DELIVERABLE

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Epigraphy Virtual Exhibition

Deliverable 2.7

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Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPLANATION
CP	Content Provider
DoW	Description of Work
WP	Work Package
WG	Working Group
VE	Virtual Exhibition
VM	Virtual Museum

LIST OF CONTRIBUTORS

The following list includes members of the EAGLE WGs, especially Content Providers and all those members of the international Best Practice Network which provided support with feedback, contents, linkable resources, advice and suggestions. We would like also to acknowledge here all those contributions which would not be possibly referenced otherwise. While contributions have been stated precisely where possible in the deliverable, it should be underlined that the responsibility for the contents stays with the project members. An updated version of this list is also available on the Credits page of the Exhibition.

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LIST OF FIGURES

EXECUTIVE SUMMARY

This Deliverable is created by the Cyprus Institute (CyI) and the University of Heidelberg (UHEI) and it is the result of the collaboration of WP3 with WP2. It reports about the EAGLE Virtual Exhibition "Signs of Life" (http://www.eagle-network.eu/virtual-exhibition/). The document details the collaborative work to produce a general introduction to Greek and Latin epigraphy for the wider public, using the data gathered during the project, especially the resources of the EAGLE best practice network that are in continuous expansion.

The Virtual Exhibition has been conceived during the EAGLE meeting in Nicosia (March 2015) with a simple but effective structure: 6 rooms which introduce the reader and the visitor to some key interesting aspects of Epigraphy.

There are two ways which the visitor can access the Exhibition in: reading the Web page version or entering the virtual space for a fully interactive and immersive tour. In this way the user who likes more to delve into the contents reading them, can start from there; while the more interactive, game like user can experience the contents with a more physical approach, walking in a 3D environment.

The web page version provides an access organized in web pages and includes several featured contents and selected links to external resources and embedded interactive contents.

The Virtual Exhibition allows the user to immerse in a virtual environment and to interact with the content through various functionalities. The virtual museum is organized in Rooms, each representing a specific topic of Epigraphy:

0. Introduction

1. Inscriptions which changed history

2. Scripts and Alphabets

3. Objects and the relation between image, text and context

4. Emotions in inscriptions

5. The stone cutter: methods and mistakes

6. Digital Technologies for Epigraphy

The Deliverable 2.7 is structured in 6 Chapters.

Chapter 1 is an introduction to the task and the objectives of elaborating the Virtual Exhibition within the project and it gives an explanation about the role of the current Deliverable.

Chapter 2 enters in the details of the Virtual Exhibition. After a general introduction and a discussion about the terminological definitions of the outcome, the document presents the research aims and the group users which the exhibition is addressed to. These in fact are the first elements to be analysed for the elaboration of a digital exhibition. After the research scopes, the chapter explains the methodological pipeline developed for the construction of the virtual exhibition: the analysis of the state of the art in the field of virtual museums (case studies) and the technologies and tools used and available. After this, the Deliverable describes the content to be included, the technical structure of the virtual environment, the organization of the content within the space and finally the functionalities to interact with it.

Chapter 3 provides information about the web page version of the digital exhibition, describing the structure and the functionalities included.

Chapter 4 provides a complete list of the content included in the two versions of the EAGLE Virtual Exhibition.

Chapter 5 provides an evaluation of the Virtual Exhibition through the analysis of the accesses' statistics. This kind of analysis reports about the increase of the visits and of the interaction with the virtual content since the publication online of the virtual museum to date.

Finally, Chapter 6 draws the conclusions. and gives information about the results and about possible further steps of the research in the future.

1. INTRODUCTION

This document reports the activities carried out by WP2 and WP3 during the EAGLE project regarding the elaboration and setting up of the Virtual Exhibition.

The work reported here is strictly connected to the work done by the Content Providers in the provision of content for the EAGLE infrastructure. In fact, it was fundamental the content put at disposal by the providers for constructing the EAGLE Virtual Exhibition. Both the data provision and the curation of the content through a virtual exhibition are parts of the same work aimed at the dissemination, the development of the EAGLE community and more broadly of the research in digital epigraphy.

The Cyprus Institute is the leader of the WP3 and all the Content Providers are involved in the WP contributing with their content to the EAGLE Aggregator and to Europeana. The University of Heidelberg is the leader of the WP2 and has various tasks: the analysis and identification of requirements and best practices for the content curation and re-use; attracting from one side new content providers to the EAGLE network, to increase the quantity and quality of the EAGLE digital resources, from another side to attract new users (not only specialized, but also the large public) of the EAGLE digital resources.

As defined in the DoW, within the Task 6 "Concertation and clustering with Europeana and sister projects", the overall aim of WP2 is to raise awareness of EAGLE. This task should lead to a better appreciation of the EAGLE digital collections and of the costs involved for digitisation, preservation and access. To promote the EAGLE digital resources, targeted promotional strategies have been developed. These include the setting up of a Virtual Exhibition on Epigraphy.

To sum up, the overall objective of the WP3, consisting in the content provision, together with the objective of the WP2 of promoting the EAGLE digital resources, brought to the enhancement of awareness about the content of the project through a Virtual Exhibition about epigraphy that is openly accessible to the specialized and general public.

The partner responsible for setting up the Virtual Exhibition is the Cyprus Institute (CYI).

1.1 ROLE OF THE DELIVERABLE 2.7 IN THE PROJECT

The aim of the Deliverable 2.7 "Epigraphy Virtual Exhibition" is to describe the activities related to the development and setting up of the EAGLE Virtual Exhibition on Epigraphy. The current document is therefore the report on the contribution, the progress and the finalization of the work carried out by the EAGLE Consortium, the Content Providers and external contributors that collaborated providing material and content and made the Virtual Exhibition grows.

This Deliverable is important to assess the implementation and the setting up of the application, reporting on the content contribution, the construction of the structure and the steps followed.

The delivery of the Virtual Exhibition and its related Deliverable is due to the end of the project, at Month 36.

2. THE EAGLE VIRTUAL EXHIBITION

Signs of Life, the Virtual Exhibition curated by the EAGLE Best Practice Network, has been conceived during the Fifth EAGLE international event in Nicosia (11-12 March 2015) with a simple but effective structure: six rooms which introduce the user to some key interesting aspects of Epigraphy.

There are two ways which the reader can access the Exhibition in: reading the Web version or entering the virtual space for a fully interactive and immersive tour. In this way the user who likes more to delve into the contents reading them, can start from there; while the more interactive, game like user can experience the contents with a more physical approach, walking in a 3D environment (Fig. 2.1).

Figure 2.1: Start page of the EAGLE Virtual Exhibition with the two versions

The contents presented in the two versions are the same, but tailored for the two different kind of users. From each page of the Web version the user can jump back into the virtual museum and vice versa, so that also a mixed tour is fully possible and the two ways of exploring the contents support one another.

Wherever possible also connection to other EAGLE resources is given, especially to the EAGLE Storytelling application, the EAGLE Mediawiki and the EAGLE Vocabularies.

2.1 DEFINITIONS

A part of the research in the Virtual Museum domain is focussed on their definition and on the right terms to be used, in order to agree on a common language and to enable researchers to develop and implement the Virtual Museum environment at its full potential. The lexical units the researchers use represent in fact the cognitive meaning they require for their discipline. A common language is therefore the first step for setting up a common understanding among the different professionals involved (archaeologists, curators, ICT researchers, communication experts, and so forth).

This topic has been largely investigated by another EU funded project: V-must. In the terminology curated by the V-must community[1], a Virtual Exhibition is considered as a synonym of a Virtual Collection, consisting of set of digital objects/data (corresponding in turn to a Digital Collection) that have a double aim of detain and interactively involve individuals. A Digital Collection is any collection or defined set of digital objects/data that are made available via online shareable platform organized by a collection management systems and/or website on a non-temporary basis for the purpose of preservation and/or enhanced access[2].

Although some differences in the terminology, it may be useful to consider also the terms used and defined by another EU funded Europeana sister project, AthenaPlus, in the research about digital exhibitions[3]. They tried to identify the key concepts of a digital exhibition describing their characteristics. Particularly for what concerns the definition of virtual exhibition, they added the concept of the virtualized environment in which the works are located[4] (Hazan, 2015).

The EAGLE Virtual Exhibition can be defined therefore as a set of digital objects and data made available via an online shareable 3D virtual environment for the purpose of preservation and enhanced access to the material curated by the consortium.

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[1]   Ferdani D., Pagano A., Farouk M., Terminology, Definitions and Types for Virtual Museums. Deliverable 2.1c. http://www.v-must.net/sites/default/files/D2.1c%20V_Must_TERMINOLOGY_V2014_FINAL.pdf

[2]   Digital collections use new formats, licensed contents, and third-party information over which the library has little or no direct curatorial control.

[3]   International Digital Exhibitions Working Group. http://www.athenaplus.eu/index.php?en/200/digital-exhibitions

[4]   "*Virtual exhibitions: to be used mainly in the case of 3D reconstructions in which there is actually also a virtualization environment in which the works are located*" (Natale et al., 2014).

