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EXECUTIVE SUMMARY

This deliverable describes the main functionalities and the technical infrastructure of the EAGLE Portal, which is available online at **www.eagle-network.eu**. It reflects the status of the EAGLE Portal in October 2014, at the time of the first release. The deliverable will be updated in M30, when the second release of the EAGLE Portal is planned.

The EAGLE Portal is the main gateway into the world of the EAGLE services and initiatives. On the portal, users can find all the background information about the project, the partners and the collections. It hosts a section where news related to the content providers or of interest for the community of epigraphists will be posted. A comprehensive presentation on the visual identity, layout and structure of the portal can be found in Deliverable D6.1 EAGLE Project Website.

The portal is the main access to the set of EAGLE services, which can be accessed by a human through a browser or by the EAGLE Flagship Mobile Application, or by other applications through a set of APIs. This document is organised in two parts: Part A describes the EAGLE functions accessible through a browser, and Part B describes the APIs available for other applications, such as the Flagship Mobile Application and the Flagship Storytelling Application developed in EAGLE.

In particular, Part A can be viewed as a **user manual**, describing the functionalities offered by the EAGLE Portal and how to use them through the Graphical User Interface (GUI). Part B can be viewed as a **developer guide**, providing a deeper insight on how these functionalities have been implemented and on the interactions between the different components and modules of the system. Part B provides also a description of the "external" APIs that can be used by applications that intend to take advantage of the rich set of data made available by EAGLE. In particular, the interfaces used by the Flagship Mobile Application (which is being developed in the frame of the EAGLE project) are here described in more details.

Firstly, users who want to find information about inscriptions can access a search interface that is at the same time friendly and sophisticated, allowing both general users and experts to perform queries on the collections. It is possible to perform both full-text searches using a simple interface, or to launch more advanced queries. The seven controlled multilingual vocabularies (types of inscriptions, object types, material, writing, decoration, state of preservation and dating criteria), that were created to help aligning the multilingual metadata of the inscriptions from the different content providers, have been also integrated in the search engine and help users to create their search strings.

Secondly, users that are interested in gaining access to the more advanced functionality can register an account and manage their Personal Space on the EAGLE Portal. In this area, they can save and annotate queries, results and single objects (including – in Release 2 – the pictures that they took using the Flagship Mobile Application) to access them in a future session.

1 INTRODUCTION

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

The ingestion and curation of data is performed through a separate dedicated interface made available by the Metadata Aggregation System (in the following referred also as Aggregator), which is described in D4.1 AIM Infrastructure Specification and D4.2.1 First Release of AIM Infrastructure. This interface includes a series of functionalities to support data ingestion and storage as well as for importing, indexing, enriching and managing the harvested metadata.

The Graphical User Interface (GUI) of the EAGLE Portal, which is the main focus of this deliverable, exposes all the content stored in the Aggregator providing to the users the following functionalities.

Functionalities available for generic users:

- Search and browse the EAGLE rich content by using either a free text search or a more advanced interface, including faceted browsing through the integration of the EAGLE controlled vocabularies.

- Access the stories created using the EAGLE Flagship Storytelling Application

- Export to the user own PC the EpiDoc document of an object for further analysis and processing (available in Release 2).

- Create a user account in order to access the functionality reserved to the registered users.

- Login to an existing user account.

Functionalities available for registered users:

- Annotate and save relevant information in a user Personal Space (e.g. records of inscriptions, search results, queries).

- Upload into the user Personal Space content saved while using the Flagship Mobile Application.

- Export to the user own PC the data saved in the user Personal Space, for further analysis (available in Release 2).

- Create new epigraphy-related narratives using the EAGLE Flagship Storytelling Application.

In terms of graphic design and layout, the GUI adheres to the 'branding guidelines' that have been designed in the first phase of the project and that have been fully described in Deliverable D6.1 EAGLE Project Website.

The implementation of the various functionalities provided by the EAGLE Portal was based on the list of requirements identified during the first phase of the project and described in Deliverable D5.1. These requirements, prioritised in three levels, represent a refinement of the functions described in the original DoW. Priority "High" means functions available in the first release of the EAGLE Portal, delivered at month 18. Priority "Medium" means functions that will be available in a second release of the EAGLE Portal, presently planned for month 30 after the testing and validation phase. Priority "Low" means functions to be taken into account as future possible developments of the EAGLE Portal.

It has to be noted that the original requirements described in Deliverable D5.1 have been further refined and updated taking into consideration the input received by the partners in the last months, and this impacted on the priority of some of the requirements (e.g. the faceted search and the possibility to refine the advanced search by adding additional fields was considered in the end more important than the possibility to use diacritics and to limit search to inscriptions that have images or translations)

Furthermore, in the query formulation and results, it was decided to distinguish between different categories of objects (artifacts, texts and images) to better reflect the EAGLE conceptual model (please refer to D3.1 EAGLE Metadata Model Specification) and to improve the accuracy of the results.

The table below summarises the requirements that are specifically related to the implementation of the EAGLE Portal. For further details please refer to Deliverable D5.1 Portal and Services Requirements and Specification, Section 4.2.

ID	User	Requirement	Priority	Status
PSE01	Generic	Create account to access all EAGLE user services	High	Completed
PSE02	Generic	Help menus for search and result pages	High	Online user manual under preparation on the basis of this document
PSE03	Generic	Simple and advanced search	High	Completed
PSE04	Generic	Full-text query on simple search	High	Completed
PSE05	Generic	Simple search interface with one text field	High	Completed
PSE06	Generic	Search fields for advanced search	High	Completed
PSE07	Generic	Boolean operator AND, OR, NOT or exact phrase match	High	Completed
PSE08	Generic	Include and exclude diacritics	High	Presently not available
PSE09	Generic	Switch to polytonic Greek and Hebrew keyboard	Medium	Presently not available
PSE10	Generic	Limit search to inscriptions that have images and/or translation	High	Presently not available
PSE11	Generic	Vocabularies for advanced search	High	Completed
PSE12	Generic	Expansion of simple search	Medium	Presently not available
PSE13	Generic	Results split in pages	High	Completed
PSE14	Generic	Table for list of matches	High	Completed according to the refined version which includes the distinction between artifacts, texts and images
PSE15	Generic	Print and export the list of results	Medium	Presently not available
PSE16	Generic	Access the detailed record of each item of the result list	High	Completed
PSE17	Generic	Related content for the records	Medium	Presently not available

PSE18	Generic	Download the EpiDoc file of each item	Medium	Presently not available
PSE19	Generic	Avoid duplicate record	High	Completed
PSE20	Generic	Access the portal from mobile devices	Medium	Completed
PSE21	Generic	Interface text available in multiple languages	Medium	Presently not available
PSE22	Generic	Add instances of search fields	Low	Completed
PSE23	Generic	Faceted browsing	Low	Completed
PSE24	Generic	Refine search with faceted categories	Medium	Completed
PSE25	Generic	Map to browse the inscriptions	Low	Presently not available
PSE26	Generic	Content from the Pelagios Network	Low	Presently not available
PSE27	Generic	Search by image	Medium	Presently not available
PSE28	Registered	User Personal Space for registered users	High	Completed
PSE29	Registered	Save items from search results	High	Completed
PSE30	Registered	Save queries	Medium	Presently not available
PSE31	Registered	Add notes to saved items	High	Completed
PSE32	Registered	Edit, delete, download saved objects	High	Completed
PSE33	Registered	Edit records and submit the modified data	Low	Presently not available

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PART A. USER MANUAL

2 THE EAGLE INSCRIPTIONS SEARCH ENGINE

The EAGLE Inscriptions Search Engine is accessible through the main horizontal navigation bar of the EAGLE Portal, **www.eagle-network.eu** (see Figure 1). It represents the core functionality of the portal, through which the entry of keywords and phrases produce matches from EAGLE's massive epigraphic database.
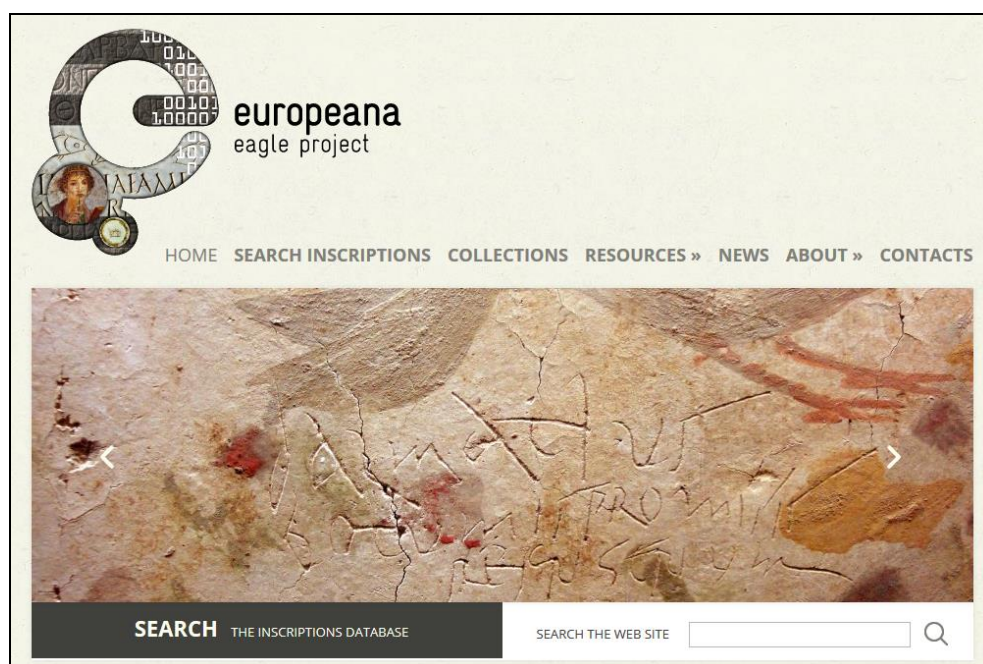

Figure 1. Home Page – Snapshot

Once the user enters the "Search Inscriptions" section, she can choose whether to perform a simple search or an advanced search, or whether she wants to access her Personal Space (available only upon registration).

