantages, however, of a more complete record of the artifact and the squeeze became apparent.

Finally, Angelos Barmpoutis concluded the panel with a discussion on the Digital Epigraphy Project and its metadata perspective, arguing in favor of a collected record as well as the flexibility to incorporate fields and metadata particularities as needed in its case. He discussed the need to treat both the physical squeeze as well as the digital artifact as objects that require metadata. He presented the sandbox upon which the Digital Epigraphy project functions with regards to the addition of metadata information. Prof. Barmpoutis also discussed the significance of considering every user's unique perspective should one wishes to increase the usability and importance of their research database.

In conclusion, the panel discussed theoretical issues that derive from the exigency to communicate and consider the advancements of technology alongside the needs of traditional research and presented current projects, databases, and actual case scenaria that deal with such issues. The intent of this multifarious cohort of scholars was to emphasize the importance of transdisciplinary collaboration and the pivotal role of the individual researcher/user. The panel considered ways to utilize traditional knowledge with the advantageous flexibility of digital tools that will ultimately not only facilitate, but also ultimately enhance epigraphic studies.

1.2. Panelists

Michèle Brunet *Université Lyon 2, UMR HiSoMA & Ecole française d'Athènes* Email: Michèle.Brunet@univ-lyon2.fr Prof. Brunet has been the Chair of Greek and Latin Epigraphy at the Université Louis Lumière Lyon 2 since 2006. She has been a member of l'École Normale Supérieure de Paris (1979-1984) and l'École française d'Athènes (1984-1988).
Adeline Levivier *Université Lyon 2, UMR HiSoMA & Ecole française d'Athènes* Email: adeline.levivier@gmail.com Adeline is a doctoral candidate in l'École française d'Athènes - Université Lyon 2. She works

on the digitization of squeezes. She collaborated on the project ANR E-pigramme (Épigraphie et Muséographie - Édition numérique et valorisation de la Collection des inscriptions grecques du Musée du Louvre). She is currently the program manager of the project E-stampages (Numérisation et diffusion web en 3D des collections de l'UMR 5189 HiSoMA et de l'École française d'Athènes).

Manuel Ramírez Sánchez *Universidad de Las Palmas de Gran Canaria*
Email: manuel.ramirez@ulpgc.es Prof. Sánchez is a Professor of Historiographic Sciences and Techniques at the Department of Historical Sciences. He works on the 3D digitization and advanced visualizations of inscriptions and has published extensively in the area of inscriptions from Ancient Hispania.

Jose-Pablo Suárez-Rivero *Universidad de Las Palmas de Gran Canaria*
Email: Josepablo.suarez@ulpgc.es Prof. Suárez-Rivero is the Director of Política Informática at the Cartography and Graphic Engineering Department. He has a Ph.D. in Applied Mathematics and works on mesh generation, algorithms and data structures, and computational geometry.

Angelos Barmpoutis *University of Florida* Email: angelos@digitalworlds.ufl.edu Prof. Barmpoutis is an Associate Professor in the On-line Institute and the Digital Worlds Institute at the University of Florida. He is also the coordinator of research and technology at the Institute and affiliate faculty at the Computer Science and Engineering Department. His research focuses on interdisciplinary applications of computer science to the service of broad areas of learning and training.

2. EAGLE Featured Panel

*Vittore Casarosa**

Keywords: epigraphic database, 3D epigraphy, storytelling, virtual epigraphic exhibitions, mobile application, image recognition

2.1. Description

The EAGLE project is really a multidisciplinary project, which can be looked at from three different perspectives, each one with many different facets.

- The epigraphy dimension, (inscriptions, transcriptions, critical editions, translations, historical context, geographical context, materials)
- The technology dimension (data model, data aggregation, search engine, 3D representations, disambiguation, image recognition)
- The application dimension (mobile application, storytelling, virtual reality, epigraphy in schools)

In this panel, we will touch on some of those facets, focussing more on the ones that are not going to be presented during the conference. Our aim is to stimulate some discussion and exchange of ideas, to try and understand what we have missed, what could have been done better, and what you (the audience) see as the strong points of EAGLE.