2.2 AIMS AND OBJECTIVES

Virtual Museums can perform as digital "copies" of a physical museum or they can be something completely different, maintaining the same authoritative status as defined by ICOM in its definition of a museum. In fact, together with the ICOM mission of a physical museum, the virtual one is aimed at the public access to the information and knowledge that the collection brings along with them, as well as at their long-term preservation. Moreover, virtual exhibitions can augment or extend the institutions responsibility to conserve and display objects, in order to continue to reflect cultural heritage and scientific process (Hazan, 2015).

The main scope of the EAGLE Virtual Exhibition is to enhance the understanding of ancient epigraphy by proposing an interactive fruition of the content as well as an open access to the data information.

The EAGLE Virtual Exhibition is not a reproduction of a real exhibition, but it is a creation of a new concept space, where to put together various epigraphies and data (both 2D and 3D), different for example for period or for provenance, in order to tell a story: a common topic or a common meaning that can bring them together and better contextualize them.

The idea has been developed by creating a Virtual Reality scenario that includes 2D and 3D elements and different functionalities (e.g. access to databases or other content through active links). The scope is to place the "visitor" in a 3D virtual environment representing a hypothetic museum scene through a subjective perspective and where *every user is "embodied" in the cyber space* (Forte, 2008).

The user is able to see the scene as it would be seen in real life, but with further functionalities, otherwise not possible to have in a real (epigraphic) exhibition.

Thanks to the use of the keyboard or of the mouse, the visitor of the EAGLE content will be able to manipulate his/her view and to create a sense of place walking through the scene, having the opportunity to "feel" the epigraphic content in another dimension and from a different perspective (Wessels et al, 2014).

The main aims of exhibitions are to provide the public with a space for the presentation of objects or artefacts and to act as a centre of knowledge in a thematic area (Economou, 2004). Usually the Web interfaces (meaning the 2D interfaces) limit somehow the users' experience bringing them to the visualization of simple page with some browsing capabilities and not giving space for an immersive or deeper experience. The 3D representation and visualization instead can provide places where the artefacts are in their natural-looking space, offering in this way a more realistic and possibly entertaining experience (Lepouras and Vassilakis, 2004).

It has however to be considered the existence of different kind of users and that not all are able or interested to use an interactive digital application. For this reason it has been decided to have two different kind of exhibitions, where the user is left free to access the 2D interface represented by the Virtual Exhibition Web page version or the 3D virtual exhibition consisting of the digital immersive environment, leaving always the opportunity to switch from one to another.

2.3 USERS

There are several factors that can influence the plan and implementation of a virtual exhibition: among them, the purpose of the exhibition and to whom is addressed. These kind of influence factors should be always taken into consideration for the design of an exhibition.

One of the first steps in the development of a Virtual Exhibition should be:

- the identification of the users is directed to (and therefore the "role" of this group);

- how to present the content to those user groups identified (and therefore taking into consideration the "skills" of the users).

For the construction of any applications where the user has to be at the centre, it is very important to identify the different types of users, in order to attempt the engagement of a larger part of the public with the specific material that is going to be presented. Regarding user engagement, it is in fact necessary to identify user behaviour and to enhance their active participation[5]. The identification of user groups, the study of their behaviour and the consequent choice of specific services dedicated to those groups are fundamental for the success of a virtual exhibition.

The strategy of the users' study is based on the review of best practice methodologies and the best practice proposal for user engagement within the EAGLE applications and tools. This includes a strategy for approaching sustainable user engagement in order to accomplish the re-use of the epigraphic content provided in EAGLE[6].

The groups addressed for the EAGLE Virtual Exhibition are both the general public (e.g. tourists, amateurs) and more expert or interested users in Epigraphy: users with a special interest in Cultural Heritage and in classical Greek and Latin culture, subject specialists, researchers, students, teachers.

Expected users include (but they are not limited to):

• School Students

• Interested Amateurs

• Tourists

• University students

• Researchers not specialized in Epigraphy

• Epigraphers

• Teachers

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[5]   Based on the analysis of user behaviour (e.g. how do users get to the web services / what services are demanded most frequently) best practice and guidelines have to be worked out to provide services (e.g. an interactive workspace) that support community building and user to user interaction with cutting edge usability.

[6]   For what concerns the user-engagement research, the current Deliverable on Virtual Exhibition is based on the Deliverable D2.3.2 "Best practice in User Engagement with Epigraphic Content, Including IPR Requirements". http://www.eagle-network.eu/repository/eagle/WP1%20-%20Project%20management/Deliverables/EAGLE_D2.3.2_Best%20practices%20on%20user%20engagement%20with%20epigraphic%20content,%20including%20IPR%20requirements%20-%20Second%20Release_v3.2.pdf

2.4 WORK METHODOLOGY

For what concerns the Virtual Exhibition design process, a pipeline based on four main phases was followed.

- Phase 1: State of the art, technologies and tools.

The first phase consists of the research about the current documentation (assessment of existing case studies and of technologies and tools used), the data types and the decisions on which data had to be incorporated.

- Phase 2: Data collection

The second phase is dedicated to the assessment, acquisition and processing of all the sets of data to be comprised in the virtual environment.

- Phase 3: Virtual exhibition design

The third phase consists of the virtual environment conceptualization and design. During this phase the spatial environment is conceived, together with the management of the software to be used for the realization of the programming phase and the effective realization of the virtual space.

- Phase 4: Functionalities

The last phase involves the analysis part, when the interactions, virtual tours, single or multiple users and eventual further tools are incorporated in the virtual environment.

2.4.1 STATE OF THE ART, TECHNOLOGIES AND TOOLS

The first step of the methodological pipeline developed for the elaboration of the EAGLE Virtual Exhibition, consisted of the analysis of the state of the art in the related research field (case studies about Virtual Museums and Virtual Exhibitions dedicated to Cultural Heritage) as well as the assessment of the best methodologies and tools available for the construction of such an application about inscriptions.

Particularly, an assessment of various projects dedicated to digital exhibitions and virtual museums (e.g. Europeana Exhibitions, Google Exhibitions, 3D-COFORM 3D applications[7], the Cyprus Cultural Heritage WebApp[8], V-must VM survey[9]) and of the software employed (Forte et al, 2008; Gonizzi Barsanti et al, 2015) has been performed.

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[7]   Unity Environment with Unity3D Demonstrator. KU Leuven has scanned an Egyptian cartouche of Pharao Ramses II with its mini-dome scanner. The digital model has been prepared to be shown online in the Unity 3D viewer. Special features which are added, are a shaded- and text-filter mode, as well as a clickable option for the translation of the hieroglyphs. Unity3D Demonstrator. The 3D-COFORM digitization technologies, such as the In-Hand Scanner or the MIni Dome, create digital three-dimensional representations of historic artefacts, that can be provided to researchers and the world-wide public using Internet-based distribution channels. A demonstrator created by 3D-COFORM partners at the Centre for Processing Speech and Images of KU Leuven and ETH Zurich shows different scans of Buddha statues embedded into a terrain.

[8]   The Cultural Heritage WebApp is an application developed within the V-Must project by the Cyprus Institute - STARC in collaboration with Fraunhofer IGD-VCST and other partners https://www.youtube.com/watch?v=9Y3mbNmjxJ8

The aim of such an analysis and evaluation was to find the best application to foster the re-use of the epigraphic content provided by EAGLE and at the same time to enhance the user-engagement in the fruition of this kind of data.

Moreover, the idea was to chose a software user friendly and freely available, or at low cost, in order to comply with the cultural heritage community needs and that required a quite easy level of programming skills[10]. Since within the realization of the Epigraphy Virtual Exhibition also the 3D aspect had to be considered, an assessment of the 3D objects publication and feasibility study of 3D interactive Virtual Exhibition has been performed considering open source/free software or low cost software.

The possibility to provide easy-to-use tools for virtual representation, suitable for a large and even not skilled audience, can stimulate the request for high level cultural content (even content that usually is not so popular as epigraphy). Therefore the first need is to chose an infrastructure that is able to act as a unique place where content description, story-telling, advanced data structure and rendering algorithms are integrated and that can provide an augmented experience for the users, or a higher level for the project (Lercari et al., 2013).

Eventually, the software that we have chosen to create the EAGLE Virtual Exhibition is Unity 3D (www.unity3d.com)[11]. Apart from the easiness of use of the software, the user community has a huge amount of registered active developers and therefore is widely used in the Virtual Reality community (user tutorials and documentation are available online). In fact, the Unity 3D is a software commonly used to create games[12] for web-plugins, desktop platforms and mobile devices, even in the Cultural Heritage field and in the archaeological domain (Agugiaro et al., 2011). It is a cross-platform engine (can be used for iOS, Mac, Android, Apple and others). The software has a free version for non-commercial use: all programming is done with scripts (in Java or in C++) that are attached to the objects in the environment (Wessels et al., 2014).