This section provides a detailed description of the two types of search, and of the items returned in the result list. Section 3 describes instead the functionality available for the registered users.

The EAGLE Portal makes available a "simple search" (in "Google" way) and an "advanced search", where the user can specify the values of a number of fields in order to make a more accurate search.

The result of a search (whether simple or advanced) is presented to the users in "pages", with a fixed number of items in each page (10 objects per page) and with two buttons (labelled "next" and "previous") to navigate the query results.

The objects that a user can search in the EAGLE Portal belong to three different categories, in accordance with the EAGLE conceptual model (see Deliverable D3.1 EAGLE Metadata Model Specification for a complete description of the elements in each category):

- The EAGLE objects in the first category, called "artefacts", contain all the information (extracted from an Epidoc document or other metadata) that is somehow related to the physical carrier of the inscription.

- The EAGLE objects in the second category, called "texts", contain all the information (extracted from an Epidoc document or other metadata, and from WikiMedia for translations) that is textual in nature.

- The EAGLE objects in the third category, called "images" contain all the information (extracted from an Epidoc document or other metadata) that is visual in nature.

The objects in the three categories that are derived from the same initial object received from a Content Provider contain the same (unique) Local ID (i.e. the ID used by the Content Provider to uniquely identify the object in its database, often indicated in EAGLE with CP-ID) and have cross-links to maintain the integrity of the "single object" received and to ease the retrieval of the associated information.

It has to be noted that the result of a query may be different depending on the category in which the search was done, as well as the information displayed for each item in the result page of a query (see following paragraph).

2.1 SIMPLE SEARCH

The simple search user interface is very straightforward (see Figure 2). The text entered in the query box is used to make a full text search in all the fields of all the EAGLE objects in the category determined when making the query. By default, the search will be done on all the objects in the "artefact" category. Two more tabs on the result list (labelled "texts" and "images") allow the user to perform the same query choosing a different category.
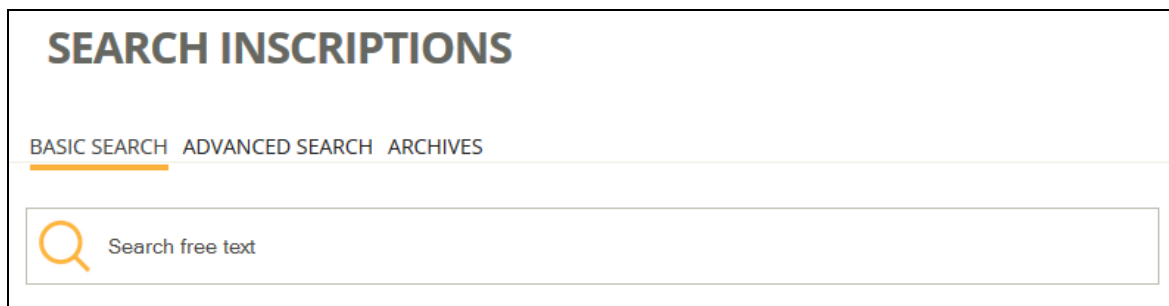

Figure 2. Simple Search

After having submitted a query, the user is presented with the first "page" of the results. Each page contains a fixed number of items, pre-set in the Aggregator, to allow a convenient display of the result in one HTML page (currently there are 10 items per page). The user can then browse the result list with the "next" and "previous" buttons which appear on the screen after receiving the first page.

In case of multiple instances of the same inscription - i.e. multiple objects that share the same Trismegistos Identifier (TM-ID) - the result list does not include all those objects but only one instance chosen according to the criteria discussed in Deliverable D5.1.

Each item in the result list of a query made on "artefacts" contains the following information, if available (see Figure 3):

- Thumbnail of the item

- Title

- Content Provider

- Location (values of the fields "RomanProvinceItalicRegion and "AncientFindSpot")

- First 256 characters of text of the transcription

- Date

Figure 3. Result List - Artefacts

Each item in the result list of a query made on "texts" contains the following information, if available (see Figure 4):

- Thumbnail of the item

- Title

- Content Provider

- Location (values of the fields "RomanProvinceItalicRegion and "AncientFindSpot")

- First 1024 characters of text of the transcription

- Date

- A simple text "NO translations available" OR a clickable text "translations available" (if translations are available, clicking on that text will open a text box with all the translations available for the inscription of the object, collected from WikiMedia)

- Indication whether there are multiple instances of the same inscription

Figure 4. Result List - Texts

Each item in the result list of a query made on "images" contains a list of thumbnails and, when the user passes with the mouse over an image, the following information is displayed (see Figure 5):

- Title
- Content Provider
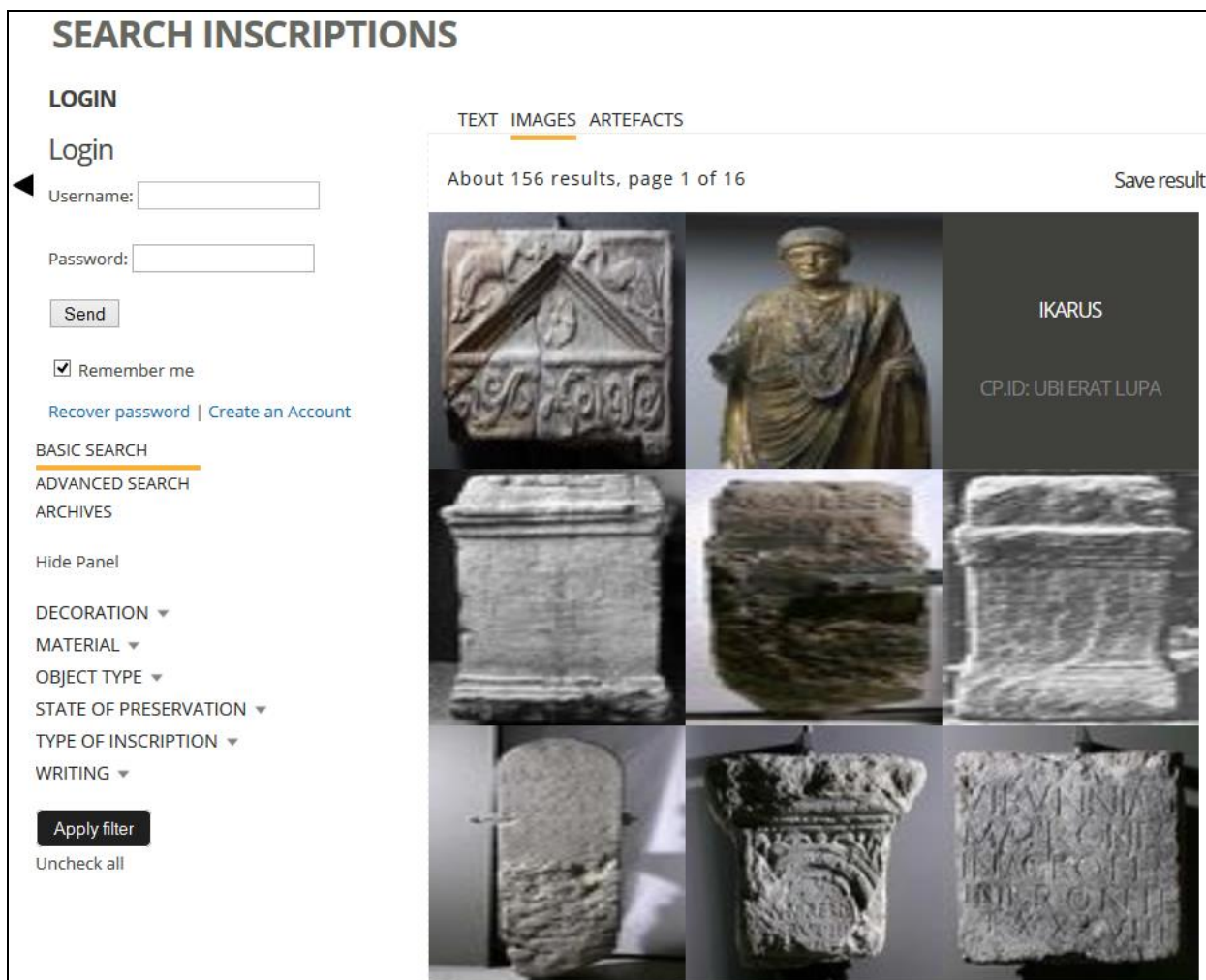
Figure 5. Result List - Images

