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ENCODE

BRIDGING THE <GAP> IN ANCIENT WRITING CULTURES
ENHANCE COMPETENCES IN THE DIGITAL ERA

Introduction to Digital Greek and Latin Epigraphy

A Handbook produced in the framework of the ENCODE Project

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Summary

Introduction

This handbook represents the original basis from which Unit I 'Digital Greek and Latin Epigraphy' was derived for the ENCODE open online course 'Digital tools for the research and study of ancient writing cultures,' developed collaboratively with colleagues from various universities and available on the #dariahTeach platform (https://teach.dariah.eu/course/view.php?id=80).

About This Handbook

This text offers a gentle introduction with inspiring tools – descriptive and ready-made examples and presentations, links to projects, bibliography, and more – fostering awareness of the importance of digital competences and training in the field of research and study of ancient writing cultures. The content is designed to support both individual users, self-training teachers, and teaching staff in their exploration of digital epigraphy.

Throughout the handbook, you will find interactive exercises that can be completed by following the links to the MOOC, which also allow you to check the correctness of your answers. The material is further enriched by video content accessible through YouTube links, including interviews with leading experts in the field and specific tutorials demonstrating digital epigraphic tools and methodologies.

The handbook shares the core educational objectives of the MOOC unit while functioning as a standalone resource. It provides a coherent overview of digital epigraphic resources, ongoing projects, and established standards that facilitate the study and preservation of inscribed materials from the ancient world.

For readers interested in deeper engagement with the material, the text includes links to the full video interviews, and transcriptions of these conversations with key figures in digital epigraphy may be integrated into future versions of this handbook.

Whether you are a seasoned epigraphist looking to enhance your digital toolkit, a student beginning your journey into the fascinating world of ancient inscriptions, or a professional seeking to implement digital methods in cultural heritage contexts, this guide provides practical insights into the intersection of traditional epigraphic study and digital humanities.

By bridging classical methodologies with innovative digital approaches, this handbook supports the growing commitment to Open Science practices, FAIR data principles, and collaborative research in the field of ancient writing cultures.

About the MOOC Structure

The ENCODE course on the #dariahTeach platform is structured into four distinct units, each covering different aspects of digital approaches to ancient writing cultures:

1. **Unit I: Digital Greek and Latin Epigraphy** - This unit, which is derived from this handbook, provides an overview of digital tools for Greek and Latin epigraphic studies.
2. **Unit II: Digital Papyrology** - Focuses on how digital techniques have transformed papyrological research.

3. **Unit III: Multilingual-Multicultural Digital Infrastructures** - Explores the relationship between language, culture, and digital platforms.
4. **Unit IV: How to create Linked Open Data (LOD)?** - Demonstrates applications of Linked Data in studying ancient written artifacts.

The course employs a diverse range of learning materials organized hierarchically:

- **Units** form the main divisions of the course, accessible through the navigation bar
- **Lessons** divide units into coherent topic areas, presented in a logical learning sequence
- **Pages** provide short sections on specific topics, including text, multimedia, and interactive elements such as image sliders, flip cards, hot spots, and timelines enhance engagement
- **Exercises** allow for reflection and assessment through quizzes and interactive activities

About the ENCODE project

ENCODE (Bridging the gap in ancient writing cultures: ENhance COmpetences in the Digital Era) was a three-year project (2020-2023) funded by the EU as an Erasmus+ Strategic Partnership, bringing together six academic institutions (*Alma Mater Studiorum Università di Bologna, Julius Maximilian Universität Würzburg, KU Leuven, Università degli studi di Parma, Universität Hamburg, Universitetet i Oslo*). The project aimed to bridge the existing gap in academic education between the highly specialized humanistic competences provided in traditional curricula in the fields of Ancient History, Archaeology, Classics, and Cultural Heritage and the digital competences required today in research and the job market.

The objectives of the project were:

- to promote collaborative, participatory, and intercultural digital approaches to ancient written heritage through new professional profiles and focused training of skilled graduates;
- to strengthen the crucial cooperation between higher education and cultural heritage institutions by supplying materials for teaching and self-training to academics and providing stakeholders with support services;
- to meet the learning needs of graduates in the field of highly specialized digital skills applied to the study of ancient writing media in old European, Asian, and African languages through innovative teaching modules.

Among the results produced by the project are: a shared framework of digital competences needed for graduate students in programs focusing on written cultural heritage; the design and testing of innovative and customizable teaching modules; a complete guide to the teaching modules, including a MOOC; and a platform for the alumni community and stakeholders/employers. These tools utilize the material produced during the numerous events organized by the project, including conferences and practical workshops where experts were invited to discuss recent developments in technologies used in the study of ancient written cultures and to illustrate their functions and ongoing projects.

These tools make use of the material produced by the several events organised by the project, conferences and practical workshops in which experts are invited to discuss recent developments in technologies used in the study of ancient written cultures and to illustrate their functions and ongoing projects. Nine events have been organised so far, most of them linked to training activities:

- ENCODE Project Conference and Digital Greek and Latin Epigraphy Workshop, Bologna (25-29 January 2021)

- ENCODE Project Conference Bridging the Gap with Linked Open Data and Linked Open Data for Written Artefacts Workshop, Hamburg (25-28 May 2021)
- ENCODE Conference Multilingual and Multicultural Digital Infrastructures for Ancient Written Artefacts and ENCODE Training workshop Multilingual and Multicultural Digital Infrastructures for Ancient Written Artefacts, Leuven (2-5 November 2021)
- ENCODE Conference Artificial Intelligence and Inscriptions. Opportunities and practicalities of Machine Learning for Epigraphy, Bologna (11 February 2022)
- ENCODE Project Conference Papyri and Crowdsourcing and Papyrology for non-specialists. ENCODE Winter School, Würzburg (14-17 February 2022)
- ENCODE Conference Digital Critical Editions and Greek Literary Manuscripts and ENCODE Digital Papyrology Workshop, Parma (23-27 May 2022)
- ENCODE Conference Encoding across Languages and Technologies and ENCODE Intensive Training Workshop Building a MySQL Relational Database for Your Data, Oslo (10-14 October 2022)
- ENCODE Conference Artificial Intelligence and Ancient Writing Cultures and ENCODE Workshop AI and ancient writing cultures, Bologna (23-27 January 2023)
- ENCODE/Epigraphy.info VII Training, Leuven (24 April 2023)

Competences

The Handbook is an entry point to further training material developed in specific workshops held during the ENCODE project life and to materials made available online by other projects. The training material produced through the ENCODE workshops has been developed, collected and organized taking in mind the most relevant areas of digital competences.

These competences are listed here below and have been formulated with specific explicit reference to the *DigComp 2.2 Framework*, published by the Joint Research Center of the European Commission which provides a common understanding of what digital competence is (European Commission, Joint Research Centre, Vuorikari, R., Kluzer, S., Punie, Y., *DigComp 2.2, The Digital Competence framework for citizens : with new examples of knowledge, skills and attitudes,* Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2760/115376)

Competence area 1: Information and data literacy

- can use independently and critically multilingual digital corpora and can evaluate and adapt and vary searching strategies to find the most appropriate data, information and content in digital corpora and databases, can guide others in browsing, searching and filtering data, information and digital content *(DigComp2.2: 1.1 level 6)*.
- are aware of the problems connected with the management of information related to multicultural contexts, data and content for the most appropriate easy retrieval and storage. Can manage xml files (through editors like Atom) and are aware of digital platforms and tools for managing digital publication (EFES, TEI-Publisher, Oxygen XML Editor project) *(DigComp2.2 / 1.3 level 4/5)*.

Competence area 2: Communication and collaboration

- can interact through a variety of digital technologies and understand appropriate digital communication means for a given multicultural context *(DigComp2.2 / 2.1 level 4/5)*.
- can share data, information and digital content with others through appropriate digital technologies. Know about referencing and attribution practices *(DigComp2.2 / 2.2 level 4/5)*.

- can use digital tools and technologies for collaborative processes and for co-construction and co-creation of data, resources and knowledge (e.g. online editing through cloud, wiki, conceive and apply agreed rules in complex projects) *(DigComp2.2 / 2.4 level 5/6).*
- are aware of behavioural norms and know-how while using digital technologies and interacting in multicultural digital environments. Can adapt communication strategies to the specific audience and are aware of cultural and generational diversity in digital environments. *(DigComp2.2 /2.5 level 5).*

Competence area 3: Digital content creation

- understand the structure of digital content in different formats (e.g. ways to create and edit a digital edition through XML language) *(DigComp2.2/3.1 level 4/5).*
- are aware of copyright about ancient documents (photographs, museum rights, printed and digital editions), different kinds of online copyright and data protection (Creative Commons, OpenAccess, Linked Open Data) *(DigComp2.2/3.4 level 5/6).*

Competence area 5: Problem solving

- is aware of specific project guidelines, forum and blogs for problem solution (e.g. Guide to SoSOL, Beta maṣāḥəft Guidelines, EpiDoc Guidelines) as a basis to address problems when operating in digital infrastructures *(DigComp2.2/5.1 level 4/5).*
- can identify, evaluate, select needs to which multicultural digital infrastructures and offer possible technological responses. Can understand where relations among different fields of study (epigraphy, philology, archaeology, linguistics) in different cultures and languages can be improved thanks to methods and tools of the digital domain *(DigComp2.2/5.2 level 4/5).*
- can understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development *(DigComp2.2/5.4 level 4/5).*

Acknowledgements

This handbook represents the collaborative spirit of the ENCODE project, bringing together diverse expertise from across European institutions to advance digital approaches to the study of ancient written cultures.

This handbook serves as the foundation for elements of the ENCODE project, particularly Unit I of the associated MOOC. While the handbook itself is the work of a single author, it has been expanded and adapted into a broader educational context through the collaborative efforts of numerous scholars across multiple institutions.

The MOOC that drew upon this handbook was developed through the contributions of specialists from various fields. The introductory materials were coordinated by Carla Salvaterra and myself from Alma Mater Studiorum Università di Bologna, along with Tom Gheldof from KU Leuven. The digital epigraphy unit, which builds upon this handbook, was adapted by myself with additional input from Alice Bencivenni and Carla Salvaterra, all from Alma Mater Studiorum Università di Bologna.

Further units of the MOOC expanded beyond the scope of this handbook, with papyrological components developed by Marta Legnini and Massimo Magnani of Università di Parma, Holger Essler from Julius Maximilian Universität Würzburg, and others. Technological frameworks were contributed by researchers from Universitetet i Oslo and KU Leuven, while the integration of digital tools was coordinated by Pietro Liuzzo and Tom Gheldof.