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2.2. Panelists

Anita Rocco *University of Padova and IDEA (International Digital Epigraphy Association), Email: anitarocco74@gmail.com.* Anita Rocco is an archaeologist and an epigraphist specialised in late antique and early Christian studies, with a Licentiate degree at Pontificio Istituto di Archeologia Cristiana and a PhD in Post Classical and Early Medieval Culture. After a period at the University of Bari as a Research Fellow, she is currently Adjunct Professor of Christian Archeology at the University of Padova. She has participated in several archaeological excavations in Apulia and in Rome and has gained solid experience in digital epigraphy working, since graduation, at the Epigraphic Database Bari as compiler, editor and administrator. In the epigraphic field, she studies the executive technique of the inscriptions from catacombs of Rome and deals with the close interconnection between epigraphical and archaeological data.

Valentina Vassallo *Science and Technology in Archaeology Research Center (STARC) of the Cyprus Institute, Email: v.vassallo@cyi.ac.cy.* Valentina Vassallo is a Research Assistant STARC, in the field of Digital Libraries. She is also a PhD candidate in Classical Archaeology at Lund University (Sweden) and in Science and Technology in Cultural Heritage at The Cyprus Institute (Cyprus). Her interest is the definition of a knowledge communication framework for data management and communication process of digital cultural heritage assets through new ways of reasoning with information technologies and metadata.

Andrea Mannocci *Knowledge Media Institute (KMI) of the Open University of Milton Keynes, UK, Email: andrea.mannocci@isti.cnr.it.* Andrea Mannocci holds a PhD in Ingegneria dell'informazione (Information Engineering) from the University of Pisa, a BSc and an MSc in Computer Science Engineering from the University of Pisa and a MSc in Telematic Engineering from the University of Carlos III of Madrid. Andrea Mannocci is presently a Research Associate at KMI, as a member of the Data Science Group, working on machine learning applied to scholarly big data and research analytics. Previously he has worked as a Research Assistant at ISTI-CNR in Pisa, focusing on the design and development of data infrastructures and data engineering solutions in support of research communities.

Francesco Mambrini, *Deutsches Archäologisches Institut (Berlin) and the Humboldt Chair for Digital Humanities at the University of Leipzig, Email:*

f.mambrini@gmail.com. Francesco Mambrini obtained his PhD in Classical Philology at the University of Trento (Italy) and EHESS (Paris) and is presently a Research Assistant at DAI. His main research interest lies in computational tools and methods for the study of the Ancient Greek language and literature. He has cooperated with a number of leading digital projects for the ancient languages, including the Ancient Greek and Latin Dependency Treebank and the Index Thomisticus Treebank. He is one of the founders of the bi-annual conference “Corpus-based Research in the Humanities”.

Giuseppe Amato *Institute for Science and Technology of Information of the Italian National Research Council (ISTI-CNR), Email: giuseppe.amato@isti.cnr.it*. Giuseppe Amato graduated in Computer Science at the University of Pisa, Italy, in 1992 and was awarded a PhD in Computer Science at the University of Dortmund, Germany, in 2002. Since 1994 he is a member of the research staff at ISTI-CNR in Pisa, working in the area of Multimedia Information Systems. He is the leader of the Multimedia Information Retrieval research group of the Networked Multimedia Information Systems laboratory at ISTI-CNR. His main research interests are content-based retrieval of multimedia documents, access methods for similarity search of multimedia documents, smart camera networks.

Pietro Liuzzo *Hiob Ludolf Centre of Ethiopian Studies at University of Hamburg, Email: pietro.liuzzo@gmail.com*. Pietro Liuzzo holds a PhD in Ancient History from the University of Bologna and presently is the technical lead of the project Beta maṣāḥəft: Manuscripts of Ethiopia and Eritrea (Schriftkultur des christlichen Äthiopiens: eine multimediale Forschungsumgebung). He was previously associated with the University of Heidelberg, where he participated in the EAGLE project. He is also a counsellor of the International Association for Digital Epigraphy.