By using the fields displayed on the left side panel, the user has the possibility to refine the query by applying some filters based on the fields that are associated with a controlled vocabulary, i.e.:
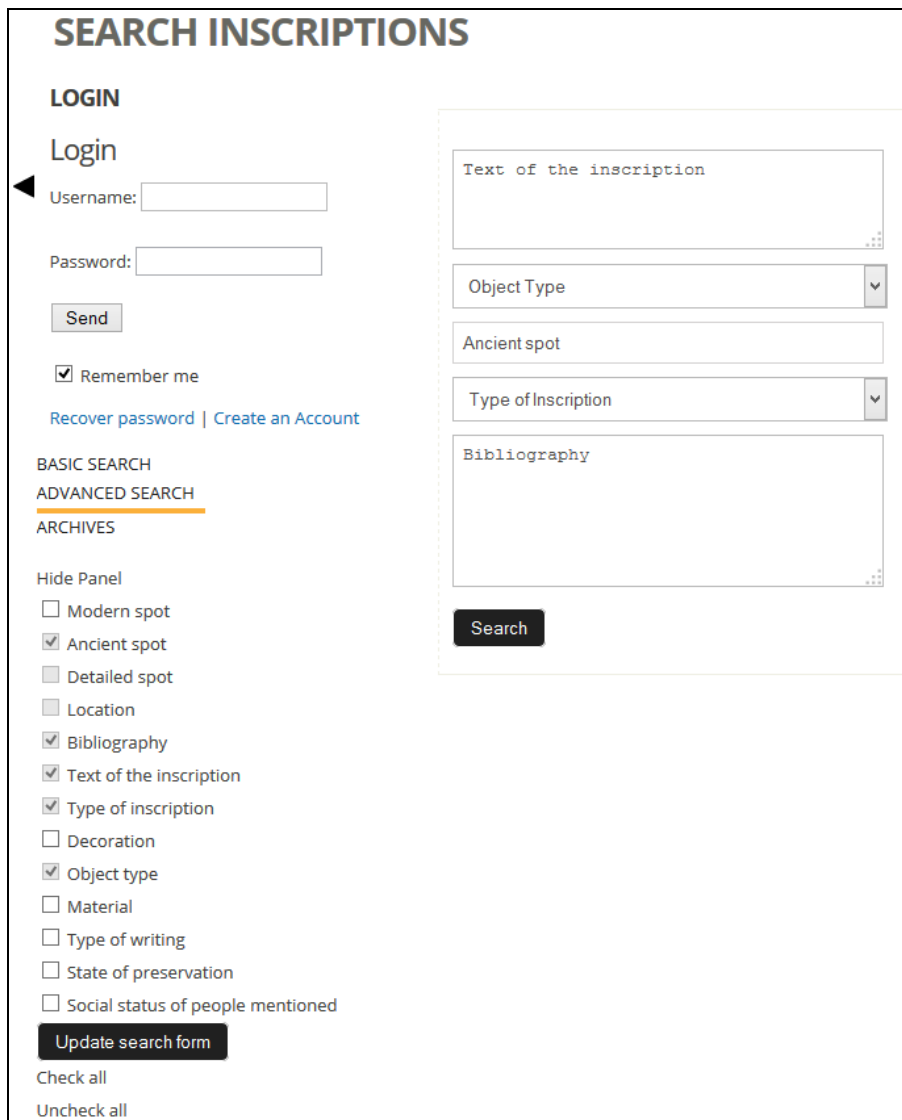
- Decoration (controlled vocabulary: **http://www.eagle-network.eu/voc/decor/**)

- Material (controlled vocabulary: **http://www.eagle-network.eu/voc/material/**)

- Object Type (controlled vocabulary: **http://www.eagle-network.eu/voc/objtyp/**)

- State of Preservation (controlled vocabulary: **http://www.eagle-network.eu/voc/statepreserv/**)

- Type of Inscription (controlled vocabulary: **http://www.eagle-network.eu/voc/typeins/**)

- Writing/Execution (controlled vocabulary: **http://www.eagle-network.eu/voc/writing/**)

2.2 ADVANCED SEARCH

Using the advanced search interface, a user can specify values for a number of fields, in order to have more accurate results. The fields that are available for an advanced search are the following, as described in Deliverable D5.1 (see Figure 6).

- Modern findspot

- Ancient findspot

- Detailed findspot (village, street, building...)

- Location

- Bibliography

- Text of the inscription

- Type of inscription

- Decoration

- Object type

- Material

- Type of writing

- State of preservation

- Social status of the persons mentioned in the text

Figure 6. Advanced Search

For the sake of a more simple interaction, when initially arriving at the advanced search page, the fields displayed will be the ones listed below. The user will have available, on the left, a menu to indicate which additional fields (among the ones listed above) should be added in the query section.

- Text of the inscription

- Object type

- Ancient findspot

- Type of inscription

- Bibliography

In advanced search, in the fields having a controlled vocabulary, the user is allowed to enter only values coming from the vocabulary. For this purpose, those fields have a "drop-down menu" which displays all the defined values for that field. Some of the vocabularies may have the same value represented in more than one language (e.g. altar, altare) and in this case the drop-down menu will display only the "preferred label", i.e. the text string that has been indicated in the vocabulary as the preferred one for display, regardless of the language in which the string is defined.

Each item in the result list of an advanced search contains the following same information, if available, as in a simple search made on "artefacts", namely (see Figure 7):

- Thumbnail of the item

- Title

- Content Provider

- Location (values of the fields "RomanProvinceItalicRegion and "AncientFindSpot")

- First 256 characters of text of the transcription

- Date

Figure 7. Result List – Advanced Search

2.3 DETAILED INFORMATION FOR A SELECTED OBJECT

Regardless of the type of query performed by the user (simple or advanced) and of the category in which the query was done, clicking on one of the items in the result page will display a summary of all the information available for that item, with links to get further details: The text in big characters on top of the page (see Figure 8) is the Title of the object. Below the title there is the local ID of the object (CP-ID, very often just a number) and then there is a line collecting all the clickable items of the summary page. Clicking on Bibliography will open a text box with the bibliography associated with the object; clicking on Translations available will open a text box with all the translations available for the inscription of the object, collected from WikiMedia; clicking on Original source will open (in a new browser tab) the page of the object in the data base of the Content Provider who provided that object; clicking on Save will save the object in the Personal Space (if the user is logged in, see Section 3); clicking on Export will download (if available) the EpiDoc document describing the object into the user own PC. In conclusion, the information displayed in the summary page are the following (see Figure 8):

- Title (as page title)

- CP-ID (as label of the Tab)

- Link to Bibliography

- Link to Translations

- Link to original source (page of the object in the data base of the Content Provider)

- Save (to user Personal Space)

- Export (EpiDoc document, disabled in the present release)

- All available thumbnails of the that item (clickable, to get full images)

- Content Provider

- Trismegistos ID

- Type of inscription

- Type of object

- Material

- Ancient findspot Region

- Ancient findspot City

- Current Location

- Date

- Complete text of the transcription

Figure 8. Object Details

If more than one instance of the object is available, the other instances will appear on the summary page as clickable "tabs", each tab being labelled with the CP-ID of another instance of the same object (see Figure 9). Clicking on a tab, the summary information of the other instance is displayed, with the same format.

Figure 9. Object Details – Multiple Instances

3 PERSONAL SPACE FOR REGISTERED USERS

3.1 SAVING THE DATA

A registered user, during a "local" or a "mobile" session, has the capability of saving (some of) the information that is being provided by the EAGLE system.

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

- A query and its results, together with a mandatory "title" and an optional "description".

- Detailed information about an inscription (i.e. the summary page obtained after clicking on one of the results of the query), together with a mandatory "title" and an optional "description".
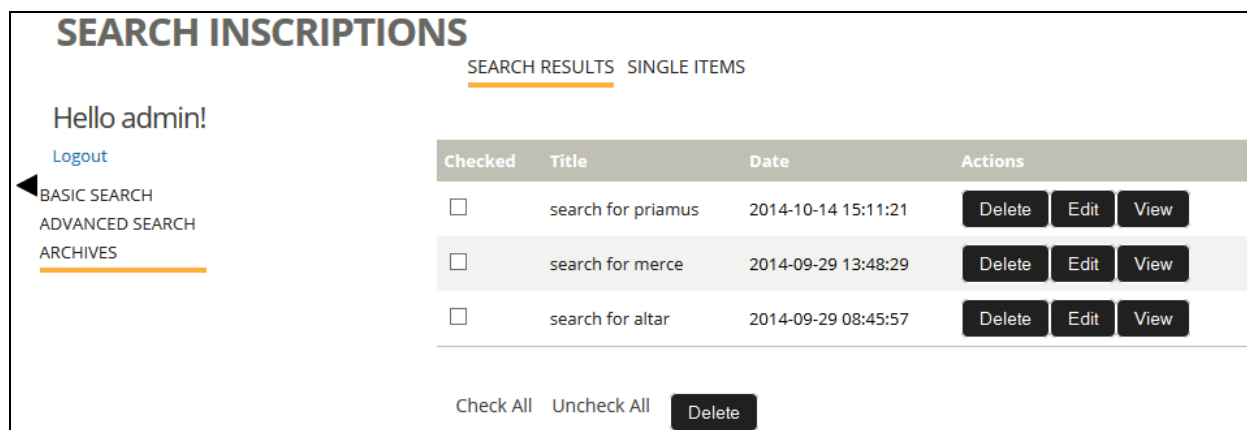
A logged-in "mobile user" has also the possibility to save a third type of data, namely a picture taken with her mobile device, together with a mandatory "title" and an optional "description".

The data saved by the local user on the EAGLE server is stored internally in a relational data base (see Part B Developer Guide).

3.1.1 Saving a query and its results

At any time when browsing the result list of a query (either a simple search or an advanced search), the user can hit the save button.

At a save request, the GUI software displays a text box requesting the user to provide some mandatory information that will be used as a "title" and will become the "human" identifier of the saved query and its results. It displays also a text box for an optional "description".

Figure 10. User Personal Space – Saved Queries and Results

The information that is saved is:

- The User-ID

- The query performed by the user

- Up to 10 pages of results, presently 5 pages before and 5 pages after the current page that the user was looking at when hitting the save button

- The textual information provided by the user as "title" and "description"

- The date when the query was saved

3.1.2 Saving detailed information about an inscription

When the user hits one of the items in a return list, she access the summary page associated with the selected object. At any time when browsing the summary page of an object, the user can hit the save button.

As in the case of saving a query, at a save request the GUI displays a text box requesting a mandatory "title", and another text box for an optional "description".

Figure 11. User Personal Space – Saved Objects

The information that is saved is:

- The User-ID

- The saved object, which means the complete information received from the Aggregator, also what it is not displayed to the user.

- The textual information provided by the user as "title" and "description"

- The date when this object was saved

If the object has more than one instance (the TM-ID is associated to more than one Content Provider-ID), the object saved is only the one displayed when the user requests the save.

3.2 EDITING THE SAVED DATA

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

- Display of the saved queries and their results (see Figure 10). The complete list of the saved queries is shown, each one identified by the textual string provided by the user at the time of saving. For each saved query the user can:

    o Modify the textual information associated with the query (both the title and the description)

    o Delete the saved query and its result from her Personal Space

    o View the saved query and its results. In this case the results that were saved are displayed to the user. It has to be noted that the saved data might be different from the data that might be retrieved by issuing the same query at the time of editing, due to changes in the data stored in the EAGLE database. By clicking on one of the results, the user can get the (updated) detailed information about that inscription.