The overall MOOC development was guided by Susan Schreibman and Costas Papadopoulos from Maastricht University, with IT development support from Norbert Czirjak of the Austrian Centre for Digital Humanities and Cultural Heritage.

Special thanks go to all the colleagues who generously gave their time to be interviewed for this project, sharing their expertise and insights that have greatly enriched this handbook. We are particularly grateful as well to those who provided valuable interactive materials, especially the team behind the Sunoikisis Digital Classics project for their excellent educational recordings. These teaching activities represent an invaluable resource for understanding digital approaches to classical studies.

The willingness of these scholars to contribute their knowledge and educational content has significantly enhanced the depth and practical value of this handbook, creating bridges between theoretical frameworks and applied methodologies in the digital study of ancient written cultures. Their collaborative spirit embodies the essence of digital humanities scholarship and demonstrates how shared resources can advance our collective understanding of these important fields. While this handbook stands as an independent work, it has been enriched by its incorporation into the broader collaborative environment of the ENCODE project, demonstrating how individual scholarship can serve as a catalyst for wider educational initiatives in the digital humanities.

1. Why Digital Epigraphy?

This lesson aims to explore the current state of digital transition in the study of Greek and Roman epigraphy, with a focus on promoting new approaches to teaching and learning in alignment with research advancements. We will examine key methodological innovations facilitated by digital methods and evaluate their impact on the discipline. Additionally, we will reflect on the changes that influence both research practices and the educational landscape.

1.1 Digital competences as an add on to epigraphy or as a way to learn how to work with Inscriptions?

Digital Epigraphy and cross-cultural and multi-disciplinary approaches to written objects

The **digital transformation of cultural heritage** is bridging disciplinary gaps, affecting the study of ancient written objects. Challenges such as ecdotic and digital editions, retrieval systems, contextualization, metadata, linguistic analysis, and treebanking are shared by epigraphists. This extends beyond Greek and Roman inscriptions to include other languages and pre-modern cultures in the Mediterranean and beyond. Disciplines such as epigraphy, papyrology, and codicology generate digital data that is increasingly integrated into broader ecosystems. One notable example is **Trismegistos**, a platform that provides comprehensive information on texts from antiquity. It facilitates cross-cultural and cross-linguistic research, breaking down language and disciplinary barriers, especially for texts from Egypt and the Nile Valley from approximately 800 BC - AD 800. For more information on Trismegistos' coverage of the ancient world, click here.

The digital transition and its contribution to research methods

Due to the need to enhance awareness of interdisciplinary connection and to produce data which can be used by many different scholars, we should add a second methodological development and namely the fact that **digital transition** is contributing to a new methodological development, improving our understanding of the relationship between text, materiality of the object and the many different contexts of production and transmission, which is one of the actual most important aspects of the scientific approach to inscriptions, papyri, and in general written objects from antiquity.

ENCODE Interview with John Bodel about the innovations that the digital environment has brought to epigraphy [8:20]

The digital transition brings with it the need to develop systems for representing – within an integrated and consistent environment – information about the text, its linguistic features, its layout, its forms of writing, its relation with the monument i.e. the object bearing the text, its state of preservation, its work of decipherment, critical edition and interpretation, and with the original context of production, and other contexts of use, conservation, display and transmission. Even more relevant is the potential connection with other sources (as in dossier, archives, or other kinds of semantic groups) which allows **sharing, selection and reorganisation to produce historical meaning**. The creation of standards for digital editions, in which information about the text and its above-mentioned relations can be represented and shared, is the precondition to structuring the knowledge we have about the

document in a digital environment and to performing information gathering and research through computer systems.

Interview with John Bodel about the changes that the digital environment has brought to epigraphy [5:37]

The creation of standards for digital editions: EpiDoc

Epigraphists have answered the need for standards for digital editions of inscriptions and for recording and linking information by developing *EpiDoc*:

an international, collaborative effort that provides guidelines and tools for encoding scholarly and educational editions of ancient documents.

It uses a subset of the Text Encoding Initiative standard for the representation of texts in digital form and was developed initially for the publication of digital editions of ancient inscriptions (e.g., Inscriptions of Aphrodisias, Vindolanda Tablets). Its domain has expanded to include the publication of papyri and manuscripts (e.g., Papyri.info). It addresses not only the transcription and editorial treatment of texts themselves, but also the history and materiality of the objects on which the texts appear (i.e., manuscripts, monuments, tablets, papyri, and other text-bearing objects)" (see https://sourceforge.net/p/epidoc/wiki/Home/).

Interview with Gabriel Bodard about the changes that the digital environment has brought to the traditional way of editing epigraphic documents [3:51]

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- De Santis, A., & Rossi, I. (Eds.). (2019). *Crossing Experiences in Digital Epigraphy: From Practice to Discipline. De Gruyter Open Poland*. https://doi.org/10.1515/9783110607208

Exercise

Test 1.1 The Challenges of Digital Epigraphy

Read the text extracted by the Introduction of the book *Crossing Experiences in Digital Epigraphy From Practice to Discipline*, edited by A. De Santis and I. Rossi, Warsaw-Berlin 1998, pp. xiii-xix (https://doi.org/10.1515/9783110607208) about the methodological challenges of the digital transition and how the volume has faced them and fill the gaps:

Digital epigraphers have informally acquired their skills in digitization methods and techniques and are creating more or less formal _____in order to exchange ideas and suggestions, still not having specific _____in which they can communicate the results of their research. The volume takes inspiration from _____, an ERC project aimed at collecting and digitizing the epigraphic corpora of pre-Islamic Arabia and the fruitful work of collaboration between epigraphers,

archaeologists, art historians, digital humanists and IT specialists. With the intention of overcoming the issues illustrated above, the volume brings together with this experience other projects, ranging from antiquity to medieval and modern times, from specific databases and lexica, to aggregators, infrastructures and gazetteers, dealing especially with _____and _____on the one hand, with _____and _____on the other hand.

Check your answers at: https://teach.dariah.eu/mod/hvp/view.php?id=1746

1.2 Teaching and learning epigraphy together with digital epigraphy

The **competences of the digital epigraphist** are not an addition but a complement to the traditional epigraphic competences; therefore, scholars have shown particular interest in integrating the former into the traditional epigraphic teaching. As Bodard and Stoyanova (2016) point out in a contribution reviewing some pioneering experiences in this field, the technical nature of the epigraphic discipline provides numerous parallels with disciplines related to digital technologies with regard to teaching tools and methods. The two scholars, in particular, focus on the digital edition of epigraphic texts realised through the EpiDoc encoding, and state that this activity is nothing more than **structured thinking about producing data**.

The structure of a digital edition substantially reflects that of a printed epigraphic edition and the hierarchic and strict organisation of the different sections of the document forces students to thoroughly think about how to organise the information and to pay more attention to the individual sections. The translation of epigraphic conventions (i.e. the Leiden system) in the digital environment asks students to reflect on the precise meaning of conventional representations, makes them more transparent, and favours disambiguation of concepts that would remain imprecise in prose descriptions, including responsibility and attribution, fostering a more scientific approach to academic publications.

Teaching EpiDoc	**Teaching epigraphy**
Assume epigraphic/classical knowledge	Assume Greek and Latin
Introduce technology	Introduce epigraphic practice
Give reference materials (Guidelines) and customized summary of reference (Cheatsheets)	Give reference materials (handbooks) and customized summary of reference (Leiden conventions)
Give lots of exercises and practice	Give lots of exercises and practice

***Table 1** - Comparison of Teaching EpiDoc with Teaching Epigraphy. (Bodard-Stoyanova 2016: 62)*

Digital epigraphy and enhanced understanding of the discipline

Another **advantage** derived from the integrated teaching of digital epigraphy and traditional epigraphy concerns the very way the discipline of epigraphy is understood. When consulting a printed epigraphic corpus, it can be difficult to find images of inscriptions or indexes, which are often, especially for large corpora, in separate volumes. This complicates the way the document is understood, catching often only the textual and not the material aspect of the object-inscription. However, through digital tools that allow also to manage images (3D modelling and imaging) and link the epigraphic edition to external digital resources and interactive maps, the history of the object and its materiality are emphasised, with the effect of understanding epigraphy not only as a

philological discipline (as it is still mostly understood today due to the legacy of the great 19th-century epigraphic studies), but also as a historical and archaeological discipline.

Integrating Teaching and Learning of Epigraphy and Digital Epigraphy

From a practical point of view, the training in digital epigraphy is often postponed to a second stage of the epigraphist's training and often delivered in the form of workshops or laboratories, attended on a voluntary basis by interested students who have already acquired basic skills in epigraphy (see Bencivenni and Agrimonti 2014; Bodard and Stoyanova 2016). This practice continues, but in recent years digital competences have begun to **be integrated into traditional epigraphy courses**; for instance, this is the case of the experimentation that Monica Berti carried out in 2010 and 2013 at Tufts University: in her Latin epigraphy module, students were also trained in EpiDoc and practised with texts from EDR.

Interview with John Bodel about the benefits of the integration of traditional epigraphy and digital epigraphy [4:05]

Traditional epigraphic competences and digital editions of Latin inscriptions were also the topics of the epigraphy and archaeology programme The Stones of Ancient Latium, held in Italy in 2011 and organised by Monica Berti and J. Matthew Harrington. John Bodel added an ***EpiDoc Practicum*** (delivered by Elli Mylonas) in his Roman epigraphy graduate seminar at Brown University (2014), where students were requested to produce EpiDoc digital editions of inscriptions from the US Epigraphy Project. Through the immediate involvement in the production of digital editions, students were thus encouraged and motivated in acquiring the basic competences for the deciphering, ecdotic and historical analysis of inscriptions.

During the pandemic, Alice Bencivenni in collaboration with Irene Vagionakis integrated some lectures on digital editions of epigraphic texts in EpiDoc into her Greek Epigraphy Class of the Master's Degrees in History and Oriental Studies, Philology, Literature and Classical Tradition and Archaeology and Cultures of the Ancient World of the University of Bologna (2020), replacing the traditional exercise at the epigraphic collection of the Archaeological Museum of Bologna with an **intensive digital training in EpiDoc** (for which see the Sunoikisis Digital Classics video below). From this experience, a regular course on the digital encoding of ancient sources has been introduced in 2022 and included in the curricula of the Master's Degrees in History and Oriental Studies and Philology, Literature and Classical Tradition (Laboratorio digitale per le fonti classiche).