Moreover, Unity 3D gives the possibility to implement a complex set of simulations that allows the users, but also the researchers, if the environment is used a an educational platform, to explore the space as an "open asset" and not as a simple still image (Lercari et al., 2013)

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[9]   Ferdani D et al., State of the art on Virtual Museums in Europe and outside Europe. Deliverable D2.3d. http://www.v-must.net/sites/default/files/D2.3d_StateArt_VirtualMuseums_2015.pdf

[10]   In the selection of the best technological platform to be employed, some evaluation criteria can be   considered: the adequacy of the method; the quality of the imformatics implementation; the acquisition and usage aspects (Ciurea and Filip, 2015; Filip, 2007).

[11]   Unity 5.0 was released free on March 3, 2015, adding the real-time global illumination based on the Geomerics Enlighten technology, physically based shaders, HDR skyboxes, reflection probes, a new audio mixer with effects and enhanced animator workflows.

[12]   Other game engine software (e.g. Unreal Tournament, Quest 3D, Morrowind) allow users to create their own Virtual Environments (Champion, 2008) but they are too complex to use or limited in their ability.

2.4.2 DATA CONTENT

All the data used for the Virtual Exhibition come from the EAGLE Content Providers, from new EAGLE affiliated partners and from cultural institutions involved with different tasks in the works of the Consortium.

The Virtual Exhibition provides information and credits to the providers in different ways: through the credits list of the data providers and through links that bring the users to the EAGLE infrastructure and in turn to websites or databases where the content shown in the Virtual Exhibition comes from. Maps, chronological tables, time-lines, images, drawings, 3Ds, texts, allow to get information and to get trace and provenance of the content put at disposal of the application.

This enhances the visibility of the providers and permits the users to access directly the content in its original place. On the other hand, the organization of the content in the virtual exhibition gives the possibility to look at it in a different way, unifying it by a common topic or a common story, and to re-use the data in a creative manner.
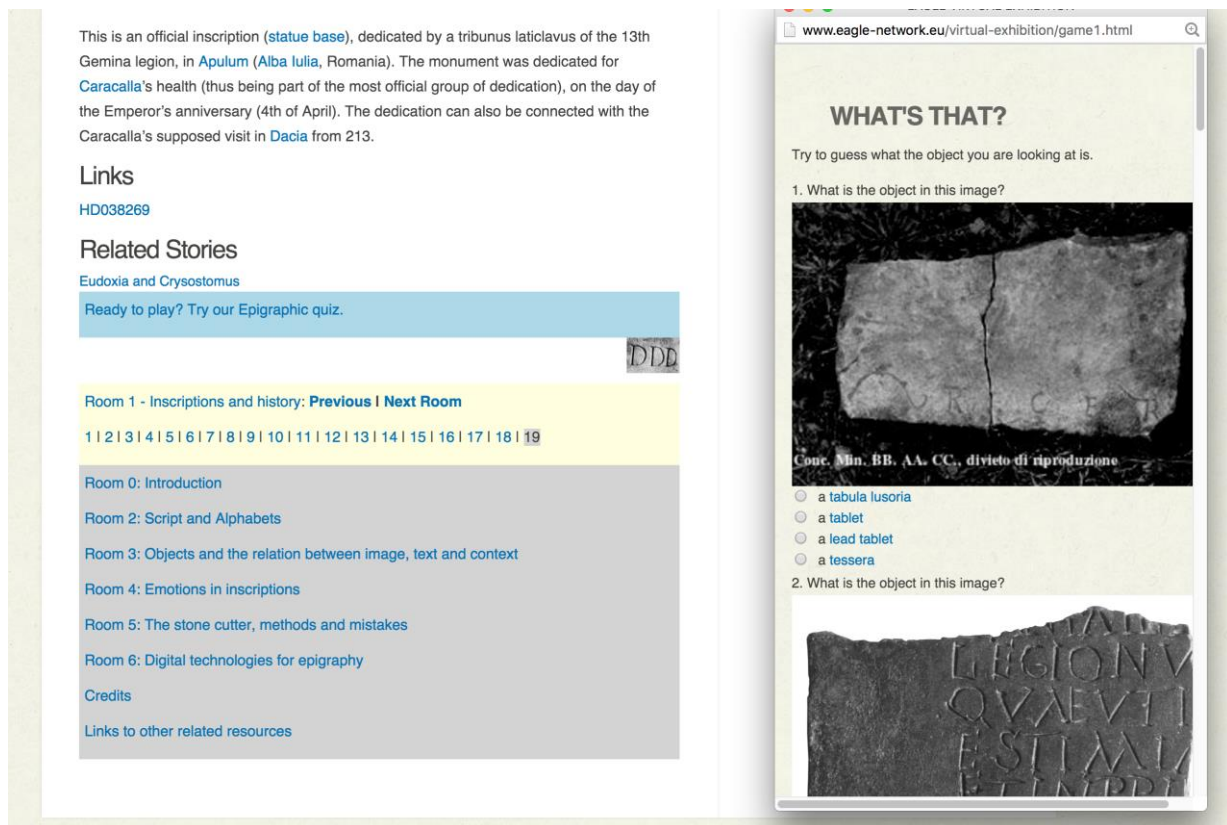
Furthermore, the structure of the virtual application allows to attract new content providers: the technical structure, thought as an implementable one, allows to possibly insert new content and new virtual spaces. One of the aim of the project is in fact to attract new content providers to the EAGLE network, in order to increase the quantity and the quality of the EAGLE digital resources[13].

The content of the Virtual Exhibition have been contributed by many of the members of the EAGLE consortium. The Virtual Exhibition Steering Committee met in Nicosia during the EAGLE international workshop (March 2015) and set an initial plan up.

A proposal of the VE plan was sent to the Consortium and content ideas where requested by August and selected by October 2015, when contributors were asked to submit more detailed information about the selected items for the exhibition. The Steering committee has curated the connection text and the disposition of the item, has gathered further relevant contents from participating projects and has developed the product in its two forms: the website version and the virtual online application. The final version of the content has been submitted for revision and then finalized before being presented for the first time during the EAGLE Second International Conference in Rome (27-29 January 2016).

There are a total of 7 rooms/topics, 58 inscriptions, 2 quizzes (Fig. 2.2) , 2 extra pages, 2 simple form based games. A full list of contents (the complete list of the content used in the EAGLE Virtual Exhibition is described in Chapter 4), a credit page and a list of further online resources are provided.

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[13]   Content providers from outside the Consortium have been encouraged to join the Best Practice Network and to contribute their content. All the content providing partners are asked to participating in the task of recruiting new content providers. The methodology and the activities about the enlargement of the network are described in the Deliverable D.2.1 'Networking infrastructure and terms of reference'. The provision of content is regulated under EAGLE agreements curated by WP2.

Figure 2.2: One of the Virtual Exhibition Web Quizzes.

2.4.3 STRUCTURE OF THE EAGLE VIRTUAL EXHIBITION

The EAGLE Virtual Exhibition design consists of the virtual environment conceptualization and the successive design. During this phase the choice of the best tool is done and the space is conceived and practically organized. According to the technical characteristics of the software chosen for the construction of the virtual environment, it is possible to start the programming phase.

The EAGLE Virtual Exhibition "Signs of Life" is built in Unity3D and exported in WebGL (Fig. 2.3); it is a self contained package hosted at the server of the EAGLE partner, CNR-ISTI. The web application is reachable at the following link: http://webgl-eagle.d4science.org.
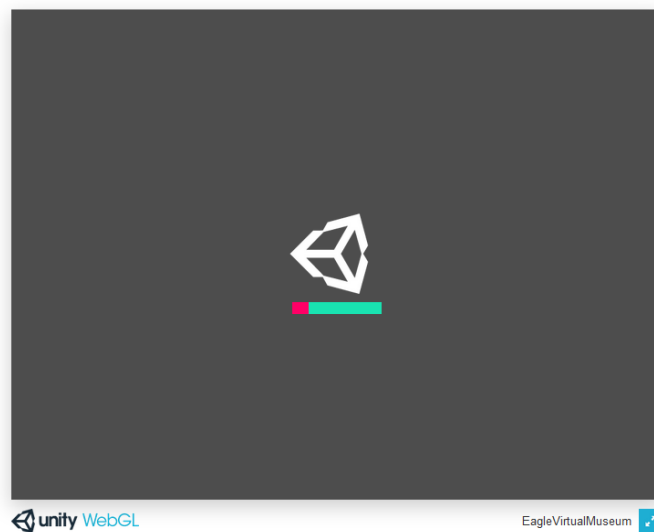
Figure 2.3: Loading the Virtual Exhibition in Unity3D

The EAGLE Virtual Exhibition, based on the content provided by the EAGLE partners, is a fully virtual immersive environment with the following main features:

• Alveolar structure

The alveolar structure allows to have different spaces that can be put in communication one with the other and it give the user the possibility to walk through them (Fig. 2.4).
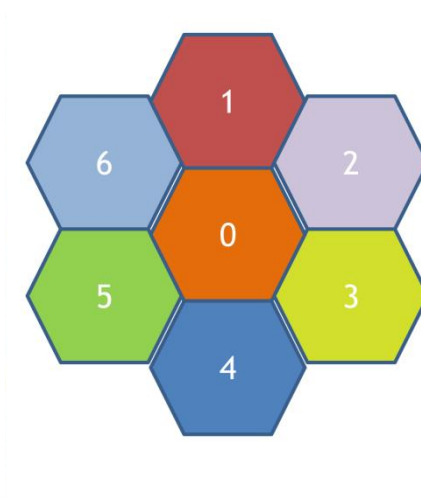
Figure 2.4: The alveolar structure of the EAGLE VE

• Rooms

The different spaces are organized in Rooms, accessible by door passages, that give to the users the possibility to pass from a room to another. Each room represents a specific topic and is furnished with objects and content that explain that topic.