- Display of the saved objects (see Figure 11). The complete list of saved objects is shown, each one identified by the textual string provided by the user at the time of saving. For each saved object the user can

    o Modify the textual information associated with the object (both the title and the description)

- o Delete the saved object from her Personal Space

- o View the summary page of the saved object. It has to be noted that the saved data might be different from the data obtained by retrieving the same object at the time of editing, due to changes in the data stored in the EAGLE database.

3.3 IMPORTING DATA SAVED DURING A MOBILE SESSION

Registered (and logged in) users of the Flagship Mobile Application are able to save data while using the application. It has to be noted that a user can log in to the Mobile Application by using the same user ID and password used at the EAGLE portal.

As already described, the data that can be saved is the same as for the "local user" (a query and its result, the detailed information for an object). It has to be noted that in this case the "query" is actually a picture taken with the mobile device and sent to the Image Recognizer at the EAGLE portal for recognition. In addition, the "mobile user" can save any picture taken with the mobile device, even if not sent to the EAGLE portal. When saving an item, the mobile user must provide a mandatory "title" and may provide an optional "description".

The data saved during a mobile session are temporarily stored in the FMA server, which is part of the EAGLE Architecture (see Part B) and is responsible for directly supporting the Mobile Application. The data saved during the mobile sessions can be imported (uploaded) into the user Personal Space, maintained in the EAGLE server, through an additional function in the Archives section of the EAGLE portal that will be available in Release 2.

PART B. DEVELOPERS GUIDE

4 EAGLE PORTAL ARCHITECTURE

The system architecture of the EAGLE Portal consists of two main components: the EAGLE server, which represents the core of the EAGLE Portal, and the FMA server which is dedicated to support the Flagship Mobile Application. Figure 11 shows the two main components of the EAGLE user-service system, along with a view of the different modules and of the interactions between them.
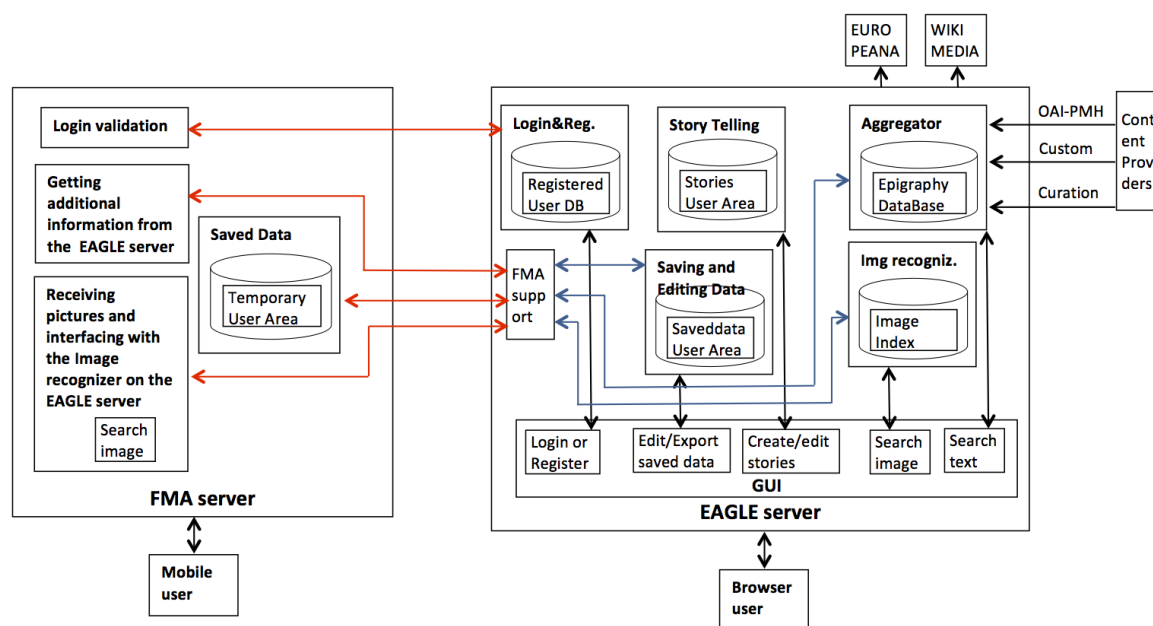
Figure 12. Summary view of the system architecture

The Content Management System that has been selected as the base technology upon which the EAGLE Portal frontend has been implemented is WordPress[1].

WordPress is an open source blog tool and publishing platform licensed under the GNU General Public License (GPL). It is powered by PHP and MySQL and can easily be customised.

WordPress has been selected as the base technology for the implementation of the EAGLE Portal because of its flexibility, its easy and user friendly setup and usage, and its provision of a high level of personalization. This ensemble of qualities makes it the ideal facilitator of a versatile CMS.

WordPress has a web template system that uses a template processor. The processor makes it easy to re-arrange widgets and install and switch between themes. The PHP and HTML code used by the themes can also be edited for more advanced customizations.

Furthermore, WordPress has a rich plugin architecture that allows users and developers to extend its functionality beyond the features that come with the base installation.

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[1] http://wordpress.org

In the case of the EAGLE Portal the following plugins have been implemented and integrated in the CMS:

- *Eagle Search Inscriptions* is the core plugin which governs the functionality of the EAGLE Inscriptions Search Engine, implementing the GUI which allows users to search the EAGLE database, browse the results and save relevant queries and items. It interfaces with SOLR, the Aggregator indexer and search engine, sending the user query and parsing the results to present them to the user according to the requirements that have been identified. The specific EAGLE plugin includes a dedicated database where to store the data saved by the registered users for future reference, including those imported from the FMA server.

- *Eagle Login Check* implements the interface called by the FMA server to validate user login at the mobile device.

For further details on the interaction between the GUI and the Aggregator, how it is structured the internal database to store the data saved by the and on the interaction between the GUI and the FMA server please see the following Sections. The full integration with the FMA server and the integration with the Storytelling application is in progress and it will be better described in the next WP5 deliverables due by the end of December 2014 (D5.3.1 First release of the flagship mobile application and SDK, D5.4.1 First release of the flagship storytelling application).

5 INTERACTION WITH THE AGGREGATOR

This Section explains the technical details of the interaction between the EAGLE Portal User Interface and the backend constituted by the EAGLE Aggregator (part of the AIM infrastructure), which is powered by the SOLR indexing and search engine (see Deliverables D4.1 AIM Infrastructure Specification and D4.2.1 First Release of AIM Infrastructure).

All the queries received by the Aggregator have to comply with the SOLR syntax, and all the responses returned by the Aggregator will be in the format provided by SOLR. Complete information about the search functionality of SOLR can be found at: http://wiki.apache.org/solr/#Search_and_Indexing

5.1 QUERY FORMAT

The requests to SOLR follow the general SRU (Search/Retrieve via URL) syntax, with the name of the action to be performed (in our case **select**) followed by a question mark (**?**), followed by any number of (**keyword=value**) pairs, separated by ampersand (**&**).

select?keyword1=value1&keyword2=value2& <and so on>

To satisfy the EAGLE requirements, two features supported by SOLR are used in EAGLE and are always part of the query.

The first feature (**group**) instructs SOLR to put in a single item of the result list all the items satisfying the query that have the same value in the field specified in the group parameter. In EAGLE, this field is the TM-ID number, so that all the objects (satisfying the query) that have the same TM-ID will be returned as a single item of the result list. Based on the EAGLE specifications, the portal will select among the objects in the item the single one to be displayed.

The second feature (**facet**) provides to SOLR a list of fields and instructs SOLR to provide, at the end of the result list, the number of items satisfying the query for each distinct value in the fields provided in the query. This information will be displayed in the result page, so that the user can perform a "faceted search".

According to the data model and the functional requirements, the queries will be done against three distinct types of EAGLE objects: artifacts, text, images, that in the query are indicated respectively as **entitytype:artifact**, **entitytype:documental**, **entitytype:visual**.

In the query to SOLR, it is also possible to indicate a list of fields (keyword **fl**) that will be returned for each item in the result list. In EAGLE, this value is always **fl=__result**, as the complete EAGLE object that we want to be returned in the result list has been indexed in the field **__result**.

Another information to be provided in the query is the number of items (keyword **rows**) to be returned in the response and the index (keyword **start**) in the result list where to start counting those **rows** items. In EAGLE it has been decided that **rows** is equal to ten, and the portal, after the first page (**start=0**) will retrieve the subsequent pages with values of **start** that are multiple of 10.

It is possible to specify in the query (keyword **wt**) the format of the response, which can be either XML or JSON, the default being XML. In the rest of this document we assume that this keyword is not specified and all the descriptions will be in XML.

To conclude, the general format of an EAGLE query is the following.

select?
group=true&
group.field=tmid&
group.limit=50&
facet=true&
facet.field=*field 1 here*&
facet.field=*field 2 here*&
.....
facet.field=*field N here*&
start=*index of first result item to be returned*&
rows=*number of results items to be returned, in EAGLE 10*&
fl=__result&
q=entitytype:*artifact/documental/visual* AND *user provided query string*

5.2   RESPONSE FORMAT

The response provided by SOLR to any query consists in a XML envelope (named **response**) containing, after a short header with a copy of the query, a list of items ranked in relevance order with respect to the query (in search engine parlance, the result list). The exact format of each item in the list clearly depends on the query. In the EAGLE case, each item in the result list is a group of EAGLE objects that have the same TM-ID value (most of the time there is just one item in each group). The EAGLE objects in the result list of course have the **entytype** specified in the query. Whatever the type, the objects returned in the result list always contains all the data to be included in the result displayed to the user.