Sunoikisis Digital Classics, Summer 2021 Session 2. Teaching epigraphy in a pandemic

However, these experiences are isolated. The aim of ENCODE is precisely to foster **the integration** of the now essential digital competences in the teaching and learning domain of ancient writing cultures through the experience of numerous workshops and training activities organised within the project (for which see Fogagnolo 2022) and the realisation of basic and advanced teaching modules collected in the ENCODE Database, which can be reused by teachers in different training and teaching contexts.

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Further reading

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- *Sunoikisis Digital Classics. Summer 2021 Session 2. Teaching epigraphy in a pandemic. Convenors: Alice Bencivenni (University of Bologna), Gabriel Bodard (ICS London), and Irene Vagionakis (University of Bologna).* (2021, April 22). https://www.youtube.com/watch?v=zerKTMN3FCo

Exercise

Test 1.2 Traditional Epigraphy and Digital Epigraphy

Read the text extracted by the article G. Bodard – S. Stoyanova, Epigraphers and Encoders: Strategies for Teaching and Learning Digital Epigraphy, in G. Bodard - M. Romanello (eds.), Digital Classics Outside the Echo-Chamber. Teaching, Knowledge Exchange & Public Engagement, London 2016, pp. 51–68. https://doi.org/10.5334/bat about the benefits of integrating the teaching of digital epigraphy into traditional epigraphy and fill the gaps:

_____is nothing more than structured thinking about data since the structure of an XML document reflects the structure of an epigraphic edition. Furthermore, digital encoding requires _____through a specific markup that prose descriptions are not able to accurately express. In addition to this, digital editions and electronic publishing stress the importance of _____and _____, because all decisions (or uncertainty about decisions) are explicitly recorded and attributed to a person. Last but not least, digital epigraphy also provides valuable s for the teaching and studying of digital humanities, providing a number of transferable skills applicable above and beyond the field of epigraphy and enhancing _____ and _____.

Check your exercise at: https://teach.dariah.eu/mod/hvp/view.php?id=1747

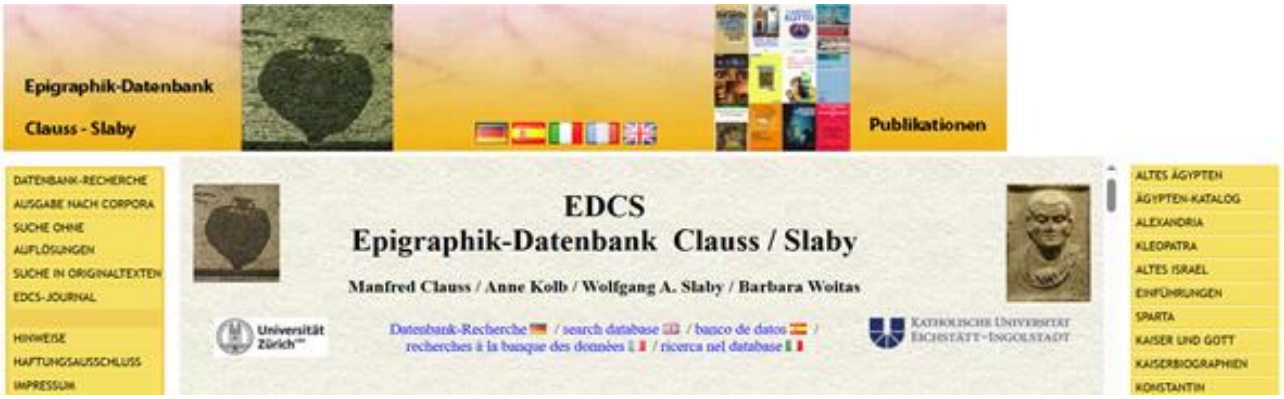
2. Mapping the Field of Digital Epigraphy

The aim of this lesson is to give a general overview of what are the most important resources and tools that have changed the landscape of epigraphic research, paying particular attention to critical aspects of using digital corpora and tools and to the collaborative dimension of these instruments.

2.1 Digital epigraphic corpora and databases

In the last decades, the digital environment has deeply changed the discipline of epigraphy. Firstly, the digital tools have contributed to the creation of **larger databases bringing together different printed corpora and inscriptions from different geographical origins**. These corpora have many different backgrounds, and sometimes are more concerned with the quantity of records and the speed in digitizing data rather than the quality of content: double entries, misreadings and wrong identifications of modern editions can be observed in some cases. Nevertheless, they represent invaluable tools for researchers.

Examples of these are the Searchable Greek Inscriptions Database (PHI) for Greek epigraphy, the Epigraphische Datenbank Clauss-Slaby (EDCS) for Latin epigraphy. In the Searchable Greek Inscriptions Database, the inscriptions are organised by regions and it is possible to search them by strings of text; nevertheless, the database does not include the critical apparatus and presents little information at the metadata level (generally provenance, date and other editions). Similarly, in the Epigraphische Datenbank Clauss-Slaby, inscriptions are not followed by the apparatus, even if they are searchable not only by text but also by material, type of inscription and date of origin.



Homepage Epigraphische Datenbank Clauss-Slaby

On the other hand, there are also smaller, regionally or thematically oriented corpora, which pay more attention to the quality of content and control information: these corpora tend to have more advanced search functions, as it is often possible to search them not only on the basis of their text but also by metadata and special textual features. They are also often produced using EpiDoc, the leading standard for the semantic encoding of ancient texts in TEI-XML (see below: 4.1 Principles and standards), which allows the semi-automatic creation of indexes. Furthermore, they are often linked to external resources, such as geographical gazetteers, prosopographical repertoires and controlled vocabularies according to the **Linked Open Data principles (LOD)**.

Among **regional databases and corpora** are worth mentioning:

- Ancient Inscriptions of the Northern Black Sea (IOSPE)
- Attic Inscriptions Online (AIO)

- Epigraphic Database Roma (EDR)
- Hispania Epigraphica (HE)
- Inscriptions of Aphrodisias Project (InsAph)
- Inscriptions of Greek Cyrenaica-Greek/Verse inscriptions of Cyrenaica (IGCyr/GVCyr), first edition 2017, (IGCyr/GVCyr^2), second edition 2024.
- Inscriptions of Roman Cyrenaica (2020)
- Inscriptions of Roman Tripolitania (IRT), first edition 2009, second edition 2021
- Roman Inscriptions of Britain (RIB)

Some corpora are narrow and have a regional character, others are broader, such as the Epigraphische Datenbank Heidelberg (EDH), which collects inscriptions from the Roman provinces.

Among **thematic databases and corpora** are worth mentioning:

- Collection of Greek Ritual Norms (CGRN)
- Epigraphic Database Bari (EDB)
- Greek Economic Inscriptions (GEI)
- Practicalities of Hellenistic Ruler Cults (PHRC)

Sometimes, the regional and thematic criteria are simultaneously present, as in the case of Cretan Institutional Inscriptions, a collection of the epigraphic records pertaining to the Cretan institutions.

Some of the previously mentioned databases contain **inscriptions in different languages**. This multilingual approach characteristic of many digital corpora allows to remove the disciplinary barriers that distinguish not only epigraphy in Greek from that in Latin, but also epigraphic material from the Greco-Roman world from those of other, less attested, Mediterranean languages. An interesting example is the I.Sicily database, which collects inscriptions from ancient Sicily from the Archaic period to the late Antiquity in all the languages spoken in this region, a true crossroads of the Mediterranean (Greek, Latin, Phoenician/Punic, Oscan, Hebrew, Sikel).

Further reading

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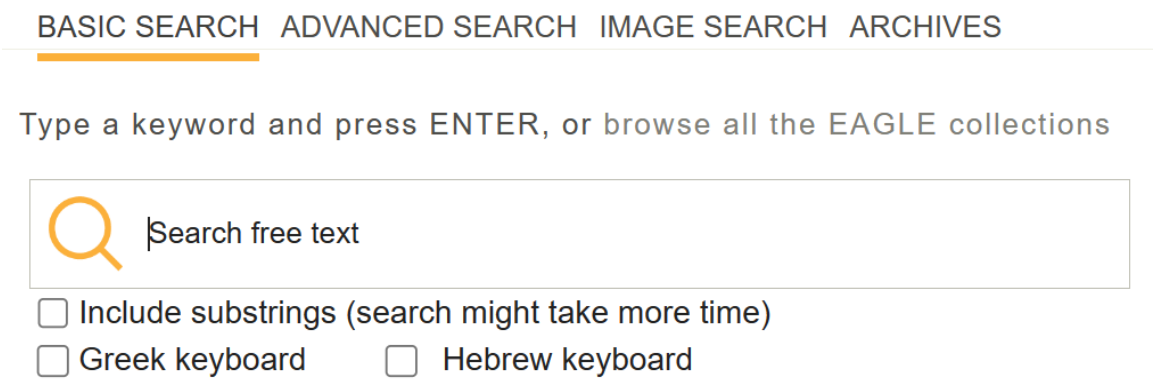
2.2 The collaborative dimension of digital epigraphy: EAGLE

Another characteristic of the digital environment is its **collaborative dimension**: ever since the creation of the first digital corpora, scholars have felt the need to create a single portal through which all materials could be accessible and searchable. For this purpose, the Europeana network of Ancient Greek and Latin Epigraphy has designed the EAGLE Inscriptions Search Engine, an aggregator and search portal of different epigraphic databases. A prerequisite for the creation of this tool was the transformation of texts according to the *EpiDoc-XML* standard, the attribution of a permanent identifier (a stable URL) to each inscription and the creation of standardised vocabularies for the description of metadata (the EAGLE vocabularies, see below 7.1 Structuring data) to allow interoperability among different projects.



EAGLE Inscriptions Search Engine

Currently, several content providers are making their texts available in EAGLE, but a single portal, where all the Latin and Greek inscriptions can be recorded and searched not only by text but also by their metadata, is still missing: in other words, the epigraphic discipline does not have an instrument such as the Papyrological Navigator in the field of papyrology. Similarly, the InsLib project aims at reproducing on a smaller scale the principle behind the federated database EAGLE, providing a search portal bringing together all corpora of inscriptions and ostraka from ancient Libya (IGCyr/GVCyr, IGCyr/GVCyr^2, IRCyr, IRT, Ostraka from Bu Njem).

Further reading

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2.3 Digital bibliographic tools and concordances

In addition to corpora and databases, there are also other important instruments such as **repositories, bibliographical tools, and concordances**; some of them represent the digitization of printed

instruments that continue to have a life of their own, others are tools designed as digital from the beginning. Among the former, the SEG Online (*Supplementum Epigraphicum Graecum Online*) has a prominent role: its digital version, although only available with subscription, allows to search for entries, text, period and place of origin, type of inscription and concordances and results are also exportable in XML. Among the born-digital instruments, an important tool is the CLAROS Database (Concordance of Greek inscriptions), which enables to trace back re-editions of Greek inscriptions, even if it is not regularly updated and is often not so intuitive due to its complex system of abbreviations.