Luca Giberti *director, producer, and cinematographer. Email: lucagiberti@gedproductions.co.uk*. After graduating in Physics at Genoa University and at Oxford University, he apprenticed under Abbas Kiarostami and Marco Bellocchio. His theatre shows have been performed in many venues worldwide – including the Piccolo in Milan, the Oxford Playhouse, the Teatro Stabile in Genoa, the Edinburgh Fringe. He has won prizes as a director, as a screenwriter, as a cinematographer, as a video artist, including accolades from the Italian Academy of Arts

in Rome (Accademia Nazionale di San Luca) and from several film festivals (Berlinale Talents, Venice Biennale Cinema, et al.). For two years he was also full-time producer-director for the Italian Council for the Physics of Matter (INFN), responsible for the media output in its entirety – comprising short documentaries and promos for the public understanding of science. He has lectured on directing at Sapienza - University of Rome, at Middlebury College (Vermont, USA), and at the Film Academy Of Performing Arts (FAMU) in Prague.

3. Epigraphic Echoes in Epigrams

*Marion Lamé**

Keywords: interoperability between editions, epigram, traditional and digital epigraphy, cross-disciplinary studies of inscriptions

3.1. Description¹

For several years, the Memorata Poetis project (PRIN 2010/11) aims at studying the intertextual relationships between literary and epigraphic epigrams in several languages (Ancient Greek, Latin, Italian, Arabic and English). In order to identify some patterns that echo across space, time, culture and languages, one of the main activity consists in manually identifying Themes & Motifs within the corpus of poems. Such Themes & Motifs are organized, for now, as a hierarchical index of metadata that are associated with the text of the poem only. However, part of this corpus is composed of epigraphic primary sources. This means that such epigrams were set up in a deliberate context of communication and that part of their message is based on linguistic and non linguistic elements of their contextual, textual and writing systems. Some examples are iconographic programs and relationships with other poems, type of verses, inscriptions, themes and motifs (ex. AE, 1967, 85; De Hoz 2014, No 355; Banti, No 5 and 51). In this panel, participants would like to discuss convergences and divergences between textual editing that tends to follow philological methods, and document editing, that focuses on the unicity of the materiality of the carrier (Pierazzo 2015) and that appears more adapted to epigraphic edition. Both types of edi-

* Centre Camille Jullian, MMSH, CNRS, France. Email: mlame@mmsch.univ-aix.fr.

tion would facilitate cross-disciplinary studies of epigraphic epigrams. Panelists will focus on how connecting both types of edition thanks to digital technologies, i.e. integrating digital edition of epigraphic epigrams in the wider context of digital philology on one hand (e.g.: giving access to high quality images thanks to computer graphics tools) and in the one of public history on the other hand (e.g.: crowdsourcing with historical method).¹

3.2. Panelists

Marion Lamé *Centre Camille Jullian, MMSH, CNRS, France* Email: mlame@mmssh.univ-aix.fr Collaborates with the Laboratorio di Cultura Digitale of the University of Pisa. She has worked and works on several digital epigraphic projects (IGLouvre, TSS, Memorata Poetis...) and collaborates to collective dissemination of digital practices (EpiDoc). Her researches are dedicated to Digital Epigraphy applied especially to complex epigraphical situation and device (multilingualism, multi-alphabetism...).

Paolo Mastrandrea *University of Venice* Email: mast@unive.it P. Mastandrea is specialized in Latin Philology. He is the Project Coordinator of important national projects in digital humanities: Memorata Poetis and Musisque Deoque.

Flavia De Rubeis *University of Venice*. Email: flavia.derubeis@unive.it Specialized in Latin Paleography and is in charge of the epigraphic epigrams of the Middle Ages in Memorata Poetis Project.