The exact format (structure) of each EAGLE object type is defined by the EAGLE Common Metadata Model. The complete XML schema of the three types of EAGLE objects is available at the link below. We recommend to always check the latest version of the XML schema, as it is being "fine-tuned" often, as the EAGLE project proceeds with the implementation and the testing of the portal functionality.

http://svn-public.driver.research-infrastructures.eu/driver/dnet40/modules/dnet-eagle-workflows/trunk/src/main/resources/eu/dnetlib/msro/eagle/eagle%20schema/EAGLE%20schema%20(EMF).xsd

In summary, a simplified view of the overall structure of the response is depicted below (the detailed structure is in the examples). As it can be seen, SOLR provides in the response generic types of elements, named with a short string suggesting the type of the element or the type of the values contained in the element (list, array, doc, integer, string, etc.).

```
<response>
  <lst name="responseHeader"> ..omissis.. </lst>
  <result name="response"
      numFound="total number of matches" start="index of the first item returned"/>
  <lst name="grouped">
    <lst name="tmid">
      <arr name="groups">
        <lst>
          <str name="groupValue">first value of TM-ID</str>
          <result name="doclist" ..omissis..>
            <doc>
              <arr name="__result">
                <str>
                  <result>
                    <header> ..omissis.. </header>
                    <metadata>
                      <EAGLE object here>
                    </metadata>
                  </result>
                </str>
              </arr>
            </doc>
            <doc>
            ....
                    <another EAGLE object with the same TM-ID>
            ....
            </doc>
            ....
          </result>
        </lst>
        <lst>
          <another group with another TM-ID>
        </lst>
        ....
      </arr>
    </lst>
..</lst>
  <lst name="facet_counts">
    <lst name="facet_queries"/>
    <lst name="facet_fields">
      <lst name="field1 here">
        <int name="first value of field1"># of items</int>
        <int name="second value of field1"># of items</int>
        ....
      </lst>
      <lst name="field2 here">
      ....
      </lst>
    </lst>
  </lst>
</response>
```

5.3   EXAMPLES

5.3.1   Simple search for all artifacts

In this example the user is not requesting any facet values, the "user provided string" will be an asterisk (*), and the **entitytype** will be specified as **artifact**. Usually many of the groups returned in the result list will have only one EAGLE object, as either the TM-ID number is associated with only one EAGLE object,

or the object does not (yet) have a TM-ID number. In the latter case the value in the element **<str name="groupValue">** will be in the form **n/a_alphanumericstring**, where the alphanumeric string is different for each object. This has been done within the aggregator, to avoid for all the EAGLE objects that do not have a TM-ID number to be put in the same group.

Query

```
select?
group=true&
group.field=tmid&
group.limit=50&
group.ngroups=true&
start=0&
rows=10&
fl=__result&
q=entitytype:artefact AND *
```

Response

```
<response>
 <lst name="responseHeader">
  <int name="status">0</int>
  <int name="QTime">1467</int>
  <lst name="params">
   // omissis
  </lst>
 </lst>
 <lst name="grouped">
  <lst name="tmid">
   <int name="matches">122703</int> // number of results
   <int name="ngroups">112217</int> // number of groups
   <arr name="groups">
    <lst>
     <str name="groupValue">n/a_UBB::00668eebef4388e943ca4315ad5db3af</str>
     <result name="doclist" numFound="1" start="0"> // number of results per group
      <doc>
       <arr name="__result">
        <str>
         // object
        </str>
       </arr>
      </doc>
     </result>
    </lst>
    <lst>
     // etc…
    </lst>
   </arr>
  </lst>
 </lst>
</response>
```

5.3.2 Advanced search

At the EAGLE Portal is also possible to formulate "advanced queries", where the user can specify values for a number of fields (some of them with controlled vocabularies) displayed in the advance search page. From the point of view of the SOLR engine, there is really no difference between the simple search and the advanced search. In the simple search no fields are indicated in the query, and the search is

performed on ALL the fields indexed. In the advanced search the query indicates the fields on which the search has to be done, and the search will be done only on those fields.

The table below gives in the left column the fields shown to the user in the advanced search page, and in the right column the corresponding fields to be indicated in the query.

As explained before, for those fields that have a controlled vocabulary, some entries in the vocabulary may have more than one value (i.e. a label) associated with it, each one corresponding to a different language. In order to make the query not dependent on the language, for all the fields with a controlled vocabulary the value indexed in the Aggregator is the URI associated with the "concept" expressed by the vocabulary entry, and therefore the value provided in the query to SOLR is a URI, and not the label selected by the user on the screen. This is accomplished by the portal GUI, by showing a drop-down menu with all the values in the vocabulary (each entry is shown using its "preferred label") and then inserting in the query the URI corresponding to the selected item.

Fields shown at the portal	Indexed fields to be indicated in the query (OR)
Ancient findspot	ancientfindspot
Modern findspot	modernfindspot
Detailed findspot (village, street, building...)	modernfindspot moderncountry modernregion modernprovince
Location	conservationcountry conservationregion conservationcity museum
Bibliography	bibliography
Text of the inscription	inscriptiontext
Type of inscription	Inscriptiontypevoc
Decoration (controlled vocabulary)	Decorationvoc
Object type (controlled vocabulary)	Objecttypevoc
Material (controlled vocabulary)	Materialvoc
Type of writing (controlled vocabulary)	Writingtypevoc

State of preservation (controlled vocabulary)	stateofpreservationvoc
Social status of the persons mentioned in the text	socialstatus

In this example the user is not requesting any facet values and is searching for all artifacts (query string=**entitytype:artefact AND ***) having specific values for the fields "decoration" and "object type".

Query:

select?
group=true&
group.field=tmid&
group.limit=50&
group.ngroups=true&
start=0&
rows=10&
fl=__result&
q=entitytype:artifact AND * AND
decorationvoc=*URI of the item selected in the vocabulary* **AND**
objecttypevoc=*URI of the item selected in the vocabulary*

Response

Same format as in the simple search

5.3.3   Request for details of a returned item

If the user clicks on one of the items in a result list, no new query is needed, as all the information to be displayed in the detailed view (as defined in the present version of the EAGLE functional specifications) can be found in the EAGLE object contained in the **response** envelop, regardless of the **entitytype** of the item being "clicked".

It has to be noted that the information included in each EAGLE object are just those needed for display, i.e. they are a subset of the complete information that may be contained in the other **entitytypes** of the same EAGLE object.

If the complete information about the entity (partially) described by the EAGLE object at hand has to be retrieved, it is necessary to identify in that object the DNET-IDs of all the other **entitytypes** related to the same object, and to make a new query specifying all the DNET-IDs of the items wanted. In this case no grouping is needed, and the query is as shown below. The format of the response follows the structure of the **response** envelope, but in this case there are no groups.

Query

select?
fl=__result&
q=dnetresourceidentifier:(*DNET-ID1* **OR** *DNET-ID2* **OR ...***DNET-IDN***)**

The example below shows the format of the actual DNET-IDs used in the Aggregator, which include alphanumeric strings identifying the entity type, the Content Provider who provided the original entity and the local ID of the original entity (often called CP-ID).

select?
fl=__result&
q=dnetresourceidentifier:"UBB::00668eebef4388e943ca4315ad5db3af::transcription" OR dnetresourceidentifier:"UBB::00668eebef4388e943ca4315ad5db3af::artifact"

Response

```
<response>
  <lst name="responseHeader">
   <int name="status">0</int>
   <int name="QTime">0</int>
   <lst name="params">
     // omissis
   </lst>
  </lst>
  <result name="response" numFound="2" start="0">
   <doc>
     <arr name="__result">
       <str>
         // object
       </str>
     </arr>
   </doc>
   <doc>
     // etc…
   </doc>
  </result>
</response>
```

5.3.4 Faceted search

As described in Part A, the list of facets (fields) that the EAGLE Portal requests by default, in order to show their counts on the result page, is the following:

- Decoration

- Material

- Object Type

- State of Preservation

- Type of Inscription

- Writing/Execution

The example below is a simple search for all artifacts and the count of the items in each value of the "material" field, which has a controlled vocabulary. It has to be noted that the portal GUI, for the facets requested, will display the "preferred label" of the vocabulary entries, and not the URI returned.

Query

select?
group=true&
group.field=tmid&
group.limit=50&
group.ngroups=true&
start=0&
rows=10&
fl=__result&
facet=true&

facet.field=materialvoc
q=entitytype:artefact AND *&

Response

```
<response>
 <lst name="responseHeader">
  <int name="status">0</int>
  <int name="QTime">1467</int>
  <lst name="params">
   // omissis
  </lst>
 </lst>
 <lst name="grouped">
  // same as previous example
 </lst>
 <lst name="facet_counts">
  <lst name="facet_queries" />
  <lst name="facet_fields">
   <lst name="materialvoc">
    <int name="http://www.eagle-network.eu/voc/material/lod/48">20664</int>
    <int name="http://www.eagle-network.eu/voc/material/lod/2">5400</int>
    <int name="http://www.eagle-network.eu/voc/material/lod/131">2055</int>
    <int name="http://www.eagle-network.eu/voc/material/lod/109">934</int>
    <int name="http://www.eagle-network.eu/voc/material/lod/128">809</int>
    <int name="http://www.eagle-network.eu/voc/material/lod/75">725</int>
    <int name="www.eagle-network.eu/voc/material/lod/57">701</int>
    // etc...
   </lst>
  </lst>
  <lst name="facet_dates" />
  <lst name="facet_ranges" />
 </lst>
</response>
```

6   THE USER PERSONAL SPACE

As described in previous Sections, a logged in registered user has the possibility of saving in a "User Personal Space" the result of a query and the detailed information about an object, obtained after "clicking" on one of the results of the query. For a "local user" (i.e. a user logged in at the EAGLE Portal) the saved data is stored internally in a relational data base maintained in the EAGLE server. For a "mobile user" (i.e. a user logged in through the Mobile Application) the saved data is stored (temporarily) in the FMA server, to be retrieved later when the user logs in at the EAGLE Portal and with an "upload function" brings the data saved during the "mobile session" into her Personal Space.