Other useful resources

For other resources such as repositories of images, prosopographical repertoires, geographic gazetteers and controlled vocabularies, see below: 7.1 Structuring data. A valuable tool, although missing a complete and up-to-date list of digital epigraphic resources, is the list produced by the Digital Classicists Wiki. To stay updated on news about epigraphy, check Current Epigraphy, a blog which publishes workshop and conference announcements, notices of discoveries and publications about digital epigraphic projects, and the AIEGL website, which gives notice of events and publication linked to the *Association Internationale d'Épigraphie Grecque et Latine*.

ENCODE Database modules

- PHI Greek Inscriptions
- Poinikastas and AIO
- Digital Resources for Epigraphy
- EAGLE dedicated services and their educational potential
- SEG online
- Claros

Exercise

Test 2.3a Digital Corpora and Databases

Taking into consideration the following digital resources for epigraphy EDCS (Epigraphik-Datenbank Clauss-Slaby), EDH (Epigraphic Database Heidelberg), TM (Trismegistos), PHI (Searchable Greek Inscriptions), search for:

- CIL VI 9317 (Corpus Inscriptionum Latinarum, volume VI, Inscriptiones Urbis Romae Latinae, number 9317

and match the digital IDs to the original publication:

TM780992, TM574378, TM210176, TM786296, EDCS19000767, EDCS13900495, HD021073, PHI232710, PHI199904

Check the solution at:
https://teach.dariah.eu/mod/hvp/view.php?id=1748

Exercise

Test 2.3b Digital Corpora and Databases

Epigraphy EDR (Epigraphic Database Roma), PHI (Searchable Greek Inscriptions) and TM (Trismegistos), match the correct digital ID to each epigraphic publication:

IGUR 2 0619 =
AE 2014, 137 =
SEG 40,860 =

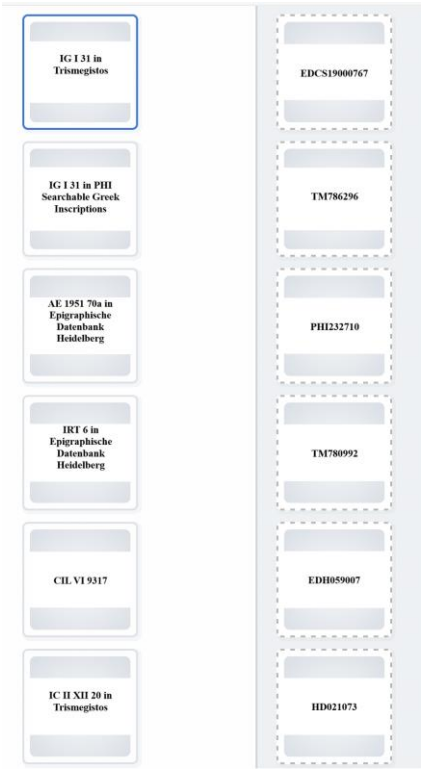
PHI188257 **TM267995** **EDR006602**

Check the solution at:
https://teach.dariah.eu/mod/hvp/view.php?id=1749

Exercise

Test 2.3c Digital Corpora and Databases

Select images from the left to match them with corresponding images on the right:



Check the solution at:
https://teach.dariah.eu/mod/hvp/view.php?id=1750

3. From user to maker: learning by doing

The aim of the lesson is to illustrate how digital projects and digital infrastructures work and why it is important to move from the front-end experience to a back-end experience by actively participating in new or existing projects/infrastructures. This chapter consists mainly of video interviews with various project coordinators about ongoing digital epigraphic projects.

3.1 Learning by doing

An overview of digital epigraphic projects

The digital environment has fundamentally changed the way of doing research by providing new possibilities of presenting and searching data. As already seen, the new way in which data is structured has enabled a greater understanding of the link between text, materiality of the object and historical context of production and transmission and has fostered the overcoming of the traditional division among disciplines.


Interview with Charlotte Roueché about the advantages of a digital corpus of inscriptions over a printed publication. [6:12]


Interview with Gabriel Bodard about the strengths of the new digital epigraphic publications. [4:01]

The **transition from user of digital epigraphic resources to maker of digital epigraphic resources** involves, on the one hand, understanding the innovation of digital epigraphic databases and corpora in comparison to traditional printed ones; on the other hand, knowing what digital competences are required to be able to actively participate in digital projects. While the latter is the objective of 1.6 The digital epigraphic workshop, the former can be achieved by looking more closely (or behind the scenes through dialogues with experts) at epigraphic digital corpora and digital infrastructures. Therefore, starting from the topic of interdisciplinarity you will find here some presentations of digital epigraphic projects, in which innovations will be particularly emphasised.


Interview with Charlotte Roueché about the main issues scholars must face when publishing digital corpora. [4:35]


Interview with Gabriel Bodard about the weaknesses of new digital epigraphic publications. [6:15]

Exercise

Test 3.1 Explore an Epigraphic Database

Explore the Telamon Database (https://telamon.uni-sofia.bg/en/) and answer the questions:

1. Which are the purposes of the database?

- to create a digital library of the ancient Greek inscriptions found in the Northern Coast of the Black Sea
- to create a digital library of the ancient Greek inscriptions found in Bulgaria
- to create a digital library of the ancient Greek and Latin inscriptions found in Bulgaria

Which technologies does it use?

- the inscriptions are encoded in EpiDoc and published through the XML publishing platform AIAX
- it is a relational database published via MySQL
- the inscriptions are encoded in EpiDoc and published through the XML publishing platform EFES

Which search functionalities are available?

- a textual search mask, facets (findspot, original location, materials, object type, category of inscription, layout) and indices (lemmata, abbreviations, emperors, attested persons, personal names, officials, divine, mentioned places, findspot)
- a textual search mask, a data slider, facets (findspot, original location, materials, object type, category of inscription) and indices (lemmata, abbreviations, emperors, attested persons, personal names, officials, divine, mentioned places, findspot)
- a textual search mask, a data slider, facets (findspot, original location, materials, object type, category of inscription) and indices (lemmata, abbreviations, emperors, attested persons, personal names, divine, mentioned places, findspot, symbols)

How are the individual epigraphic records structured?

- lemma with the description of the object and its ancient and modern history, images and maps, text with both interpretative and diplomatic edition, translation, apparatus, commentary and bibliography
- lemma with the description of the object and its ancient and modern history, images and maps, edition, translation, apparatus, commentary and bibliography
- lemma with the description of the object and its ancient and modern history, text with both interpretative and diplomatic edition, translation, apparatus, commentary and bibliography

Check your answers at:
https://teach.dariah.eu/mod/hvp/view.php?id=1752

4. From user to maker: principles and standards

The aim of the lesson is to focus on some essential principles of digital publication and how their application in the digital environment has changed the way of doing research. This chapter will focus mainly on epigraphy.

4.1 Principles and standards

Recent years have seen a great proliferation of corpora, databases and digital resources for epigraphy. For this reason, scholars have planned to create an instrument that would collect all epigraphic databases online, equivalent to Papyri.info for digital papyrology. This instrument should have been the federation of Epigraphic Databases EAGLE, which aggregates data from different epigraphic databases providing a single searching portal. However, the platform is far from collecting all epigraphic datasets as scholars have encountered some difficulties, such as the long-term maintenance of a similar tool and the inconsistent format of data which made it difficult to integrate, export and align them.

Interview with Jonathan Prag about the importance of LOD and FAIR for digital publications [4:48]

In recent years, the community of digital epigraphists has been trying to conform resources to principles that allow the exchange, reuse and interconnection of data. These can be summarised in the Linked Open Data paradigm and in the 5-star deployment scheme for Open Data by Tim Berners-Lee (https://5stardata.info/en/):

★ make your stuff available on the Web (whatever format) under an open license

★★ make it available as structured data (e.g., Excel instead of image scan of a table)

★★★ make it available in a non-proprietary open format (e.g., CSV instead of Excel)

★★★★ use URIs to denote things, so that people can point at your stuff

★★★★★ link your data to other data to provide context

The scheme represents a growing pattern of behaviour to which we are expected to conform when publishing data online. These behaviours also comply with the FAIR principles.

Video presentation of FAIR Epigraphy [6:36]

FAIR is an acronym for **Findability, Accessibility, Interoperability, Reuse**; according to these principles data should be:

- findable both by humans and computers by assigning to each resource a stable URI

- accessible because retrievable by their identifier using an open, free and implementable protocol
- interoperable because they can be exported and integrated with other data due to their machine-readable format (XML, JSON, CSV, RDF)
- reusable because released with a *Creative Common Licence*.

In order to align data to these principles, the epigraphic community has gradually adopted **open access publication formats** and produced a **standard for a machine-readable representation of epigraphic texts**, *EpiDoc-XML*. The need to standardise digital editions of ancient texts, and inscriptions in particular, developed from the second half of the 1990s, when the *EAGLE* (Electronic Archive of Greek and Latin Epigraphy) Commission came up with a series of recommendations about how to bring all the existing epigraphic databases together. The commission produced a document (Panciera 1999), in which scholars were invited to use a markup language to produce epigraphic digital editions, namely semantic encoding in XML.

In the next few years, a group of scholars from the *Ancient World Mapping Center* of the University of North Carolina in Chapel Hill took up this recommendation and drafted the *EpiDoc Guidelines 1.0* (2000) in order to respond to this need. Since then, **EpiDoc** has been the **leading standard for the encoding of ancient document**s. The new way of structuring epigraphic data directly linked to the use of EpiDoc combined with Linked Open Data (LOD) has produced not only new ways of presenting the materials but also a new model of interpretation (on the topic, see below: 6 The digital epigraphic workshop: Editing).

Sunoikisis DC Session 6 Linked Open Data [1:32:08]

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Further reading

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- https://www.digitalhumanities.org/dhq/vol/3/1/000030/000030.html
- Daquino, M. (2021). Linked Open Data native cataloguing and archival description. *JLIS*, *12*(3), Article 3. https://doi.org/10.4403/jlis.it-12703

Exercise

Test 4.1 The FAIR Principles

Which of the FAIR (Findability, Accessibility, Interoperability, Reusability) principles these statements make reference to (there can be more than one answer)?