• Expandable structure

The structure is built to be always expandable, in order to allow the adding of new Rooms next to the existing ones. This kind of structure is thought in this way in order to guarantee a sustainability of the application in the future and also a growth in case of the enlargement of the exhibition with further concepts and content.

• 2D and 3D elements

The Rooms are populated with 2D and 3D elements along the walls and within the spaces, in order to provide deep knowledge and information about the topics presented.

Once the application is loaded, a Start Page of the Virtual Exhibition appears (Fig. 2.5). Here an introduction gives to the users general information about epigraphy and about the scope of the virtual exhibition.
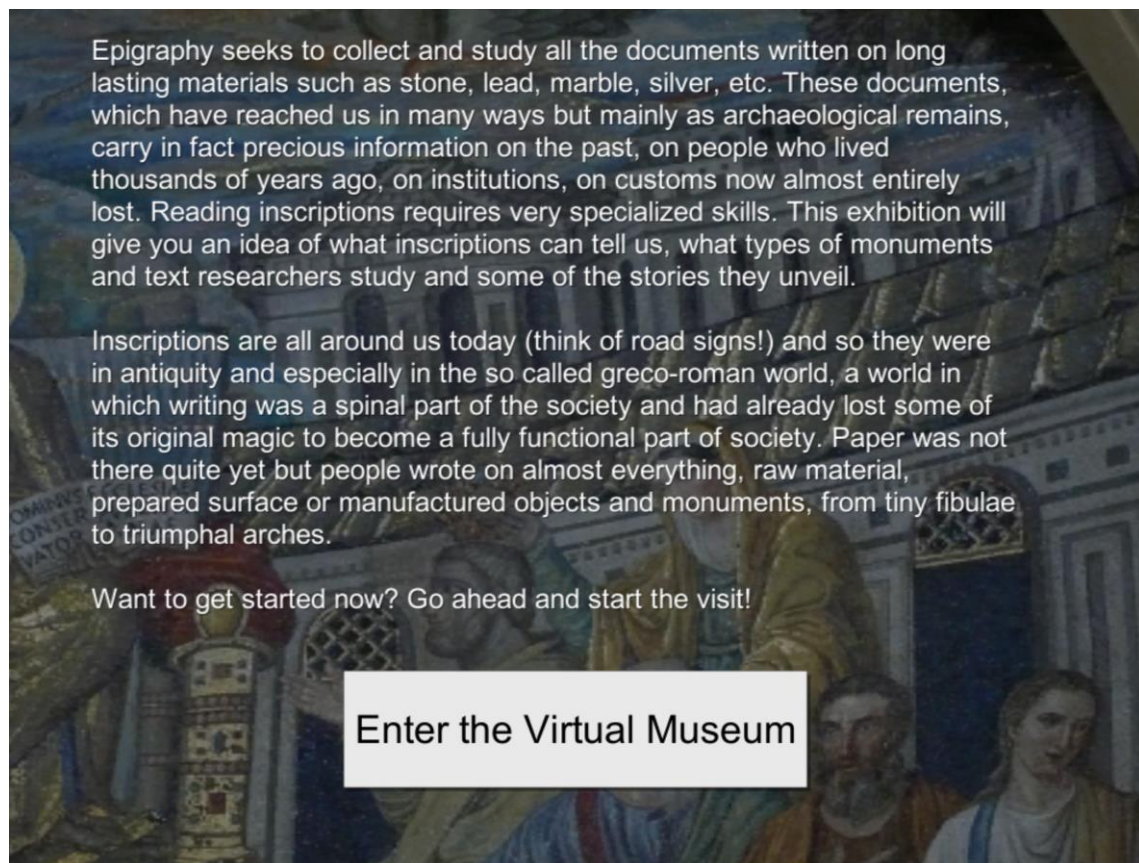
Figure 2.5: The Start Page of the Virtual Exhibition

From that screenshot, clicking a button ("Enter the Virtual Museum") the user is brought into the virtual space of the exhibition. Following, the Rooms and the topic that constitute the EAGLE Virtual Exhibition:

- Room 0

The Room 0 is dedicated to the explanation and aims of the VE, specifically what is this exhibition about and what is epigraphy. Some example of inscriptions are presented: not only

single inscriptions, but also items that have a meaning in group, such as the milestones inscriptions. Further information are given (for example how many inscriptions are currently known in the world) and the presence of maps help the user to contextualize them (Fig. 2.6).

Figure 2.6: Room 0: the Introduction to the EAGLE VE

- Room 1

Room 1 is dedicated to the inscriptions that changed history (including a presentation of the problem of defining an inscription and a series). In fact in this room is explained how for example a new discover or a new reading of an old stone can shed light on a lot of misconceptions about the past. And there are indeed a number of *V.I.Ins. (Very Important Inscriptions)* with high historical significance as well as inscriptions which have a curious or remarkable history. This room of the exhibition includes 19 inscriptions.

- Room 2

The Room is dedicated to scripts and alphabets (including different alphabets, magic texts and problems related to multilingual inscriptions). The inscriptions from the ancient Greco-Roman world were carved in fact in a variety of scripts and languages. Some scripts, that had a very long history as Latin, can change not only from place to place, but also in time. There are studies devoted entirely to this topics. In the space are included 12 inscriptions that help the user to understand this argument.

- Room 3

The Room 3 is dedicated to Objects and the relation between image, text and context (including inscriptions in later paintings). Inscriptions are first of all objects: they can be monuments on

their own (e.g. a funerary stele), part of a monument (e.g. a dedicatory inscription on a building), or they can be occasionally written on a wall as a graffito or inscribed on pottery. The inscriptions are often accompanied by reliefs, which in most cases are one thing with the text. Therefore it is impossible to deal only with the text of an inscription, only with it as a monument or to look only at the images linked with it. Researchers in epigraphy need to be archaeologists, philologists and art historians, as well as experts in epigraphy as such. To explain the concept of inscriptions as a carrier of multidisciplinary information, 9 inscriptions are presented.

- Room 4

The Room 4 is dedicated to the content of inscriptions and particularly to Emotions in inscriptions (including verse inscriptions, erotic texts, graffiti, etc.). Inscriptions can take us into the deepest emotions of ancient people, directly in touch with their lives. Through the examples of 6 inscriptions it is possible to get into the feelings and the emotions of our predecessors: we can find here love letters, crimes, horror and emotions of ancient people (for other humans but also for animals) (Fig. 2.7).

Figure 2.7: Room 4: Emotions in inscriptions within the EAGLE VE

- Room 5

The Room 5 is dedicated to the stone cutters, the methods used and also the mistakes produced. The stone cutter was an artisan, often illiterate, who copied the design from the approved model provided to him. In the workshop a variety of purpose built tools where available and the inscription was not simply carved (as in the most common writing technique) but also painted with red colour. 12 inscriptions are included in the Room 5 and they provide

information about how they could be realized or what common mistakes and phenomena could occur.

- Room 6

Room 6 is dedicated to Digital Technologies for the study of Epigraphy. Nowadays, 3D laser scanner and photogrammetric techniques are used to digitally acquire the geometry and the texture details of the artefacts. They make possible their measurable analysis, simulation, visualization and enhancing of the writing, in order to study, compare and get new information about the epigraphies both as object and as text. A group of 3D inscriptions give the possibility to immerse the user in the space, giving the effect of the objects in real scale, and to interact with some of them, virtually (Fig. 2.8).
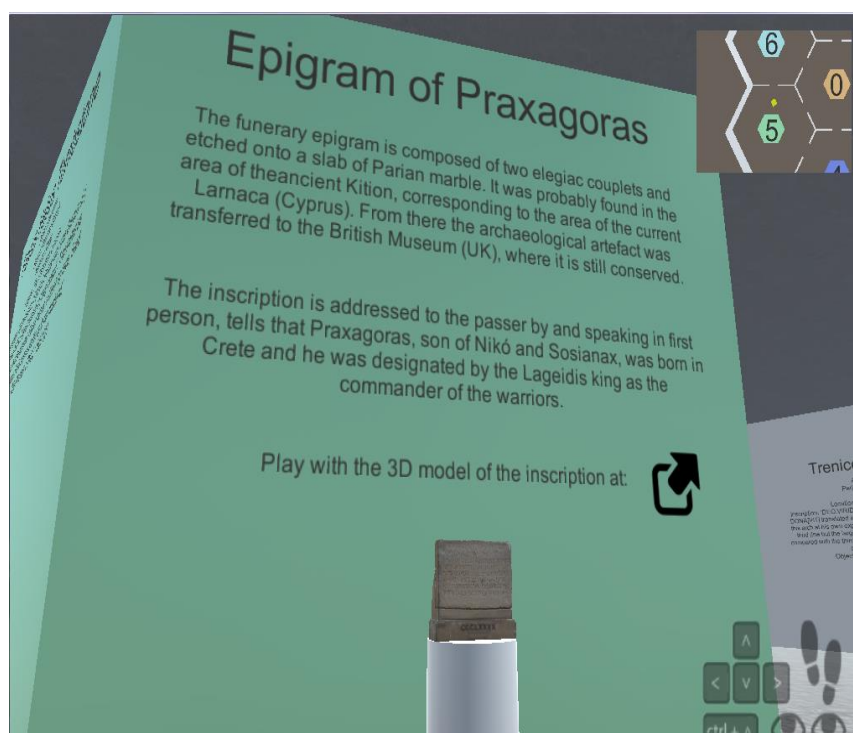
Figure 2.8: Room 6: virtual interaction with 3D models