6.1   SAVING A QUERY AND ITS RESULTS

When a user hits the save button when looking at a result page, the EAGLE Portal will save the information described below. In the present release the "query type" of the data saved at the EAGLE Portal will always be "string". In the next release of the portal it is planned to support also a "query by example" function, where the user can provide a picture as the query and take advantage of the Image Recognition functionality already used by the Mobile Application.

- The User-ID

- The type of query (string or image query)

- The string entered in the query box OR the image provided as an example (in Release 2)

- The page number the user was looking at when hitting the save button

- Up to 10 pages of results, at present 5 pages before and 5 after the actual page that the user was looking at when hitting the save button

- The number of saved pages

- The provided annotations ("title" and "description")

- The date when the query was saved

To perform the saving, the GUI software issues (in the background) N calls to the Aggregator to retrieve the N pages of the result of the query that are to be saved, and stores all the information in its internal data structure.

Internally, the data for a saved query are stored in a table of a Relational Data Base. The fields of the table (in MySQL notation) are the following.

- `query_id` int(11) ====> an internal unique ID, generated by the system (the table primary key)

- `user_id` int(11) ====> the ID of the (logged-in) user requesting the save

- `query_type` varchar(6) ====> it can have only three values to indicate the content of the query field

    o   Type1 = the query is the string entered in the query box

    o   Type2 = the query is an image provided as an example

    o   Type3 = the query is a picture taken by the mobile user

- `query` text ====> the query made by the user OR the URL to an image

- `page_number` smallint(5) ====> the number of the page that the user was looking at when requesting the save of the query

- `tot_page_saved` tinyint(3) ====> the total number of pages saved

- `title` varchar(80) ====> is the mandatory "human ID" entered by the user

- `comment` text ====> the optional description entered by the user

- `resource` longtext ====> all the saved pages in Json format, following the XML structure returned by the Aggregator (see Section 5); for Type 3 is empty (no query was sent to the EAGLE server)

- 'data' datetime ====> the date when the query was saved by the user

6.2 SAVING DETAILED INFORMATION ABOUT AN INSCRIPTION

When the user hits the save button to save one of the items in a result list, the information that is saved is the following:

- The User-ID

- The saved inscription

- Some internal data (position of the saved item in the group of inscriptions associated to the same Trismegistos ID, position of the saved item in the query from which it has been retrieved and saved)

- The provided annotations ("title" and "description")

- The date when the item was saved

If the inscription has more than one instance (the TM-ID is associated to more than one Content Provider-ID), the saved instance is only the one displayed when the user requests the save.

The saved data consist of the actual values of the data being displayed to the user (i.e. no links to data in the aggregator).

Internally, the data for a saved instance are stored in a table of a Relational Data Base. The fields of the table (in MySQL notation) are the following.

- `eagle_instance_id` int(11) ====> an internal unique ID, generated by the system (the table primary key)

- `user_id` int(11) ====> the ID of the (logged-in) user requesting the save

- `col` tinyint(3) ====> position of the saved item in the group of inscriptions associated to the same Trismegistos ID

- `row` tinyint(3) ====> position of the saved item in the results page from which it has been saved

- `page` int(11) ====> result page number containing the saved item in the original query

- `resource` longtext ====> the saved inscription in Json format, following the XML structure returned by the Aggregator (see Section 5)

- `comment` text ====> the optional description entered by the user

- `title` varchar(80) ====> the mandatory "human ID" entered by the user

- 'data' datetime ====> the date when the item was saved by the user

7 SUPPORT OF THE FLAGSHIP MOBILE APPLICATION

The Flagship Mobile Application (FMA) is being developed as an alternative way to access the Eagle platform functionalities. This application, running on a Smartphone, will communicate with its dedicated server (the FMA server, see the architecture), which in turn will need to communicate with the EAGLE server in order to access the information there.

The functions to be supported for the FMA are those described in the Deliverable D5.1, Sect.4.3 (summarised in the Table below).

ID	User	Requirement	Priority
MBE01	Generic	Change default values of basic parameters	High
MBE02	Generic	Search images by "similarity search"	High
MBE03	Generic	Search images by "exact match"	High
MBE04	Generic	Browse history of previous queries	High
MBE05	Generic	Login to the EAGLE system	High
MBE06	Registered	Create and save simple-text notes on records	High
MBE07	Registered	Upload and save pictures of an inscription	High
MBE08	Registered	Browse history of saved images and text	Medium

The FMA server will need four different services from the EAGLE server, namely the "Image Recognition" service, the "Image Similarity Search" service, the "Get Metadata" service and the "Login Registered User" service. In addition, the FMA server will need to support one service needed by the EAGLE Portal, namely the "Get Saved Info" service. All services provided to the FMA server are REST services. They accept HTTP requests and return XML responses.

7.1 THE IMAGE RECOGNITION SERVICE

The image Recognition Service provides a service to recognize epigraphs. It gets a query image and returns the metadata of the recognized epigraph. Internally, this will interact with the Aggregation and Image Retrieval system (AIM) in the EAGLE server (see Deliverable D.4.1) which has two main components: the Image Retrieval System, performing the recognition, and the Metadata Aggregation System, providing the metadata of the recognized epigraph.

Temporary Service Address: http://virserv101.isti.cnr.it/fma/services/IRServices/recognize

This service address is temporary, to be used during the testing phase. It will be changed when the services will be in the deployment phase.

HTTP Request Format

HTTP request type: Multipart POST

Supported images formats: JPG, PNG

Image encoding: either binary or Base64 encoding (by Apache Commons Codec library).

Parameters

- img   inputstream of an image (mandatory).

- correlationId   optional (for asynchronous calls)

- in the present release any other parameters will be ignored

Response Format

- XML structure containing the complete epigraph metadata (see examples in the Appendix)

HTML Call Example

```
<form method="POST" enctype="multipart/form-data" name="test" action="
http://virserv101.isti.cnr.it/fma/services/IRServices/recognize">

        Query <input name="img" type="file">

        <input type="submit" value="Search" name="submit">

</form>
```

HTML Testing Page: http://virserv101.isti.cnr.it/fma/recognizeTesting.html

Through this page it is possible to test the recognition service by uploading an image selected from a test set.

7.2 THE IMAGE SIMILARITY SEARCH SERVICE

The Image Similarity Service retrieves the visually similar epigraphs of a query. It gets a query image and returns a sorted list of the most visually similar epigraphs.

Temporary Service Address: http://virserv101.isti.cnr.it/fma/services/IRServices/searchSimilar

Please note that this service address is temporary and it will change when the services are deployed on Eagle servers.

HTTP Request Format

HTTP request type: Multipart POST

Supported images formats: JPG, PNG

Image encoding: either binary or Base64 encoding (by Apache Commons Codec library).

Parameters

- img   inputstream of an image (mandatory)

- correlationId   optional (for asynchronous calls)

- nResults   optional, number of results (default: 30)

- in the present release any other parameters will be ignored

Response Format

- XML structure containing the complete epigraph metadata (see examples in the Appendix)

HTML Call Example

<form method="POST" enctype="multipart/form-data" name="test" action="
http://virserv101.isti.cnr.it/fma/services/IRServices/searchSimilar">

   Query <input name="img" type="file">

   Num of Results <input name="nResults" type="text" size="5">

    <input type="submit" value="Search" name="submit">

</form>

HTML Testing Page: http://virserv101.isti.cnr.it/fma/similarityTesting.html

Through this page is possible to test the similarity service by uploading an epigraph image.

7.3   GET METADATA SERVICE

This service gets an ID and returns the full metadata of an epigraph as described in **D3.1**. It queries the **Metadata Aggregation System** to retrieve the epigraph metadata.

It performs the following query to the Metadata Aggregation System:

*http://search.eagle.research-infrastructures.eu/solr/EMF-index-cleaned/select?q=__all:"**id**"*

where **id** is the epigraph ID.

Service Address: http://virserv101.isti.cnr.it/fma/services/IRServices/getMetadata

Please note that this service address is temporary and it will change when the services are deployed on Eagle servers.

HTTP Request Format

HTTP request type: GET

Parameters

- id   ID of the epigraph to retrieve

Response Format

- XML structure containing the complete metadata of the object (see examples in the Appendix)

HTML Call Example

<form method="GET" name="UITestForm" action="
http://virserv101.isti.cnr.it/fma/services/IRServices/getMetadata">

ID <input name="id" type="text" size="30">

<input type="submit" value="Search" name="submit">

</form>

HTML Testing Page: http://virserv101.isti.cnr.it/fma/getMetadataTesting.html

Through this page is possible to test the get metadata service by sending an epigraph id.

7.4 LOGIN REGISTERED USER SERVICE

The "Login Registered User" interface is called by the FMA server to validate user login at the mobile device. The request/response interaction is on a secure channel (https).

Service Address (SSL): https://www.eagle-network.eu//wp-admin/admin-ajax.php

HTTP request type: GET

Parameters

- action   "elc_process_login_request" (hidden parameter)

- username   the username of the user requesting to login

- password   the password of the user requesting to login

Response Format

- A Boolean value:
    - o 0   user not authenticated
    - o 1   user successfully authenticated

HTML Call Example

<form method="GET" name="LoginTestForm" action=" https://www.eagle-network.eu//wp-admin/admin-ajax.php">

<input type="hidden" value=" elc_process_login_request " name="action">

Username <input name="username" type="text" size="20">

Password <input name="password" type="password" size="20">

<input type="submit" value="Login" name="submit">

</form>

7.5 REGISTER USER SERVICE

The "Register User" interface is called by the FMA server to create a new user account from the mobile device. The request/response interaction is on a secure channel (https).