The Inscriptions of RomCheck your answers at: a Cyrenaica (IRCyr) project is licensed under a Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)

- Interoperability
- Findability
- Reuse
- Accessibility

The Vindolanda Tablets online project can be found via the Catalogue of Digital Editions maintained by Greta Franzini and the Catalog of Digital Scholarly edition by Patrick Sahle

- Findability
- Interoperability
- Accessibility
- Reuse

The dataset of the I.Sicily project is stored in the research repository of Zenodo

- Reuse
- Findability
- Interoperability
- Accessibility

The epigraphic inscriptions of the Cretan Institutional Inscriptions (CII) project are encoded through the EpiDoc-XML markup

- Reuse
- Findability
- Accessibility
- Interoperability

EDH has a IIIF API which allows reusing images without copying them from one server to another

- Interoperability
- Accessibility
- Findability
- Reuse

The Inscriptions of Roman Tripolitania (IRT) project allows downloading the whole dataset

- Reuse

- Findability
- Interoperability
- Accessibility

Check your answers at: https://teach.dariah.eu/mod/hvp/view.php?id=1753

5. From user to maker: effective pedagogies

The aim of this lesson is to illustrate examples of formats and methods for teaching digital competences applied to the study of ancient written cultures with special attention to epigraphy. In reviewing different kinds of experiences, we will focus in particular on some principles and innovative pedagogies widely used for the transmission of these skills, such as learning-by-doing, problem-based learning and integration of different expertise.

5.1 Effective pedagogies

The most frequent teaching and learning contexts

The development of digital tools for the study and research of ancient texts has soon led scholars to reflect on how they could digitally train epigraphists, papyrologists, ancient historians etc. in order to meet new needs and how they could integrate these now necessary **digital competences** into traditional teaching.

The first *EpiDoc* and *Leiden+* workshops of the early 2000s have been designed in the context of projects such as Inscriptions of Aphrodisias and Integrating Digital Papyrology. Since then, **workshops** and **intensive training activities** dedicated to scholars and researchers of classical antiquity who want to acquire digital skills are regularly organised in several universities and institutions in Europe and beyond. An updated (but not complete and with a special focus on EpiDoc training events) list of these activities can be found on a dedicated page in the *Digital Classicists Wiki*: https://wiki.digitalclassicist.org/EpiDoc_Workshops.

As Bodard and Stoyanova (2016) observe in an article about **strategies for teaching and learning digital epigraphy**, at least three different formats of training activities have been experimented so far:

1. one- or two-day workshops attached to conferences/week-long workshops/short summer schools
2. specific training of students, interns and research assistants
3. EpiDoc training re-cast for students as part of digital humanities or other courses

The first teaching and learning activity usually offers a **general introduction to both practical and theoretical concepts for beginners** and has the main purpose of attracting participants' interest in digital tools applied to ancient written cultures. This category includes the workshops and intensive training activities connected to project conferences organised by ENCODE, which are useful for collecting information about best practices in teaching and learning and producing materials to be re-used in teaching contexts (this ENCODE open online course and the teaching modules stored in the ENCODE Database). Besides this, ENCODE aims at enhancing the modular integration of digital competences into academic courses in various forms (distance learning practice, blended, e-learning) and/or the inclusion of the digital training set inside the university study curricula.

The second type of teaching and learning activity is usually **dedicated to student interns and research assistants on EpiDoc-based projects**, with the possibility to put their training into practice and work directly on their own materials.

Lastly, the third example is exemplified by Bodard and Stoyanova (2016, 56-57) by describing the experimentation of a 90-minute class within an MA course on *Digital Scholarly Editing and Textual Criticism* they have taught at the University of Leipzig. The course was followed by a heterogeneous group of students of Computer Science and other disciplines connected with the ancient cultural heritage (but not Greek and Latin epigraphy). After this experience, other experiments have been conducted in order to **integrate digital epigraphy into the traditional epigraphic teaching**. The benefits of digital methodologies on traditional teaching, such as the improvement of a structured way of thinking about producing data, the ability to manage complex sets of information and the development of a more interdisciplinary perspective, have already been described in 1.1.2 Teaching and Learning Epigraphy together with digital Epigraphy, alongside some concrete examples.

A fourth possibility must be added to these three, i.e. **fully online courses with forum interaction**, often integrated into university courses but also open to a global audience. The most famous example of this is Sunoikisis Digital Classics, which offers online sessions live-streamed through *YouTube* and materials available in a *GitHub* repository.

Interview with Monica Berti about goals and teaching format of SunoikisisDC [10:10]

SunoikisisDC originally started in 2015 as a MA programme for the Digital Humanities course of the University of Leipzig in collaboration with the Harvard's Center for Hellenic Studies and the Institute of Classical Studies London, but it is now an international consortium of Digital Classics programs involving a large community of instructors and students from more than 90 institutions from all around the world. On SunoikisisDC, see the ENCODE Guidelines 2.3.3 SunoikisisDC. For a more recent article on the context of teaching and learning, see Bodard and Vagionakis (2022).

Presentation of SunoikisisDC - An International Consortium of Digital Classics Programs, Monica Berti, Gregory R. Crane (Leipzig), Kenny Morrell (Center for Hellenic Studies) [1:03:29]

References

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Exercise

Test 5.1 Teaching Digital Epigraphy

Read the Report on digital competences, learning outcomes and best practices in teaching and learning by Birgit Breuer within the ENCODE project (2021: https://site.unibo.it/encode/en/outputs)

and match each training programme mentioned by the participants to the survey (p. 8) with the three formats of training activities identified in the article of Bodard and Stoyanova (2016)

- EpiDoc training re-cast for students as part of digital humanities or other courses
- one- or two-day workshops attached to conferences/week-long workshops/short summer schools
- specific training of students, interns and research assistants

EpiDoc Workshops:

- specific training of students, interns and research assistants
- EpiDoc training re-cast for students as part of digital humanities or other courses
- one- or two-day workshops attached to conferences/week-long workshops/short summer schools

ENCODE Workshops:

- EpiDoc training re-cast for students as part of digital humanities or other courses
- specific training of students, interns and research assistants
- one- or two-day workshops attached to conferences/week-long workshops/short summer schools

Epigraphy.info Workshops:

- one- or two-day workshops attached to conferences/week-long workshops/short summer schools
- EpiDoc training re-cast for students as part of digital humanities or other courses
- specific training of students, interns and research assistants

SummerCamp 2020 VeDPH:

- one- or two-day workshops attached to conferences/week-long workshops/short summer schools
- specific training of students, interns and research assistants
- EpiDoc training re-cast for students as part of digital humanities or other courses

Check your answers at: https://teach.dariah.eu/mod/hvp/view.php?id=1754

6. The digital epigraphic workshop: Editing

This lesson focusses on the creation of digital critical editions, emphasizing the importance of markup. It explores digital editions of ancient inscriptions and introduces EpiDoc, a standard for encoding these texts. Additionally, the chapter covers the encoding of metadata, text, and relevant semantic features, providing participants with the skills to produce detailed and meaningful digital representations of historical inscriptions.

6.1 What is a digital critical edition? What do we mean with markup?

A **digital critical edition** is not just a reproduction of a printed critical edition but, to quote Patrick Sahle:

"a digital edition cannot be given in print without significant loss of content and functionality" (Sahle 2016).

It means that it should exploit the opportunities of the digital environment to provide a surplus of information and/or functionalities, like for example new possibility of flexible indexing when working on a corpus, or adding dynamic information about different possible interpretations of the written object itself.

Digital critical editions usually make the most of descriptive or semantic markup. **Descriptive markup** (also called 'encoding' or 'annotation') is a way to make explicit for the computer what is implicit for a reader: it is a way to tell the computer what we think a thing represents (in a written document or in our understanding of metadata). It is different from renditional markup which mainly represents a layout but not the meaning associated with it.

In order to make this clearer we can look at the following example:

The renditional markup will look like this:

```
<p><span style="color:black">YOU ARE NOT WHAT YOU OWN</span></p>

<p>

<span style="color:white">YOU ARE</span>

<span style="color:black">X</span>

<span style="color:white">NOT WHAT YOU OWN</span>

</p>
```

You can see that the markup tags (which are put always at the beginning and at the end of the part of text that you are encoding) make explicit to the computer that the text is divided in two paragraphs ( ) and that the first is written in black (), while the second is written in white (), except for one letter (x) which is written in black.

The semantic markup will instead look like this:

```
<p>YOU ARE NOT WHAT YOU OWN</p>

<p>YOU ARE <del rend="strikethrough">NOT</del> WHAT YOU OWN</p>
```

You can see that through this markup we are describing that there are two paragraphs, each one surrounded by , and in the second paragraph we make explicit the meaning of the black letter, namely that its function is to delete with another sign (<del rend="strikethrough"></del>) a part of the text (NOT). In this case we are not interested in explaining the different colour of the two lines, which we could otherwise do, but we want to make clear that the second line has a different meaning thanks to the deletion of one part of the text. Through the semantic markup, we could make explicit other aspects as well, by deciding what it is relevant from the semantic point of view. The decision on which markup to use, as it involves an interpretation, depends on the research questions that the digital editor wants to make explicit.

In the community of digital epigraphists, as well as among most scholars dealing with different types of texts, the most used markup language is XML (Extensible Markup Language), which is a very flexible tool nowadays widely used in electronic publishing and data exchange. Since XML is highly customizable, in order to describe many textual and other data phenomena, many vocabularies and standards have been created by communities of practice. Scholars dealing with written documents take advantage of TEI (Text Encoding Initiative), a consortium which developed a standard specific for encoding historical and literary documents through XML. More specifically digital epigraphists as well as papyrologists have created a subset of markup declarations within TEI which is called EpiDoc.

Interview with Gabriel Bodard about EpiDoc and its advantages in publishing digital epigraphic corpora and databases [4:30]

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Further reading

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6.2 Digital editions of ancient inscriptions and EpiDoc

One of the most important tasks of epigraphists is to produce the edition of the inscriptions on which they are working. Building the edition of ancient written sources means not only providing the transcription and interpretation of the text but also the study of the monumental support, its topographical and historical context. Scholars pointed out that the digital environment succeeds in enhancing the multidimensionality of the inscription-object (Lasagni 2020: 206) text, support and context by rapidly juxtaposing, comparing and relating different types of information: this new way of structuring data has the advantage of creating new perspectives of investigation on the ancient document, changing the way the discipline has been traditionally understood.

As we have seen above, EpiDoc is a subset of TEI (Text Encoding Initiative), an XML language for encoding literary and linguistic texts, and as an XML language, makes use of the XML syntax, based on elements composed of tags (bits of code surrounded by angle brackets).