Each Room has several inscriptions for which a link to metadata is provided, one or more photos and a paragraph contextualization in the path of the exhibition. Each of the objects has, where possible, also the text of the inscription and a translation from the EAGLE Media Wiki. There are then links to other related contents, especially definitions of keywords, videos, 3D models and geographical information but also further interesting content from other online resources (texts, papyri, etc.) in order to look at these objects also from different perspectives (historical, archaeological, artistic, etc.).

After the realization of the three-dimensional virtual museum structure in Unity, the EAGLE VE application has been implemented importing all the images and the 3D files with their textures (.obj, .ply)[14].

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[14]   The import of 3D models is easily done and they can be correctly visualised within Unity just by adding some virtual lights.

2.4.4. FUNCTIONALITIES

The last part of the Virtual Exhibition design process consists of the analysis and adding of functionalities and interactions able to enhance the users' experience in the virtual environment. There are different kind of interactions that of course depend also on the technology used: from the simple tours within the spaces to the most complicated interactions with the environment and with the objects within the environment.

For what concerns the EAGLE Virtual exhibition the following functionalities for the visualization and interaction with the content have been introduced in the virtual space:

- The virtual tour

The virtual tour of the space give the users the possibility to go around and to explore the different Rooms of the Virtual Exhibition as well as the objects and the content that populate them. The opportunity to visit in an enhanced way the objects represented in the space, give the users an additional understanding and additional information about the content. The presence of different objects, elements and contents linked by a common topic help to understand the single objects and the relations between the objects.

- Subjective visualization

Once accessed the Web based Unity package, via any web browser, the Virtual Exhibition gives the possibility to the user to enter in the virtual space living a subjective experience. The user can have the feeling to be embodied in the virtual space and to walk moving freely around.

- Environment sound

In order to enhance the embodiment of the user in the virtual space, environment sounds have been inserted. While the visitor of the virtual exhibition walks around the space, it is possible to hear the sound of the steps. This functionality gives the user the feeling to really walk on the floor of the museum and to live the experience as a real one.

- Navigation map

To facilitate the movement in the space, a map of the Virtual Exhibition is provided at the top right corner of the user's screen. The map shows the Rooms that constitute the Virtual Exhibition, identified by different colours. A small yellow moving ball represents the user moving in the space, helping him/her to orient and to find the desired direction (Fig. 2.9).
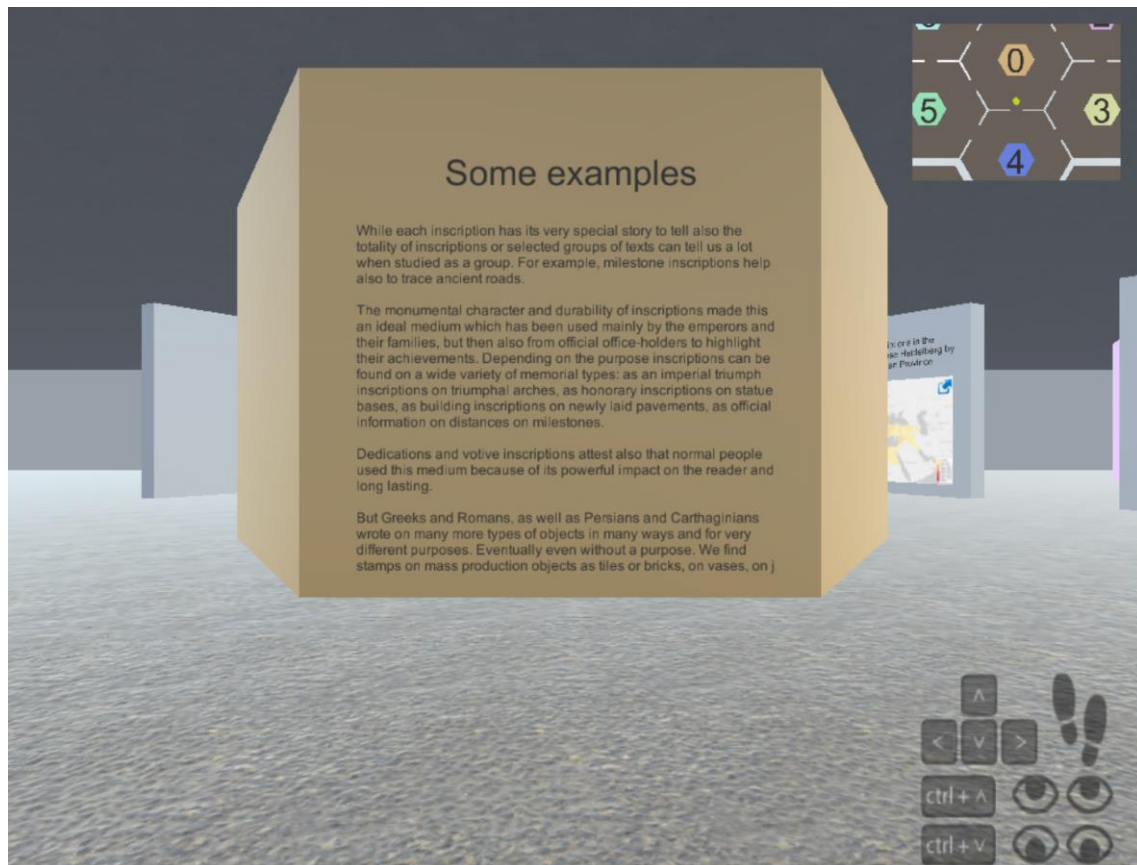
Figure 2.9: Navigation map in the Virtual Exhibition

- Navigation instructions

As the previous functionality, the navigation instructions assist the user to move in the space. These simple visual instructions help also the less skilled users to learn which key-board buttons to use in order to move (go forward, go back, turn right, turn left). The instructions also explain to the user how to direct the sight up and down, in order to visualize the higher and the lower parts of the walls equipped with content (Fig. 2.10).
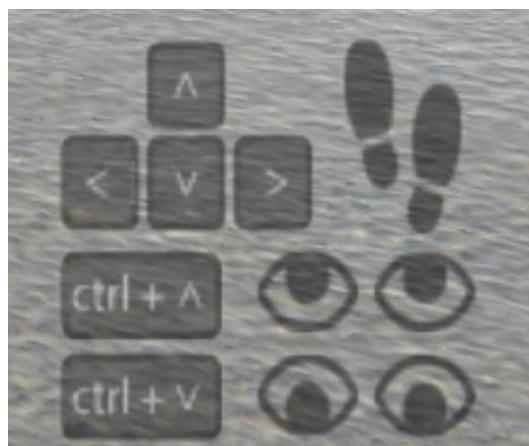
Figure 2.10: Navigation instructions in the Virtual Exhibition

- Visual content, 3D objects and active links

In the Virtual Exhibition the "musealized" objects are represented by 2D or 3D digital resources and they are accompanied by short texts that describe or contextualize them. Differently from the Web Version of the EAGLE exhibition, here the objects are described by a short text in order to focus more on the visual and emotional effect of the content on the user. Priority is given to images, maps and three-dimensional objects. The presence of active links allow the user to explore further content stored outside the Virtual Exhibition, which is possible to interact with (e.g. interactive maps, interactive 3D models, chronological tables) (Fig. 2.11).