Service Address (SSL): https://www.eagle-network.eu//wp-admin/admin-ajax.php

HTTP request type: GET

Parameters

- action   "elc_process_register_request" (hidden parameter)
- username   the username of the new user
- password   the password of the new user
- email   the email address of the new user

Response Format

- The user ID of the new user in case of success, one of the following error codes in case of failure:
    - empty_user_login   cannot create a user with an empty login name
    - existing_user_login   this username is already registered
    - existing_user_email   this email address is already registered

HTML Call Example

```
<form method="GET" name="RegistrationTestForm" action=" https://www.eagle-network.eu//wp-admin/admin-ajax.php">
    <input type="hidden" value=" elc_process_register_request " name="action">
    Username <input name="username" type="text" size="20"><br/>
    Password <input name="password" type="password" size="20"><br/>
    Email <input name="email" type="email" size="20"><br/>
    <input type="submit" value="Register" name="submit">
</form>
```

7.6   GET SAVED INFO SERVICE

The "Get Saved Info" Interface is called by the EAGLE server to upload data saved in the "user temporary area" in the FMA server. This interface is invoked when the user, logged in at the EAGLE Portal, requests the uploading to his Personal Space of the data saved by the FMA server during a "mobile session".

When the user activates the "Get Saved Info" interface, all his data are uploaded to the Eagle Portal. This data are sent as a JSON file, representing all the items that have been saved by the user since his last upload. For images, the response will contain just their URLs (in the FMA server), and the uploader will retrieve them with a subsequent GET.

In input only the user ID is needed, as all the saved information will be transferred to the EAGLE server in one block. If convenient, the data transferred to the EAGLE server may be deleted from the FMA server after the transfer. The exact format of the block being uploaded follows as closely as possible the format of similar information that a user can save on the EAGLE server during a "local session".

The data that will be stored in the FMA server will be organised into the following categories:

1. saved queries and their results;
2. saved epigraphs (visualized after hitting one item in the result of a query);
3. pictures (of anything) taken by the "mobile user".

For each saved item the user will be requested to provide a text string that will become the "human readable" ID of the saved item and an optional description (again as a text field).

Service Address: to be defined

Parameters

- UserId   ID of the user requesting the upload

- CorrelationId   Unique identifier of the request

Response Format

- ResponseCode   Code describing the outcome of the operation. Possible values:

    o OK   Data found

    o NO MATCH FOUND   User not recognised

    o NO SAVED DATA   No data available for this user

- CorrelationId   Unique identifier of the request

- SavedData   All the data saved by the user since the last upload request. It contains the results of a query to the data base tables which store the data saved by the user, as specified in Sections 6.1 and 6.2:

    o saved queries and results, where the fields that are not applicable ('page_number', 'tot_page_saved') are set to "0"

    o saved epigraphs, where the fields that are not applicable ('col', 'row', 'page') are set to "0"

    o pictures taken by the "mobile user", as special case of saved queries and results, where the query is the picture and the result list is empty

8 CONCLUSION

With the first release of the EAGLE Portal, available at **www.eagle-network.eu**, the implementation of the core functionality of the EAGLE Inscription Search Engine has been completed according to the requirements identified and reported in Deliverable D5.1, as well as the possibility for a user to register and save information on her Personal Space on the Portal.

The remaining features will be prioritised again and possibly added in the second release of the EAGLE Portal, after the testing phase has been completed and the feedback from the users has been collected and analysed.

The integration with the Mobile and Storytelling Flagship Applications is in progress and it will be completed in the following months, after the first version of the two applications will be ready.

9 APPENDIX: FMA CLIENT

9.1 JAVA CODE

Eclipse project: **FMAClient**

This project contains some Java code and images to test the FMA services.
The code should work also on Android platforms.

- **ResponseCodes** contains the following response codes:
  - o *RESPONSE_OK* = 200
  - o *RESPONSE_NO_MATCH_FOUND* = 300
  - o *RESPONSE_SERVER_ERROR* = 400

- **RecognizerExample** is a simple image recognition example.
- **SimilaritySearchExample** is a simple image similarity search example.
- **GetMetadataExample** is a simple example to retrieve epigraph metadata.

- **ImageRecognitionClient, ImageSimilarityClient and GetMetadataClient are** just a simple classes to show how to call the Image Recognition Service by Apache **HttpClient** library (v4.0.3)*.

9.1.1 ImageRecognitionClient Code Fragment

The following is just a Java code fragment to show how to call the Image Recognition Service through Apache **HttpClient library**

```
String sr="http://virserv101.isti.cnr.it/fma/services/IRServices/recognize";
InputStream img=an epigraph image;
InputStreamBody isb = new InputStreamBody(img, "img");
MultipartEntity me = new MultipartEntity(HttpMultipartMode.BROWSER_COMPATIBLE);
me.addPart("img", isb);
HttpClient httpClient = new DefaultHttpClient();
HttpPost postRequest = new HttpPost(sr);
postRequest.setEntity(me);
HttpResponse res = httpClient.execute(postRequest);
String response = EntityUtils.toString(res.getEntity());
```

9.1.2 ImageSimilarityClient Code Fragment

The following is just a Java code fragment to show how to call the Image Similarity Service through Apache **HttpClient library**

```
String sr="http://virserv101.isti.cnr.it/fma/services/IRServices/searchSimilar";
InputStream img=an epigraph image;
int numResults = 10;
InputStreamBody isb = new InputStreamBody(img, "img");
MultipartEntity me = new MultipartEntity(HttpMultipartMode.BROWSER_COMPATIBLE);
me.addPart("img", isb);
me.addPart("nResults", new StringBody(Integer.toString(numResults)));
HttpClient httpClient = new DefaultHttpClient();
HttpPost postRequest = new HttpPost(sr);
postRequest.setEntity(me);
HttpResponse res = httpClient.execute(postRequest);
String response = EntityUtils.toString(res.getEntity());
```

9.1.3 GetMetadataClient Code Fragment

The following is just a Java code fragment to show how to call the Get metadata Service through Apache **HttpClient library**

```java
String sr="http://virserv101.isti.cnr.it/fma/services/IRServices/getMetadata";
String id = "epigraph ID";
HttpClient httpClient = new DefaultHttpClient();
HttpGet getRequest = new HttpGet(sr + "?id=" + id);
HttpResponse res = httpClient.execute(getRequest);
String response = EntityUtils.toString(res.getEntity());
```

9.2 TESTING IMAGES

The EDR_Images folder contains a collection of 16 images from EDR archives for testing purpose.

9.3 XML RESPONSES

9.3.1 Image Recognition XML Response

The XML response complies with the requirements in *EAGLE_Adv_Architecture*. It returns also the full epigraph metadata got from the Metadata Aggregation System as described in **D3.1.**

9.3.2 XML Response Skeleton

The following is the structure of the XML response returned from the Image Recognition Service

```xml
?xml version="1.0" encoding="UTF-8"?>
<imageRecognition  responseCode="Response  Code"  correlationId="Correlation
ID">
     <result score="Recognition Score">
          <id>Epigraph ID</id>
          <metadata>
               <!—EAGLE Epigraph Metadata-->
          </metadata>
     </result>
</ imageRecognition>
```

Relevant fields:

- **responseCode:** returns the recognition outcome code. Possible response codes**:**
  - o 200: *Ok*
  - o 300: *No match found*
  - o 400: *Server error*
- **score:** image recognition score
- **Id:** ID of the recognized epigraph
- **metadata:** contains the full epigraph metadata (if available), as described in **D3.1**

9.3.3 XML Response Example

The following is an example of a response received from the Image Recognition Service. All the content inside the **metadata** tag come from the **Metadata Aggregation System**.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<imageRecognition responseCode="200" correlationId="null">
<result score="0.749">
<id>EDR000023</id>
<metadata>
<response>
```

<lst name="responseHeader"><int name="status">0</int><int name="QTime">1</int><lst name="params"><str name="q">__all:"EDR000023"</str></lst></lst><result name="response" numFound="3" start="0"><doc><arr name="__dsversion"><date>2014-10-08T11:59:49Z</date></arr><arr name="__result"><str><result xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:dri="http://www.driver-repository.eu/namespace/dri" xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dnet="eu.dnetlib.miscutils.functional.xml.DnetXsltFunctions" xmlns:dr="http://www.driver-repository.eu/namespace/dr"><header><dri:objIdentifier>378b3c99-21d3-47a5-ade8-bb423e2aa39f_UmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZXMvUmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZVR5cGU=::94a9c565725d917437609127430bbe18_589651232e6c9ee246ef47753191c89b_visual</dri:objIdentifier><dri:repositoryId>

378b3c99-21d3-47a5-ade8-bb423e2aa39f_UmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZXMvUmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZVR5cGU=

</dri:repositoryId><dri:dateOfCollection>2014-10-08T11:56:52+02:00</dri:dateOfCollection></header><metadata><eagleObject>

<dnetResourceIdentifier>EDR::94a9c565725d917437609127430bbe18::589651232e6c9ee246ef47753191c89b::visual</dnetResourceIdentifier>
    <recordSourceInfo providerName="Archivio epigrafico di Roma" providerAcronym="EDR" landingPage="http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000023">http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000023</recordSourceInfo>
      <editingInfo>
       <dateEdited>1970-01-01</dateEdited>
       <metadataEditor>MARGHERITA FOGLIA</metadataEditor>
      </editingInfo>
      <metadataIpr uri="http://www.europeana.eu/rights/rr-f/">Reserved Rights - Free access via EDR</metadataIpr>
      <title lang="la">EDR000023</title>
      <description lang="la"/>
      <entityType>visual</entityType>
      <visualRepresentation>
       <url>http://www.edr-edr.it/foto_epigrafi/immagini_uso/1/000023.jpg</url>
       <thumbnail>http://www.edr-edr.it/foto_epigrafi/immagini_uso/1/000023.jpg</thumbnail>
       <visualRepresentationIpr uri=""/>
      <hasArtifact>
       <dnetResourceIdentifier>EDR::94a9c565725d917437609127430bbe18::artifact</dnetResourceIdentifier>
       <recordSourceInfo providerName="Archivio epigrafico di Roma" providerAcronym="EDR" landingPage="http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000023">http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000023</recordSourceInfo>
        <hasTmId>
         <tmId>n/a_EDR::94a9c565725d917437609127430bbe18</tmId>
        </hasTmId>
        <artifactTitle lang="la">EDR000023</artifactTitle>
        <originDating notBefore="1" notAfter="50" datingMethod="http://en.wikipedia.org/wiki/Julian_calendar" evidence="" period="">1 AD - 1 AD</originDating>
        <findingSpot>
         <romanProvinceItalicRegion uri="www.trismegistos.org/place/NaN">Roma</romanProvinceItalicRegion>
         <ancientFindSpot uri="www.trismegistos.org/place/NaN">Roma</ancientFindSpot>
         <modernFindSpot uri="">Roma, via Labicana (oggi via Casilina), km 3, colombario</modernFindSpot>
         <modernCountry uri=""/>
         <modernRegion uri=""/>
         <modernProvince uri=""/>
        </findingSpot>
        <inscriptionType uri="http://www.eagle-network.eu/voc/typeins/lod/92">sepulcralis</inscriptionType>
        <objectType uri="http://www.eagle-network.eu/voc/objtyp/lod/257">tabula</objectType>
        <material uri="http://www.eagle-network.eu/voc/material/lod/48">marmor</material>
        <conservationPlace>
         <conservationCountry uri=""/>
         <conservationRegion uri=""/>
         <conservationCity uri=""/>
         <museum uri="">Roma, Museo Nazionale Romano, inv. 61725</museum>
         <position/>
         <inventoryNumber/>
        </conservationPlace>
       </hasArtifact>
       <hasTranscription>
        <dnetResourceIdentifier>EDR::94a9c565725d917437609127430bbe18::transcription</dnetResourceIdentifier>
        <recordSourceInfo providerName="Archivio epigrafico di Roma" providerAcronym="EDR" landingPage="http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000023">http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000023</recordSourceInfo>
        <text lang="la">[A(ulus)] Novius A(uli) l(ibertus) / â‚¢Philargurusâ‚£. / Opetreia P(ubli) l(iberta) Secunda. / parte CXXV.</text>
        <textHtml lang="la">
         <div class="textpart">