Example of two EpiDoc-XML elements and of their components:

```
<supplied reason="lost">ἔδοξε</supplied>: element
```

This means that the word ἔδοξε has been supplied by the editor as it was lost on the stone.

supplied: element name

reason: attribute name

lost: value name

ἔδοξε: element content

<supplied>: opening tag

</supplied>: closing tag

<lb n="1"/>: empty element (i.e. without any content, used to mark a point in the text and not a span of text)

This indicates the beginning of line number 1 of a text.

lb: element name

n: attribute name

1: value name

<lb/>: unique opening and closing tag

From the first example, it is pretty clear that the XML markup has a rather transparent meaning. According to the Leiden conventions, the square brackets express a lacuna integrated by the editor - [ἔδοξε: the same phenomenon is expressed in EpiDoc through a <supplied> element followed by an attribute and a value, which explain why the original text cannot be read on the support. In other words, the EpiDoc-XML markup is not only a machine-readable but also a human-readable language.

The semantic nature of this language allows not only to efficiently encode the traditional components of a critical epigraphic edition (metadata, text, apparatus, translation, commentary and bibliography), but also specific interpretative features, such as historical, topographic, prosopographical and linguistic data, which may occur in your inscriptions and which you may want to highlight for specific purposes of your project (see Cayless et al. 2009). The digital edition, thus, presents the same structure as the printed edition, but the strict distinction in specific sections allows epigraphists to reflect even more on how to deal with all these aspects and to safeguard consistency in the handling of data.

For the structure of an EpiDoc edition please check the following page: https://epidoc.stoa.org/gl/latest/supp-structure.html, from which you can download an EpiDoc template and open it in an XML Editor.

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- Steiner, K., & Mahony, S. (2016). How are digital methods changing research in the study of the classical world? An EpiDoc case study. Panta Rei. *Revista Digital de Historia y Didáctica de La Historia*, *10*, 125–148. https://doi.org/10.6018/pantarei/2016/8.

ENCODE Database Modules

- Unibo Digital Lab
- Introduction to XML
- Introduction to TEI
- London-Bologna Online EpiDoc Workshop 2021
- Encode DGLE Workshop 2021
- ATOM
- Oxygen XML Editor Demo

Resources

- For the EpiDoc Guidelines: https://epidoc.stoa.org/gl/latest/index.html
- For other EpiDoc resources: https://sourceforge.net/projects/epidoc/
- For syllabi of EpiDoc workshops and courses linked to resources produced by the EpiDoc community: https://github.com/EpiDoc/Tutorials/wiki/All-tutorials

Exercise

Test 6.1 The rules of XML

Which of these examples is not a well-formed XML? Please refer to the rules you find in the ENCODE module Introduction to XML

Which of these examples is not a well-formed XML?

<gap reason="lost"/></gap>

Well formed
Not well formed

<name>Augu<st>i</name>

Well formed
Not well formed

<bibl><author>Bodard & Yordanova</author>...</bibl>

Well formed
Not well formed

<name><supplied reason="lost">Ἀρτ</supplied>εμίδωρον</name>

Well formed
Not well formed

<dimensions type="letterHeight">

```
    <height unit="mm">70-75</height>

</dimensions>
```

Well formed
Not well formed

```
<book>

   <page>
      <paragraph>.....</paragraph>
      <paragraph>...
   </page>
   <page>
      </paragraph>

      <paragraph>.....</paragraph>
   </page>

</book>
```

Well formed
Not well formed

```
<name>Νικο<gap reason="lost"/></name>
```

Well formed
Not well formed

How can you correct the not well-formed examples? Check your answers at:
https://teach.dariah.eu/mod/hvp/view.php?id=1756

7. The digital epigraphic workshop: structuring data

The aim of this lesson is to explain how digital tools can improve our capacities to structure and categorise data in order to manage and integrate different kinds of information. A starting point could be to reflect on the difference between including information in a structured relational database or marking it up following a hierarchically semi-structured content model. Another important aspect is the integration of external resources, such as links to controlled vocabularies, geographical gazetteers, prosopographical and bibliographical repertoires and the creation of indexes and concordances.

7.1 Structuring data

Semi-structured and structured data: XML and relational databases

In the digital humanities (and more broadly in the IT world) there are not things such as good or wrong formats and data models: the core question is to ask what purpose we aim at, and what format or data model is most appropriate for achieving it.

For the purposes of digital epigraphy, it is usually most appropriate to work with **semi-structured data**, and specifically with data that follow a hierarchical tree structure. This is the case of **XML language**, where all the contents of a file are included in a so-called root element, inside which all other elements are nested. This type of data model makes it possible to locate very precisely each element based on its relationships with the other elements, that are conventionally defined in terms of 'kinship': an element can in fact be the ancestor, parent, sibling, child or descendant of another element. To make a practical example, this type of structure allows for instance to find and extract all the bibliographic references that are mentioned in the commentary of an epigraphic edition but e.g. not those that are mentioned in its proper bibliography, and more precisely only those for which a range of pages have been specified (that is, all the <bibl> elements that have as ancestor and have a descendant <citedRange unit="page">). Or, again, it would make it possible to retrieve from the text transcriptions of a collection of inscriptions all the onomastic formulas that include an ethnic adjective (that is, all the <persName> elements having as a descendant or as a close following sibling a <placeName type="ethnic">).

ENCODE Interview with Pietro Liuzzo about the advantages of working on semi-structured data in the field of digital epigraphy [6:37]

Nothing like this would be possible if the inscription data were digitised as unstructured data, e.g., as plain texts. Another possibility could be digitise inscriptions through relational databases containing fully structured data. Relational databases are collections of data that follow a relational model, based on one or more tables constituted of rows and columns that can be related between each other.

An example of a relational model applied to epigraphy could be a table in which each row contains a different inscription, and each column contains a particular type of epigraphic information, for example title, identifier (main bibliographic reference), provenance, date, inscription type, support type and so on. With this approach it would be possible to find for example all inscriptions that have been classified as decrees, or that belong to the III century AD, or whose Provenance column contains

Sicily, or whose Text column contains the word 'nobilis'. Whereas this approach could be enough for the management of epigraphic metadata (as the ones mentioned above), perhaps is not the best way to handle the ancient texts and the other non-schematic parts of an epigraphic edition.

Exercise

Test 7.2 Digital Epigraphy and Authority Lists

Which kind of information would you find in Pleiades?

Cyzicus, milestone, Xenon, limestone, Aigai, Pasiklees_son_of_Antipatros

Which kind of information would you find in LGPN?

Cyzicus, milestone, Xenon, limestone, Aigai, Pasiklees_son_of_Antipatros

Which kind of information would you find in the EAGLE vocabularies?

Cyzicus, milestone, Xenon, limestone, Aigai, Pasiklees_son_of_Antipatros

Check your answers at: https://teach.dariah.eu/mod/hvp/view.php?id=1757

8. The digital epigraphic workshop: contextualising

This lesson aims at teaching how to manage information about the context in which sources were produced and preserved. In particular, we will take into account 3D reconstructions of archaeological objects and contexts used for visualising or reconstructing inscribed objects and their original and modern locations and thick mapping in order to rebuild their travelling history. This topic is strictly linked to the problem of decolonisation of cultural heritage (to which the digital environment with its several tools may offer a solution), since it is an ethical obligation to trace back the movements and the history of ancient objects.

8.1 Reconstructing contexts and objects: 3D technologies and thick mapping

In order to be interpreted correctly, the inscription must be analysed taking into account its context of production, use and eventually relocation due to reuse. For instance, special attention to the geographic location of inscriptions is paid by LatEpig, a tool that allows you to query all the inscriptions from the Epigraphic Database Clauss Slaby in a reproducible manner, saving the search results in a TSV and a JSON file and reproducing them on an interactive map of the Roman Empire along with the system of the Roman Provinces, roads, and cities.

In recent years, the practice of **3D modelling and digital reconstruction of archaeological contexts** has become widespread in archaeology for research purposes and dissemination. In particular, 3D modelling or visualisation (and other techniques such as Augmented Reality, AR) is used for the reconstruction of damaged or lost objects and archaeological contexts. For this reason, this technique is particularly used for the digital preservation of cultural heritage sites as long as reconstructive models follow a scientific approach.

Sunoikisis DC Spring 2022 Session 3: 3D Imaging in Museum Research. Convenors: Gabriel Bodard (Institute of Classical Studies, University of London), Daniel O'Flynn (British Museum), Daniel Pett (Cambridge) [1:31:21]

An example of this practice is Ancient Olympia: Common Grounds, a collaboration between the Hellenic Ministry of Culture and Sports and Microsoft, which uses AI and 3D modelling to recreate the ancient city of Olympia with guided tours among monuments and buildings, giving an impressive insight into what daily life must have been like in the ancient city. Indeed, as Sanders (2008) points out, 3D can help to better understand data compared to static representation in 2D and produce new insight into the past. Moreover, the use of 3D reconstructions can also have the ethical function of bringing to a new life our cultural heritage damaged by natural disasters or human intervention. This is the aim of Rekrei, a crowdsourced project collecting photographs of damaged monuments, museums, and artefacts and creating 3D representations through photogrammetric techniques.

C. Coughenour, How your pictures can help reclaim lost history (TEDxHamburg) [11:57]

More frequent in the epigraphic field is **3D imaging or scanning**, which recreates a three-dimensional digital copy of the inscribed object. Several projects make use of 3D imaging, such as Epigraphia.3D and some projects of the Digital Epigraphy and Archaeology Project (Digital Worlds Institute and Department of Classics at the University of Florida), such as the Digitization of inscriptions from the Aleshire collection or tools for 3D reconstruction of epigraphic squeezes such as the Digital Epigraphy Toolbox and the Shape-From-Shading 3D reconstruction On-Line Tool. The advantage of having 3D images of inscriptions is particularly obvious in the case of damaged inscribed surfaces difficult to read with the naked eye. An accurate digital reproduction of the object can also allow, for example, an exact categorisation of ancient inscriptions providing information on epigraphic workshops. Finally, the combination of different types of images of the inscribed object can also be of great interest from a diachronic point of view, especially when a photograph and a squeeze or its 3D reproduction testify to two different states of preservation over time. For 3D imaging or scanning applied to inscriptions, see also below: 9.3 Digital tools for public engagement.


Interview with Gabriel Bodard about the use of imaging and 3D models for the study of ancient inscriptions [5:34]

Other projects make use of the **Reflectance Transformation Imaging (RTI)**, a computation photography technique that captures the surface shape and colour of the artefact enabling the interactive re-lighting of the subject from any light direction and improving the readability of the written document. RTI images of a small collection of inscriptions are employed in the Ashmolean Latin Inscriptions Project website.

Furthermore, many repositories of images make use of the **International Image Interoperability Framework (IIIF)**, a set of application programming interfaces that provide a standardised method of integrating textual data with the images of documents bearing texts (including manuscripts, inscriptions, cultural heritage objects) and the related metadata.