Mia Trentin *University of Venice* Email: trentin.mia@unive.it Mia Trentin is specialized in Medieval Epigraphy and Latin Palaeography, focusing on medieval ways of communication and expression through the analysis of historical graffiti writing. She collaborates with prof. Flavia De Rubeis for the project Memorata Poetis.

Massimo Manca *University of Torino* Email: massimo.manca@unito.it Researcher specialized in Latin Language and Literature, his interests are Latin literature in Late antiquity, didactics of Ancient Greek and Latin, training of teachers, digital tools for classics.

Alfredo Morelli *Università degli Studi di Cassino* Email: alfmorel@unicas.it Professor of Latin language and literature at the University

¹ The texts of authors are open to discussion on the blog *Épigraphie En Réseau*: <http://eer.hypotheses.org>.

of Cassino (Italy), he works on the history of Greco-Roman literary and epigraphic epigram of Hellenistic period until the age of Martial, the Roman elegy at the time of Augustus and the tragedies of Seneca. He has been active for years on the *Carmina Latina Epigraphica* in cooperation with Epigraphic Database Roma.

Enrica Salvatori *University of Pisa* Email: enrica.salvatori@unipi.it Specialized in Medieval history and Director of the Laboratorio di Cultura Digitale of the University of Pisa. She works in the digitization process of inscriptions of Pisa, included epigrams, and in projects of public history concerning the valorization of epigraphs. [<http://pisaeislam.humnet.unipi.it/> - <http://epigrapisa.humnet.unipi.it/>]

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List of Poster Presented

All posters can be seen in the digital poster exhibition on the Eagle [website](#).

Jan-Mathieu Carbon,
Saskia Peels
and Vinciane Pirenne-Delforge

*The Collection of Greek Ritual
Norms Project (CGRN)*

Stefano Caneva
and Guido D'Ippolito

*Pasquino: Talking Statues
and Inscriptions in Rome*

Mat Carbon,
Mario Paganini
and Stella Skaltsa

*The Copenhagen Associations
Project (CAP)*

Emilia Mataix Ferrandiz

*Bridging the gap Linking com-
mercial epigraphy and Roman law*

Barbara Mazzei
and Agnese Pergola

*The PCAS Photographic Digital
Archive: Fruition of Epigraphic
Images*

Barbara De Nicolò

*“Talking Stones”: from Stone
to History. A Latin Epigraphy
workshop for Primary School*

Sara Chiarini
and Kirsten Jahn

*TheDeMa (Thesaurus Defixi-
onum Magdeburgensis) – A digi-
tal companion to ancient curse
tablets*

- Daniele Silvi
and Fabio Ciotti *Thematic annotation and ontologies: application to digital epigraphy*
- Loredana Francesca Tedeschi *Integration of geomatic techniques for the analysis and geolocation of graphic forms of the Filocalian letter in the Elogia Martyrum by Pope Damasus(366-384)*
- Fulvia Mainardis,
Claudio Zaccaria,
Andrea Favretto
and Giovanni Mauro *A WebGIS for the knowledge of the epigraphic locations in the Friuli Venezia Giulia region (North-East of Italy)*
- Petra Janouchova *INSCRIPTIONS TO GO: Mobile platform for offline epigraphic data collection*
- Tamar Kalkhitashvili
and Eka Kvirkevelia *Epigraphic Corpus of Georgia*
- Gaia Trombin
and Antonio Bonaldo *Out of the wall. 3D documentation and restoration of an endangered Roman altar*
- Gaia Lembi *Saxa Judaica: Delving Digitally into Jewish Inscriptions*
- Olga Pelcer-Vujacic,
Epigraphica Montenegrina *The road so far and the journey ahead*
- Marion Lamé, Federico Ponchio,
Ivan Radman-Livaja
and Bruce Robertson *Teaching (Digital) Epigraphy*
- Claudio Prandoni,
Antonella Fresa *Civic Epistemologies*
- Silvia Marchesini *Ancient European Languages*
- Antonella Ferraro *From Paper to Web*
- Lavinio Del Monaco *Le iscrizioni di Palestrina*

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