Figure 2.11: Inclusion of a 2D digital resource with related active link in the Virtual Exhibition

The 2D digital resources are distributed on the walls of the virtual space, giving priority to images and maps. (see Fig. 2.12)
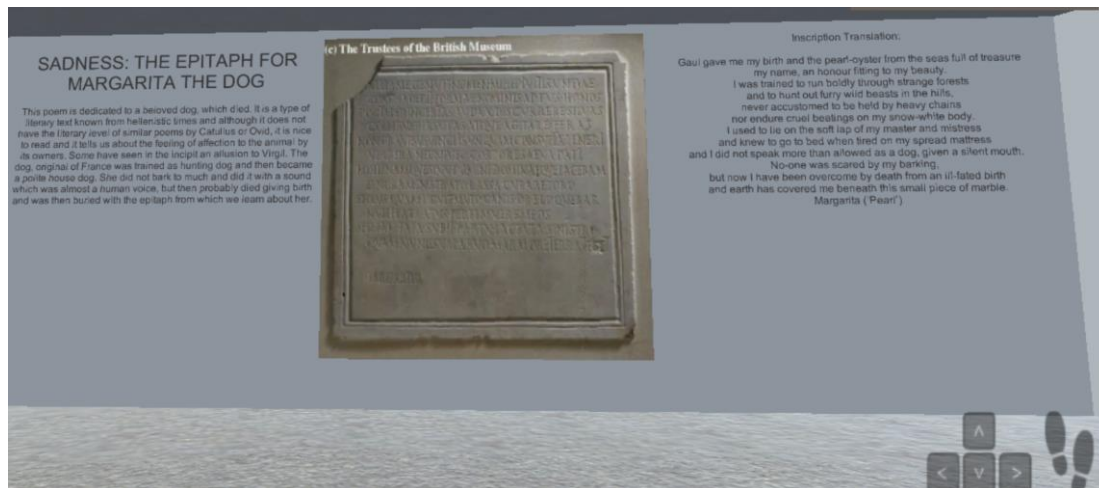
Figure 2.12: A wall in the Virtual Exhibition

Room 6 is specifically dedicated to the exhibition of 3D models of inscriptions, in scale with the environment and provided with short descriptions as well as the other content[15]. Their three-dimensional presence gives a further complete immersive experience to the user (Fig. 2.13).

Figure 2.13: Room 6: 3Ds of inscriptions

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[15]   These items are not present in the Virtual Exhibition Web version.

The use of proximity agents and collision detection sensors in the application allow that the interaction with the items can go as far as to make fall down them by hitting the pedestals. This gives a real environment feeling, and also will make some fun, for those who accidentally "clash" an ancient artefact (Fig. 2.14).

Figure 2.14: "Interacting" with 3D models

3. THE EAGLE VIRTUAL EXHIBITION - WEB PAGE VERSION

3.1 DESCRIPTION

Within the EAGLE Website and thus fully embedded with the other EAGLE resources and the EAGLE search Engine is the Web page version of the EAGLE Virtual Exhibition "Signs of Life" (http://www.eagle-network.eu/virtual-exhibition/room0.html).

This version provides an organized access to the digital exhibition, which can be followed page after page. It includes several featured information and numerous selected links to external resources and embedded interactive contents.

Contents have been produced and curated by members of the EAGLE consortium and organized by the steering committee to deliver the best user experience, taking into consideration all experts' feedback during the development phase.

The scope of this web version is to introduce Epigraphy to newbies. A student might start on the EAGLE website without prior knowledge of Epigraphy, and will find here a simple but complete introduction especially focused on online resources. The user will learn about epigraphy but also get in touch with some of the available online resources within the portal and out in the web.

Figure 3.1: Text introduction to the Virtual Exhibition website version

3.2 FUNCTIONALITIES

The Introduction page (Fig. 3.1) provides an overview on the theme of the entire exhibition. Each page has always a side and a bottom navigation tool, images, text and links, with a double level of bold for text. This is a Museum exhibition practice which facilitate the focusing on the most important concepts for the reader glancing at a panel, giving two degrees of emphasis within a long text.

Each Room has its own introduction and an explanation to the theme represented and allows a navigation at Room level only (Fig. 3.2).

ROOM 3 - OBJECTS AND THE RELATION BETWEEN IMAGE, TEXT AND CONTEXT
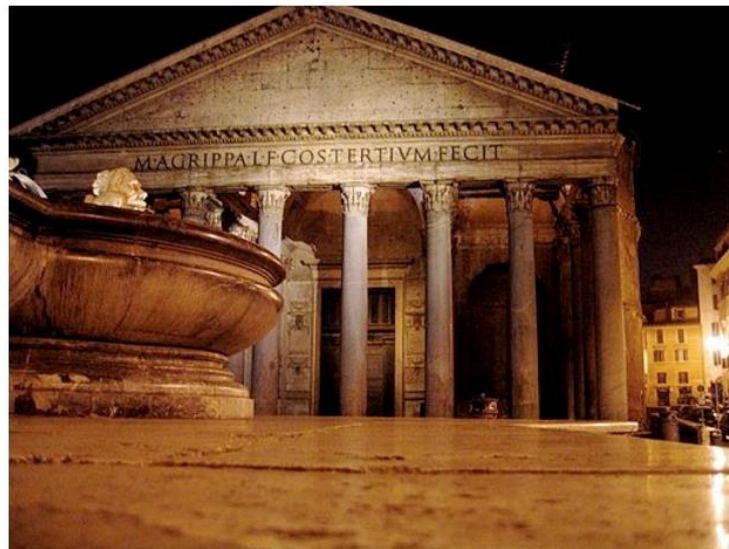
Inscriptions are objects, they can be monuments on their own as a funerary stele, part of a monument as a dedicatory inscription on a building, they can be occasionally written on a wall as a graffito or on a pottery slab. They are often accompanied by reliefs which in most cases are one thing with the text. Therefore **it is impossible to deal only with the text of an inscription, only with it as a monument or object or to look only at the images.** Researchers in epigraphy need to be archaeologists, philologists, and art historians, as well as experts in epigraphy as such. **A holistic approach is becoming the rule**, but paradoxically the questions posed by the digitization of epigraphic databases bring back these problems of description, as they are studied for museums which distinctly give priority to the object, or to the text which is one important component but not the only one of an inscription. In this room you will see some examples of inscriptions in which **the relation between images, text and the context of the inscription are fundamental element for our understanding of the document**, but all inscriptions are studied in this way.

Related Stories

- Story of ancient inn with relief and inscription: ITALIAN, ENGLISH
- A votive monument with relief and inscription with problems of interpretation
- bricks of the Ashmolean Museums

Figure 3.2: The Introductory text to each Room

Once the user enters a Room and starts to see the items navigation is also provided among the items keeping track of the position of the user in the contents. Ancient Place Names are linked to Pleiades and with the use of a javascript library available online, related contents are visualized together with a small map of the mentioned place in a small popup window (Fig. 3.3).
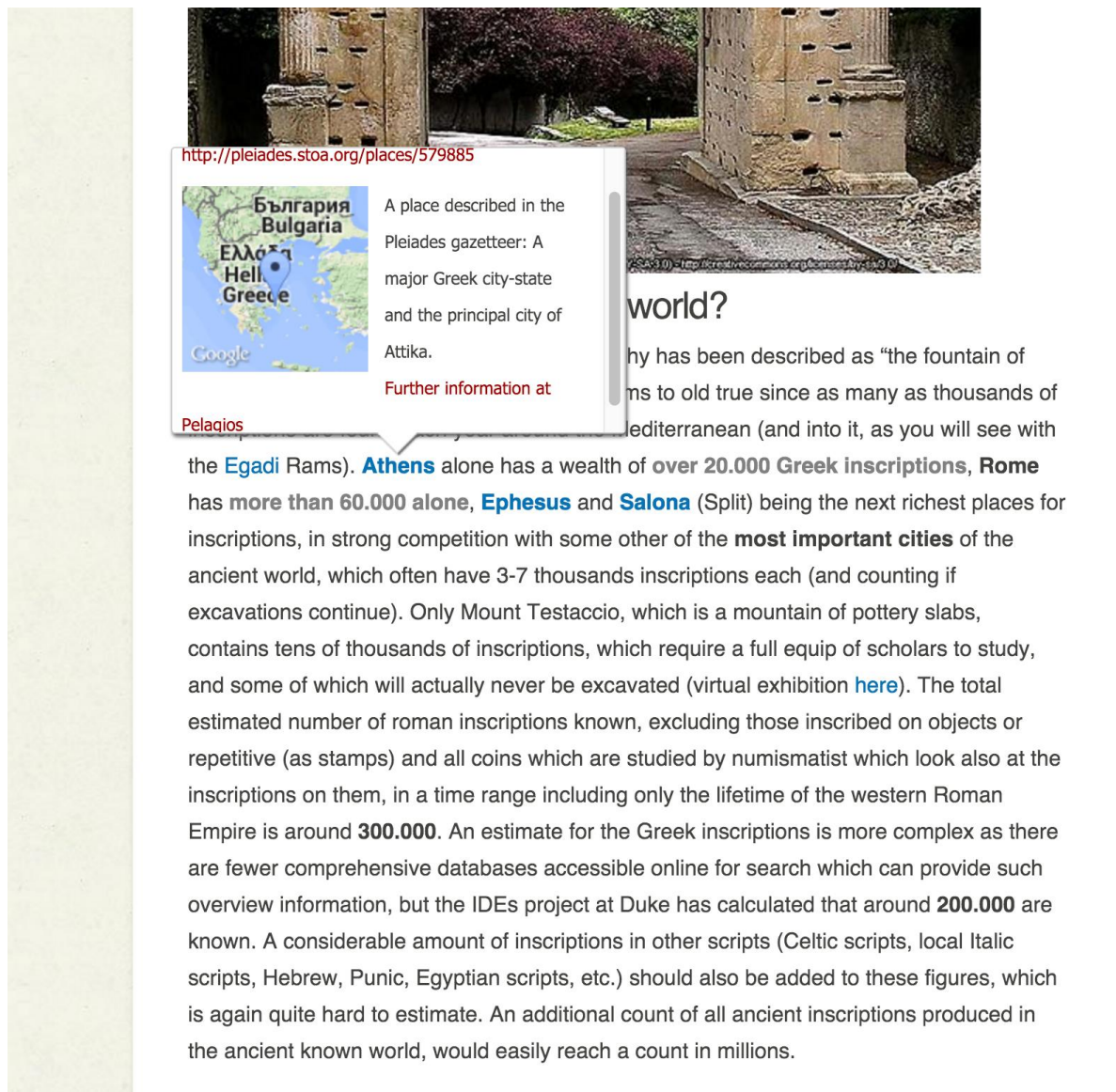

Figure 3.3: Javascript application showing related contents from Pelagios

At the end of each page relevant related stories or links to external resources (Fig. 3.4) are given, especially to those interactive tools about epigraphy which are openly available and accessible online, like interactive maps (Fig. 3.5).