Sunoikisis DC 2017-2018 Session 10: 3D Scanning and Imaging. Graeme Earl (King's College London), Sven Gronemeyer (Bonn), Valeria Vitale (University of London) [1:21:06]

8.2 Travelling objects

In addition to the reconstruction of archaeological contexts and objects, it is important to **record the travelling history of the object**, highlighting its connection to different places and possibly its different functions in relation to places. The **EpiDoc markup** with its template provides structured sections in which we can record the different locations of the inscribed object, from its place of origin (<origPlace>) to the context of discovery and subsequent modern observations. The modern locations of the object are encoded by a <provenance> element: adding to the element a @type attribute we can specify through different values the circumstances of findings ("found"), observations by scholars ("observed") and possible relocation ("transferred").

This is an example from I.Sicily (ISic000477):

```
                <origin>
                  <origPlace>
                    <placeName type="ancient" cert="low"/>
                    <placeName type="modern"
ref="http://pleiades.stoa.org/places/816414429">Castronuovo di Sicilia</placeName>
                    <geo>37.67894, 13.60346</geo>
                  </origPlace>
                  <origDate datingMethod="#julian" when-custom="0570">570 CE</origDate>
                </origin>
                <provenance type="observed">Known since the 17th century; previously in the
church of S. Maria dell'Udienza on Colle S. Vitale.</provenance>
                <provenance type="transferred">Subsequently transferred to the Chiesa Madre of
the Holy Trinity in Castronovo, where it is built into the wall.</provenance>
                <provenance type="observed" subtype="autopsied">None</provenance>
                <acquisition/>
              </history>
```

The EpiDoc markup, thus, allows the digital editor to very carefully record details of the object's spatial location over time, but this is not the only way we can use to record its travelling history. **Thick mapping**, for example, displays different data on a geographic map, taking into account different movements and moments in the object's life, by adding different layers of information and different types of data that help to shed light on the object itself. This is the aim of the Deep-mapping Sanctuaries project, funded by the Netherlands Organisation for Scientific Research (NWO), which will create a 'spatial narrative' of festival hubs in the Hellenistic world through thick mapping, investigating the significance that visitors attached to these places, true crossroads of collective ideologies and personal lives.

Furthermore, some digital epigraphic projects have maps that **geolocalise inscriptions** and other written artefacts using a **Geographic Information System (GIS)**. An example is the tool provided by the LatinNow project LatinNow GIS Data, a freely available online web GIS, which allows the visualization of a huge epigraphic dataset alongside a range of data from collaborating projects. This makes it possible to extrapolate spatial, topographical and geographic information regarding the places of discovery, original location, conservation of the inscribed artefact or references to places or communities within the epigraphic text. A project using GIS software is Poeti Vaganti (Prof. A. Cinalli, funded by the European Union's Horizon 2020 program), in order to show a map representation of the mobility of artists in the Hellenistic period. The map is linked to an autonomous epigraphic database (with links to Pleiades and other external resources) that contains inscriptions documenting artists' itineraries and that can also be consulted via a search mask.

Further reading

- Lasagni, C. (2020b). The Places of the Inscriptions: From Epigraphy to Digital Epigraphy. *Historikà, 10*, 233–250. https://doi.org/10.13135/2039-4985/5185

8.3 Decolonizing ancient cultural heritage

The digital reconstruction of archaeological contexts and the digital reproduction of artefacts have greatly encouraged the **decolonisation of ancient cultural heritage**: it is not uncommon that many inscribed objects found mainly in the south-eastern part of the Mediterranean have been brought to light by archaeological exploration linked to a colonial context and transferred to European museums and institutions, thus uprooting them from their original places. The **digital environment**, on the

other hand, allows the reproduction of the inscribed object through images and the tracing of its history from its discovery to its transfer, thus favouring its **re-appropriation by the inhabitants of its countries of origin**. This, for instance, is the aim of a corpus such as IGCyr (Inscriptions of Greek Cyrenaica), as stated in the preface edited by Alice Bencivenni (2017):

In the aftermath of the revolution it seemed that Libya was 'facing an era of unparalleled change' and it was 'greatly to be hoped that this' would have brought 'new benefits both to archaeology and to tourism, and that it' would have resulted 'in a level of public understanding of history and archaeology amongst the Libyans themselves which they have never previously been invited to participate in' [Kenrick 2013: 17]. The IGCyr project was launched in the same period, in the same spirit. At the time of writing (2017) everything is very uncertain since 2013, archaeological expeditions are impossible, most foreign diplomatic missions are closed or displaced to another country; but scholars who are prevented from visiting Libya can take stock of their work at this point, and aim to make it more fully available than ever before, in the hope of providing a rich resource for Libyan scholarship in the future.


SunoikisisDC Fall 2019 Session 3. Decolonization of Cultural Heritage. Convenors: Usama Gad (Aim Shams University, Egypt & Institute of Classical Studies), Zena Kamash (Royal Holloway University of London), Patricia Murrieta Flores (Lancaster University) [1:28:36]

Further reading

- Kenrick, P. M. (2013). *Cyrenaica*. Silphium Press. https://www.bilnas.org/ebook/libya-archaeological-guides-cyrenaica/
- Traina, G., Janniard, S., Cecconi, G.-A., Marotta, V., Lamberti, F., & Le Roux, P. (2006). Sur le concept de romanisation. Paradigmes Historiographiques et perspectives de recherche. *MEFRA, 118*(1), 71–166.

Exercise

Test 8.1 Inscriptions in Context

Read the text about 3D technologies for the contextualization of ancient artefacts and fill in the gaps:

_____, _____and _____are used nowadays in archaeology and other disciplines dealing with ancient artefacts for research purposes and dissemination. An interesting field is for example the reconstruction of damaged or lost objects and archaeological contexts. This is the aim of the _____ project, which collects photographs of damaged monuments and artefacts to recreate their 3D representation. In the field of epigraphy, the _____and _____make use of 3D imaging or scanning. Another technology that several epigraphic projects use is _____, a computation photography technique which captures the surface shape and colour of the artefact enabling the interactive re-lighting of the object from any light direction. An example of project which makes use of this technology is the _____.

Check your answers at: https://teach.dariah.eu/mod/hvp/view.php?id=1758

9. The digital epigraphic workshop: disseminating

This lesson aims to present issues, teaching/learning materials and projects related to the scientific dissemination of epigraphic knowledge and public engagement with digitised heritage. We will take into account, on the one hand, the active participation of digital epigraphists in digital infrastructures and, on the other hand, tools employed to involve the general public in scholarly research and for heritage organisations to engage with the wider community.

9.1 Scientific Dissemination: International Digital Infrastructures

As mentioned before, one of the most important aspects of **digital epigraphy** is the possibility to **exchange and reuse data** according to the Linked Open Data principles. Exchange and reuse are possible due to the fact that resources are identified and disambiguated through a univocal URI, data are published in open access and structured according to specific encoding formats (see above: 4.1 Principles and standards). Scientific dissemination in the digital environment is therefore based on these principles and also made possible by the existence of international digital infrastructures that make sets of data freely available aggregating different projects. Many scholars, including epigraphists, are involved in these international digital infrastructures, among which are worth mentioning:

- Trismegistos
- Europeana, a platform that offers tools with the aim of enhancing access to cultural heritage for education, research, creation and recreation (among its projects is EAGLE, for which see above: 2.2 The collaborative dimension of digital epigraphy: EAGLE)
- DARIAH-EU, an international network, whose aim is to enhance and support digitally-enabled research and teaching across the arts and humanities and other international platforms (among its projects is #dariahTeach)

ENCODE Interview with Silvia Orlandi about EAGLE and the instruments for scientific dissemination [3.20]

9.2 Scientific Dissemination: Publication Tools

For **publishing individual corpora of inscriptions in XML**, there are several XML publishing tools, some of which are specifically designated for EpiDoc files. These include:

- TEI Publisher
- CETEIcean
- TAPAS (TEI Archiving, Publishing, and Access Service)
- Kiln
- EFES (EpiDoc Front-End Services)

EFES, in particular, is a customisable platform specifically designed to publish ancient texts in EpiDoc XML, allowing the creation of multiple indices, search and browse interface, concordances, and integration with linked open data. Many of the epigraphic projects mentioned in the previous chapters are published via EFES; for a list of projects based on EFES: https://github.com/EpiDoc/EFES/wiki/Projects-using-EFES.

ENCODE Database Modules

- Create your textbook from TEI EpiDoc
- Displaying EpiDoc files using EFES
- EFES Customisation
- EAGLE dedicated services and their educational potential

9.3 Digital Tools for Public Engagement

With regard to **public engagement**, we can mention several digital tools that contribute to the preservation, dissemination and promotion of the epigraphic heritage.

Digital Epigraphic Storytelling

An important tool is **storytelling** or **the creation of multimedia narratives on epigraphic content**. The storytelling practice assumes that behind every document there are stories of people and/or communities and that every document needs a historical contextualisation in order to be correctly read and interpreted. Trying to give voice to ancient documents and inscriptions, in particular, can have multiple purposes and involve different areas, from education (storytelling as a way to support training activities), to research (storytelling as a way for scholars to inform the public about ongoing research) and to museum curation (storytelling as a way to promote the archaeological heritage and facilitate wider access to ancient artefacts).

A **storytelling platform** is offered by EAGLE (for which see above: 2.2 The collaborative dimension of digital epigraphy: EAGLE), the Flagship Storytelling Application. Through this platform, users can read published stories and publish new stories accompanying them with epigraphic texts, images, videos, maps of ancient places and other resources provided by EAGLE and other providers (Perseus, Wikimedia Commons) according to the LOD principles. Moreover, the platform provides the possibility to search the full text of all published stories and to search them by author, Europeana ID, keywords and language using filters.


Interview with Silvia Orlandi about EAGLE and the instruments for public dissemination, in particular the EAGLE Storytelling Application [3:01]

Not only do international digital infrastructures promote storytelling, but also individual **museums**: a beautiful example of this practice is the storytelling initiative promoted by the Museo Nazionale Romano #ilMuseoTiRacconta- for an example of story, see Diomedes il calzolaio:


Museo Nazionale Romano. Storytelling by Carlotta Caruso: Diomedes il calzolaio [1:50]

An ongoing ESF-React EU **project on digital storytelling** worth mentioning is Telling Stones (Department of Historical Studies, University of Torino, Prof. D. Marchiandi, Prof. C. Lasagni, Dott. P. Fratini), which aims to make groups of Athenian public inscriptions accessible to the public by emphasizing the link with their original context. This is possible thanks to the Izy.Travel app, already extensively tested in the field of digital storytelling, which offers the possibility of listening to and downloading geolocalized audio guides created by users. The aim of the project is to create an epigraphically themed tour of Athens that will bring the public closer to ancient inscriptions.

Involvement of schools

The project was responsible for the organisation of a workshop Laboratorio di epigrafia romana a scuola. Il progetto EAGLE e alcune esperienze didattiche con i licei classici e scientifici di Roma, 2015-2016. During this workshop, **students** were given an introduction to Roman epigraphy and the EAGLE project, with practical exercises on editing epigraphic texts and entering translations on MediaWiki.

Other digital epigraphic projects are very **active in involving schools**, such as the Ashmolean Latin Inscriptions Project (AshLi), which provides several teaching resources such as texts, images and videos (https://www.ashmolean.org/learning-resource-ancient-greece), the Roman Inscriptions of Britain in Schools (https://romaninscriptionsofbritain.org/schools/about), an Open Learning collaboration between LatinNow and Classics For All,which provides teachers with useful resources for teaching Latin epigraphy and the projects I.Sicily and EPICUM which collaborated with the Liceo Artistico Statale M.M. Lazzaro within the Italian state's alternanza scuola-lavoro scheme, producing digital editions of inscriptions from Catania preserved in the Museo Civico di Castello Ursino (https://isicily.org/2016/10/19/its-all-about-collaboration/).

ENCODE Interview with Lorenzo Calvelli about the practice of epigraphic storytelling in educational contexts [3:14]

Virtual Exhibitions

Another area aimed at promoting public dissemination is that of **digital and virtual exhibitions**, which offer an immersive and interactive experience using animation to reproduce original artefacts and archaeological contexts. Such exhibitions usually aggregate different kinds of contents (digital libraries of 3D models, texts, images, geospatial data, audio, videos, etc.) and are useful to display temporarily or permanently tangible and intangible cultural heritage: the techniques employed Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR) etc. can also contribute to the preservation or the reconstruction (if lost) of the damaged archaeological heritage.

ENCODE Interview with Lorenzo Calvelli about the role played by digital technologies in the epigraphic training of students and in the dissemination and preservation of ancient cultural heritage [3:29]

SunoikisisDC Session 9: Archaeology, VR and other gaming technologies. Convenors: Coré Ferrer-Alcantud (Universitat Jaume I), Andrew Reinhard (New York University) [1:35:23]

Another digital tool of EAGLE is a **mobile app**, the EAGLE Mobile App, that uses an image-based recognition system to provide the text and metadata of inscriptions from photographs: users can take a picture of an inscription with a mobile device, send it to the EAGLE server, which links the image to inscriptions stored in the EAGLE database. This tool is particularly useful because inscriptions, unlike other artistic objects, are most of the time less accessible to the general public, especially if one cannot decipher them. By being able to obtain from a photograph the contextual information, the ancient text and possibly its translation, the user can have an easier access to the document. Increased accessibility to ancient inscriptions can have the consequence of encouraging their inclusion in touristic routes and educational projects. The translation of the inscriptions is provided through EAGLE MediaWiki, a software installed on the EAGLE website, which uses the additional extension Wikibase, aiming at producing multilingual translations of ancient inscriptions.

Videogames

Lastly, another way of bringing the past closer to the wider public is through **video games**, which represent an important participatory form of public history, offering **interpretations of the past in the form of simulations**, and can be used for educational and academic purposes. Here it is worth mentioning the first example of epigraphic videogames VALETE VOS VIATORES, a project funded by the European Union's Creative Europe programme and carried out by the University of Navarra, University of Coimbra, University of Bordeaux and University of Rome La Sapienza. The project provides a virtual museum and a videogame realised through 3D modelling by following in the footsteps of a stonecutter in the Roman empire: by playing the videogame, users learn the rudiments of the Roman craftsmanship on stone and the epigraphic culture of the western regions of the Roman empire.

Valete vos viatores: la vía Appia en el videojuego epigráfico [1:25]

Exercise

Test 9.3 Epigraphy and Public Engagement

Read the keynote speech that Mary Beard presented to the final EAGLE conference held in Rome on Jan, 27-29 2016 (https://www.eagle-network.eu/story/putting-ancient-inscriptions-in-the-limelight/) and answer the questions about inscriptions and storytelling:

What is the main aim of the three-part series Meet the Romans commissioned by BBC2 and first broadcast in 2012:

- raise excitement of Roman epigraphy in the general public
- bring experts in the field into dialogue for a specialist audience
- tracing the history of the Roman Empire mainly through the analysis of literary sources

What is the main reason identified by Mary Beard for the general public’s lack of interest in the Latin epigraphy?

- the general public's lack of interest in ancient history
- the lack of knowledge of the language
- the disorder of exhibits in museums

Which of these factors identified by the scholar to raise the excitement for the Latin epigraphy in the general public is not explicitly mentioned in the text?

- inscriptions as historical sources
- epigraphy as a glimpse into the intimate domestic life
- the inscription as a physical tangible object

What further information can be deduced from reading the epitaph of Minicia Marcella (CIL 6 16631)?

- political and military history
- demographic and social history
- cultural history

What is the focus of the programme Caligula (2013)?

- dealing with inscriptions with more specifically political themes
- focusing on epigraphic sources attesting to ancient daily life, especially epitaphs
- tracing the history of the emperor through the analysis of epigraphic sources

Check your answers at: https://teach.dariah.eu/mod/hvp/view.php?id=1759

10. AI and ancient inscriptions

This lesson illustrates individual projects based on the application of AI to the study of ancient epigraphy, providing an updated list of the most recent studies and projects. Critical aspects alongside best practices in the use of AI applied to this field of study will also be discussed.

10.1 The application of AI in Epigraphy: The example of some projects

Machine learning is the branch of **Artificial Intelligence** which teaches computers patterns and models by looking at examples from already provided datasets; these models are incorporated by computers and applied to other new datasets. In recent years, many projects in the field of ancient cultural heritage have made use of machine learning to accomplish different **automated tasks** such as translation of ancient texts, restoration of damaged texts, identification of ancient workshops and hands, attribution of ancient written artefacts to their original findspot, 3D representations of damaged archaeological sites etc. In the epigraphic field, in particular, some interesting **tools** can be mentioned:

- Pythia (Thea Sommerschield, University of Oxford, Yannis Assael, DeepMind, Jonathan Prag, University of Oxford), an Ancient Greek text restoration model that recovers missing characters from a damaged text; the project will be implemented through a Marie Skłodowska-Curie postdoctoral fellowship (Thea Sommerschield, University of Oxford) by enlarging the dataset (PythiaPlus);
- Ithaca (Thea Sommerschield, University of Oxford, Yannis Assael, DeepMind et al.), a deep neural network which restores ancient texts attributing them to their original place and time of writing;

Interview with Thea Sommerschield about Pythia and Ithaca [3:45]

- Fabricius (Google Arts and Culture), a machine learning tool which offers translations of Egyptian hieroglyphs into modern languages;
- Classifying Latin Inscriptions of the Roman Empire: A Machine-Learning Approach (Vojtěch Kaše, Petra Heřmánková and Adéla Sobotková, SDAM project), a machine learning classification model which uses inscriptions categories from EDH to label inscriptions from EDCS in order to standardise categories of inscriptions to shared vocabularies (EAGLE);
- AGILe (The First Lemmatizer for Ancient Greek Inscriptions) is an open-source software which applies Machine Learning for lemmatizing epigraphic texts developed by a team of the University of Groningen (Evelien de Graaf, Silvia Stopponi, Jasper K. Bos, Saskia Peels-Matthey, Malvina Nissim). The model is trained through epigraphic data since they are very different from literary texts as characterised by many different local alphabets, a large dialectal variation and a lack of standardised spelling.

The AI historian: A new tool to decipher ancient texts [6:53]

These tools are the product of projects which have involved the collaboration of several scholars and include more stages, such as the already mentioned Pythia and PythiaPlus. Another important example is the project **Reconsidering the Roman workshop: examining the process behind the making of inscribed texts**, funded by the Institute for Data Science and Artificial Intelligence (Charlotte Tupman and Jacqueline Christmas, University of Exeter), which at a first step used a text recognition software for detecting words in an image with the aim of getting information about patterns in the design and creation of epigraphic texts of the Roman world and possibly identifying the work of individual workshops. The same scholars are now undertaking a follow-up project, also in collaboration with the Alan Turing Institute and the University of Oxford to pursue a larger-scale analysis of letter-cutting practices. As a matter of fact, these projects require not only a great effort for the technical part but also much work to prepare huge datasets for software training.

10.2 Challenges and best practices

As sensational as these tools may be, there are some **challenges** scholars have to face in dealing with AI and ancient writing cultures. First of all, the **prediction ability of software** can be **biased** by the kind of data we use during the training: for instance, if we provide the software with documents from only one geographical area or historical period, we will expect very different results than if we widen the field or change the parameters. Another major problem in the use of machine learning for the study of inscriptions is **the need to create large standardised and consistent datasets for software training**: the data must be large because, unlike humans, machines can only learn from large datasets that are standardised and consistent because they have to be processed by computers. Not all epigraphic databases available online have these features, although in recent years the spread of the semantic encoding in EpiDoc-XML has helped to create standardised and potentially reusable data.

Another **issue** for digital epigraphists is to **access the world of AI projects**: the realisation of similar projects is only possible in a collaborative environment and in dialogue with other disciplines, in particular with the world of Computer Science. Interdisciplinarity, alongside the production of open data, is actually a real strength of the application of AI to epigraphy because it also has an impact on the sustainability of these resources. For this reason, it is necessary to overcome the mistrust of traditional epigraphists who are worried about the possibility that these tools may in the future replace them, presenting these projects as complementary integration of their work.

Interview with Thea Sommerschield about the next developments in the applications of machine learning to the study of Greek inscriptions *[3:26]*

Exercise

Test 10.1 Ithaca

Use Ithaca to restore and identify provenance and dating of the following inscription:

[— — —]

[— — —]ν κόσμον ἅπαντα ἐν

[— — —]εως καὶ Βασιλίδος·

[— — —]τως καὶ ἀκαταγνώ-

[— — —]άν μοι ἔτη ιδ ἕν(?),

[— — —]ασα ἔτη κη· ν ὁρκί-

[— — —]κράτορα καὶ

[— — —]οντα αἰῶνα

[— — —]δέν’ ἀνῦξαι

[— — —]νων κατ[ά]-

[— — —]

Evaluate the results you got, both from the point of view of the attribution outputs and the restoration outputs.

Check your answer: https://teach.dariah.eu/mod/hvp/view.php?id=1761

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