Maps and inscriptions

- The Archaic Inscriptions of Greece
- Geographical Overview of CIL Volumes
- Interactive Map of Milestones recorded in the Epigraphic Database Heidelberg
- Heat map of inscriptions recorded in the Epigraphic Database Heidelberg
- Browse Inscriptions in the Epigraphic Database Heidelberg by Ancient Roman Province
- Inscriptions recorded in the Epigraphic Database Heidelberg by modern country
- Ancient Documents on an interactive linked data map - Peripleo

Want to know even more? Click here for some additional details.

Room 1: Inscriptions and history

Room 2: Script and Alphabets

Room 3: Objects and the relation between image, text and context

Room 4: Emotions in inscriptions

Room 5: The stone cutter, methods and mistakes

Room 6: Digital technologies for epigraphy

Credits

Links to other related resources

Figure 3.4: The links section and navigation area
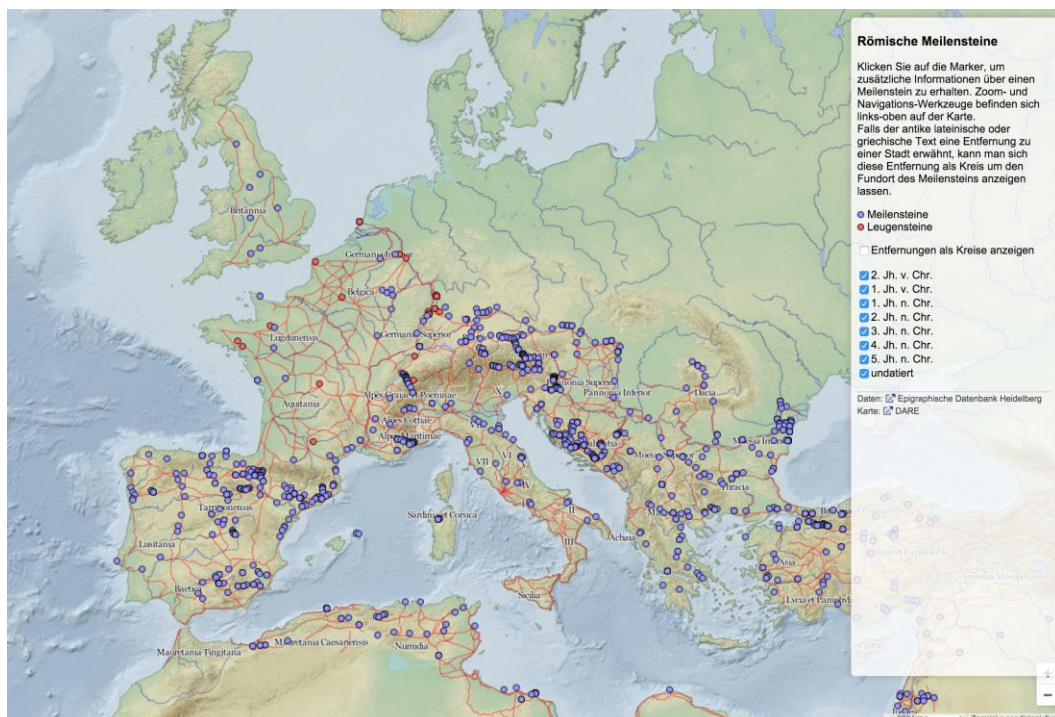
Figure 3.5: A map based on EAGLE contents showing findspost of Milestones interactively

Where possible, interactive contents are directly embedded, like the timeline of the Parian Marble (Fig. 3.6), the map of places mentioned on the Vicarello Beckers (Fig. 3.7) or the graph of attested languages and their relation provided by Trismegistos[16] (Fig. 3.8).

Figure 3.6: Events named in the Parian Marble from the Digital Edition (curated in Leipzig by Monica Berti)

Figure 3.7: Peripleo project map of the places mentioned on the Vicarello Backers, reconstructing the itinerary there described on an interactive map of the Roman World

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[16]   http://www.trismegistos.org/network/10_2015_11_18/
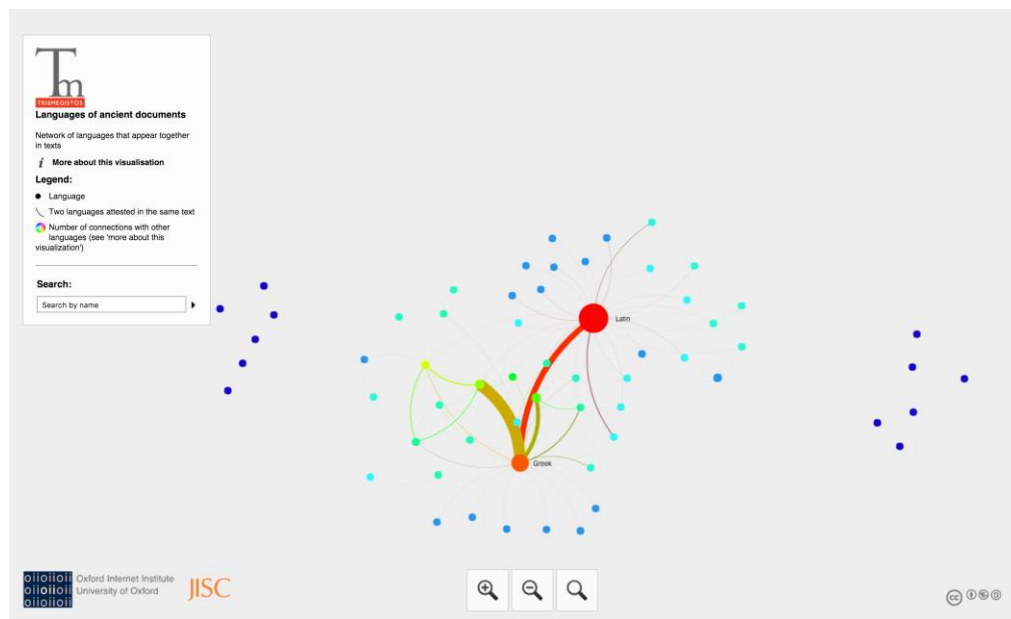
Figure 3.8: A graph provided via Trismegistos of the languages attested and their relations

The navigation in each Room (Fig. 3.9) and by Item (Fig. 3.10) provides the possibility to jump from one Room to another or to simply proceed and the 3D icon hints the user to visualize the same content in the Virtual Exhibition. Images from participating Archives and from Wikimedia Commons are visualized as slideshows, as static images or, when they are exposed with a IIIF protocol, they are visualized with Openseadragon as zoomable images in a simple viewer (Fig. 3.11).

Figure 3.9: Web Navigation

Figure 3.10: Position in the Room

Figure 3.11: Zoomable images with Openseadragon

The user experience is also extended with some games and extras embedded in the exhibition (Fig. 3.12). In the quizzes the user can try its knowledge and see the solutions, to learn while playing in a simple and intuitive way (Fig. 3.13).

Figure 3.12: Additional Virtual Exhibition Content

The script of inscription has played a fundamental role throughout the centuries for its monumental presence in the daily life of people. And it made it into the most common things we do now a days, as typing. The script of the inscription on the Trajan column in Rome has been in fact used by typographers as a model for a font: Trajan:
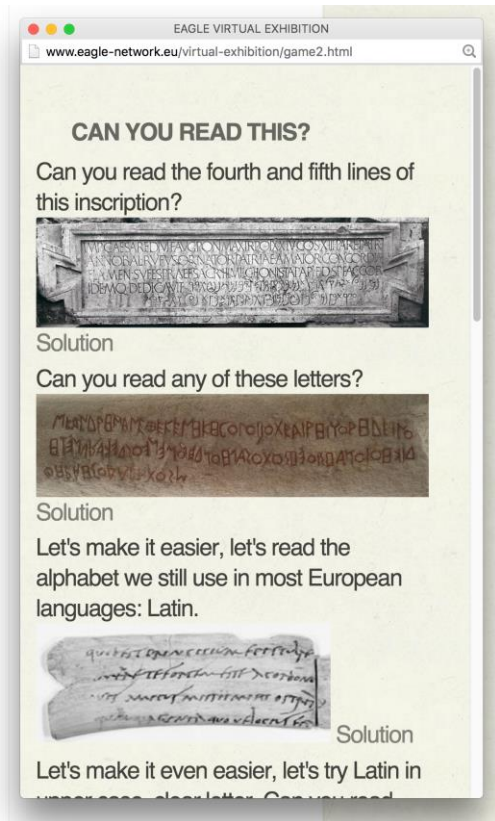
> "The Trajan™ design is a serif font with elegant, sweeping curves and due to its Roman typography inspiration is consequently an upper-case only font family. The Trajan typeface family was originally designed by Carol Twombly and released in 1989 by Adobe Systems Inc. in OpenType® format. Edward Caitch was a Roman Catholic priest who, as a master calligrapher, had been researching the typeface on Trajan 's column for some time. He was unconvinced that these typefaces were based solely on chiseling techniques, and surmised that the serifs they contained were in fact the result of painted calligraphy. Caitch showed that the letters were painted onto the stone, wherupon the expert stone-masons would then chisel the characters out."

Links

Related Stories

Ready to play? Try our Epigraphic quiz.

CAN YOU READ THIS?

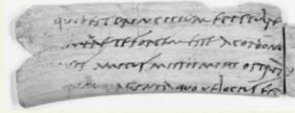Can you read the fourth and fifth lines of this inscription?

Solution

Can you read any of these letters?

Solution

Let's make it easier, let's read the alphabet we still use in most European languages: Latin.

Solution

Let's make it even easier, let's try Latin in

Figure 3.13: Epigraphy game in the Virtual Exhibition

4. "SIGNS OF LIFE" TABLE OF CONTENTS

12. The Trajan Column

- **Room 3: Objects and the relation between image, text and context**

    1. Amphion Mus

    2. At the 4 Sisters - A Business Sign

    3. Nammonius the Blacksmith

    4. The Vicarello Beckers

    5. Tabula Execrationis

    6. Vestigia from Italica Amphitheater

    7. A defixio

    8. A Course with Magical Symbols

    9. Leburna Magister Mimarum, a centenarian

- **Room 4: Emotions in inscriptions**

    1. Pontilienus and Pontiliena

    2. Rage against Crime

    3. Sadness: the Epitaph for Margarita the dog

    4. Violence: Man Throws Wife in the River after Quarrel

    5. Stress: The Sagalassos Edict on Transport Vehicles

    6. Cruel Parents

- **Room 5: The stone cutter, methods and mistakes**

    1. Zoilianus the Lapidarius

    2. A Signed Inscription

    3. A Sculpture Workshop

    4. Copying from a Draft Text

    5. Practicing

    6. Forgotten Lines

    7. Misteken Letters

    8. Wrong Tribe

    9. False Start

    10. Analphabet Stonecutter

    11. Try Again

    12. Writing in another Language

- **Room 6 - Digital technologies for epigraphy**

- **Credits**

- **Links to other related resources**

5. THE EAGLE VIRTUAL EXHIBITION EVALUATION

5.1 THE ACCESSES' STATISTICS

The evaluation of a virtual environment online is something that cannot be fully evaluated: a system that include different users' interaction capabilities accessed by a large audience, are difficult to evaluate in terms of results efficacy on the users (unless if organized and performed through a questionnaire and a user group evaluation[17]) (Bonis et al., 2009). Mostly, the evaluation can only provide an analysis on the observation produced by the usage of the system.

So far, the only tool at disposal for the evaluation of the Virtual Exhibition is the statistics report of the access to the digital application.

As it can be noticed in the Fig. 5.1, starting from 18th November 2015 (date when the first users' accesses start to appear) to 22nd March 2016 (last date checked), the Audience Overview demonstrates a constant increase in the access to the Virtual Exhibition.

53.4% are New Visitors, while 46.6% are represented by Returning Visitors. This is an interesting information, since demonstrates that users return to interact with the application, with an average session of circa 8 minutes.
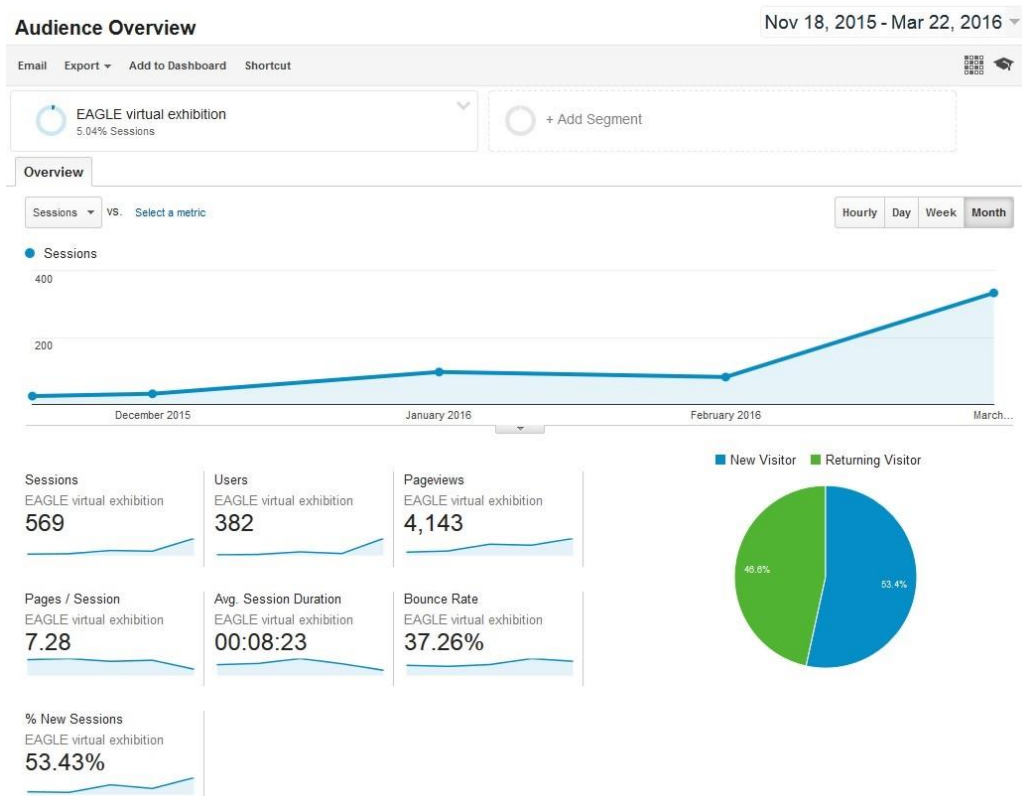

Figure 5.1: EAGLE Virtual Exhibition accesses' statistics

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[17] The EAGLE Virtual Exhibition as declared and described in the DoW does not foresee any users questionnaire evaluation, but the responsible people of the application have planned a user group evaluation for the dissemination of the research results in a dedicated scientific publication.

6. CONCLUSIONS

A Virtual Exhibition about Epigraphy has been developed by the EAGLE consortium. It is a product that comes from the collaboration of various experts in different disciplines (archaeologists, epigraphers, ICT professionals, scholars on technologies for Cultural Heritage, and so forth).

The aim of the collaborative work was to produce a general introduction to Greek and Latin epigraphy for the public (general and more specialized), using the data gathered during the project in an interactive and appealing way.

Although there are other Virtual Exhibitions on specific epigraphic topics (e.g. Digitl Epigraphy toolbox[18]; Written in Stone - Inscriptions from the National Museum of Saudi Arabia[19]), there has never been an online freely accessible and interactive Virtual Exhibition on Epigraphy. We believe that this resource, finally possible thanks to the EAGLE consortium, is going to meet several needs and to provide a place where to get a first easy and enjoyable taste of what epigraphy is. The format and the features of the EAGLE Virtual Exhibition "*Signs of Life*" are devised to meet the largest possible audience.

The EAGLE Virtual Exhibition is openly accessible through the EAGLE project website. The virtual exhibition "Signs of Life" provides with this simple and usable design an interactive experience to accompany the users into the subject of Epigraphy, presenting a full range of items and interesting content in a freely navigable way.

The experience of the partners involved in the elaboration of the EAGLE Virtual Exhibition, both in the use and in the development of virtual museums and digital exhibitions, allowed to analyse the state of the art in the field and to construct a virtual exhibition that respond to the criteria established by the scientific community.

The analysis of the access to the Virtual Exhibition proved an increased interest for the application since its publication online.

The expandable structure of the Virtual Exhibition gives the possibility to further enlarge the space, adding new rooms and new contents, in order to guarantee a sustainability of the application also in the future.

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[18]   http://www.digitalepigraphy.org/toolbox/info.html

[19]   http://naturalhistory.si.edu/epigraphy/

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