```
&lt;recordSourceInfo providerName="Archivio epigrafico di Roma" providerAcronym="EDR" landingPage="http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;amp;id_nr=EDR000023"&gt;http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;amp;id_nr=EDR000023&lt;/recordSourceInfo&gt;
        &lt;editingInfo&gt;
         &lt;dateEdited&gt;1970-01-01&lt;/dateEdited&gt;
         &lt;metadataEditor&gt;MARGHERITA FOGLIA&lt;/metadataEditor&gt;
        &lt;/editingInfo&gt;
        &lt;metadataIpr uri="http://www.europeana.eu/rights/rr-f/"&gt;Reserved Rights - Free access via EDR&lt;/metadataIpr&gt;
        &lt;title lang="la"&gt;EDR000023&lt;/title&gt;
        &lt;description lang="la"/&gt;
        &lt;entityType&gt;documental&lt;/entityType&gt;
        &lt;documentalManifestation&gt;
         &lt;documentType&gt;transcription&lt;/documentType&gt;
         &lt;hasArtifact&gt;
          &lt;dnetResourceIdentifier&gt;EDR::94a9c565725d917437609127430bbe18::artifact&lt;/dnetResourceIdentifier&gt;
          &lt;recordSourceInfo providerName="Archivio epigrafico di Roma" providerAcronym="EDR" landingPage="http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;amp;id_nr=EDR000023"&gt;http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;amp;id_nr=EDR000023&lt;/recordSourceInfo&gt;
         &lt;hasTmId&gt;
           &lt;tmId&gt;n/a_EDR::94a9c565725d917437609127430bbe18&lt;/tmId&gt;
         &lt;/hasTmId&gt;
         &lt;artifactTitle lang="la"&gt;EDR000023&lt;/artifactTitle&gt;
         &lt;originDating notBefore="1" notAfter="50" datingMethod="http://en.wikipedia.org/wiki/Julian_calendar" evidence="" period=""&gt;1 AD - 1 AD&lt;/originDating&gt;
         &lt;findingSpot&gt;
          &lt;romanProvinceItalicRegion uri="www.trismegistos.org/place/NaN"&gt;Roma&lt;/romanProvinceItalicRegion&gt;
          &lt;ancientFindSpot uri="www.trismegistos.org/place/NaN"&gt;Roma&lt;/ancientFindSpot&gt;
          &lt;modernFindSpot uri=""&gt;Roma, via Labicana (oggi via Casilina), km 3, colombario&lt;/modernFindSpot&gt;
          &lt;modernCountry uri=""/&gt;
          &lt;modernRegion uri=""/&gt;
          &lt;modernProvince uri=""/&gt;
         &lt;/findingSpot&gt;
         &lt;inscriptionType uri="http://www.eagle-network.eu/voc/typeins/lod/92"&gt;sepulcralis&lt;/inscriptionType&gt;
         &lt;objectType uri="http://www.eagle-network.eu/voc/objtyp/lod/257"&gt;tabula&lt;/objectType&gt;
         &lt;material uri="http://www.eagle-network.eu/voc/material/lod/48"&gt;marmor&lt;/material&gt;
         &lt;conservationPlace&gt;
          &lt;conservationCountry uri=""/&gt;
          &lt;conservationRegion uri=""/&gt;
          &lt;conservationCity uri=""/&gt;
          &lt;museum uri=""&gt;Roma, Museo Nazionale Romano, inv. 61725&lt;/museum&gt;
          &lt;position/&gt;
          &lt;inventoryNumber/&gt;
         &lt;/conservationPlace&gt;
        &lt;/hasArtifact&gt;
        &lt;hasVisualRepresentation&gt;

&lt;dnetResourceIdentifier&gt;EDR::94a9c565725d917437609127430bbe18::589651232e6c9ee246ef47753191c89b::visual&lt;/dnetResourceIdentifier&gt;
          &lt;recordSourceInfo providerName="Archivio epigrafico di Roma" providerAcronym="EDR" landingPage="http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;amp;id_nr=EDR000023"&gt;http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;amp;id_nr=EDR000023&lt;/recordSourceInfo&gt;
          &lt;thumbnail&gt;http://www.edr-edr.it/foto_epigrafi/immagini_uso/1/000023.jpg&lt;/thumbnail&gt;
         &lt;/hasVisualRepresentation&gt;
         &lt;transcription&gt;
          &lt;text lang="la"&gt;[A(ulus) ] Novius A(uli) l(ibertus) / â¸¢Philargurusâ¸£. / Opetreia P(ubli) l(iberta) Secunda. / parte CXXV.&lt;/text&gt;
          &lt;textHtml lang="la"&gt;
           &lt;div class="textpart"&gt;
            &lt;a id="al1"&gt;&lt;!--0--&gt;&lt;/a&gt;  [A(ulus) ] Novius A(uli) l(ibertus)  &lt;br id="al2"/&gt;â¸¢Philargurusâ¸£.&lt;br id="al3"/&gt;Opetreia P(ubli) l(iberta) Secunda.&lt;br id="al4"/&gt;parte CXXV. &lt;/div&gt;
          &lt;/textHtml&gt;
          &lt;criticalApparatus&gt;
                                                        Textus secundum (1) contulit ad imaginem archivii photographici Instituti Epigraphiae Latinae (Roma) Foglia a. 2002.&amp;lt;br&gt;
                                            &lt;/criticalApparatus&gt;
          &lt;bibliography&gt;
                                            Not. Sc., 1926, p. 297, nr. 4 (R. Paribeni) (1)
                                     &lt;/bibliography&gt;
          &lt;bibliography&gt;
                                            L. Quilici, Collatia, Roma 1974, p. 494 con foto - AE 1974 (2)
                                     &lt;/bibliography&gt;
```

```
        &lt;bibliography&gt;
                                              AE 1974, 0178 (3)
                                         &lt;/bibliography&gt;

      &lt;commentary/&gt;
    &lt;/transcription&gt;
   &lt;/documentalManifestation&gt;
  &lt;/eagleObject&gt;&lt;/metadata&gt;&lt;/result&gt;</str></arr><arr          name="__dsid"><str>fb004d19-7702-4d9c-91cb-
d8697d03a9a0_SW5kZXhEU1Jlc291cmNlcy9JbmRleERTUmVzb3VyY2VUeXBl</str></arr><str      name="__indexrecordidentifier">378b3c99-21d3-
47a5-ade8-
bb423e2aa39f_UmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZXMvUmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZVR5cGU=::94a9c565725d917437609127
430bbe18_transcription</str><long name="_version_">1481388868632576000</long><arr name="__fulltext"><str/></arr></doc></result>
</response>
</metadata>
</result>
</imageRecognition>
```

9.3.4   Image Similarity Search XML Response

The XML response complies with the requirements in *EAGLE_Adv_Architecture*.
The image similarity response returns a list of the most visually similar epigraphs.

9.3.5   XML Response Skeleton

The following is the structure of the XML response returned from the Image Similarity Service

```
<imageSimilarity responseCode="Response Code" correlationId="Correlation ID">
        <results>
                <result score="Result Score">
                        <id>Epigraph ID</id>
                        <thumbnail>Epigraph Thumbnail URL</thumbnail>
                        <title>Epigraph Title</title>
                </result>
                <result score="Result Score">
                        <id>Epigraph ID</id>
                        <thumbnail>Epigraph Thumbnail URL</thumbnail>
                        <title>Epigraph Title</title>
                </result>
                …
        </results>
</imageSimilarity>
```

Each result is contained in a result tag.

Relevant fields:

- **responseCode:** returns the image similarity response code. Possible response codes**:**
    - o   200: *Ok*
    - o   300: *No match found*
    - o   400: *Server error*
- **score:** image simialrity score
- **Id:** ID of the similar epigraph
- **thumbnail:** URL of the epigraph thumbnail
- **title:** thumbnail title (if available)

9.3.6   XML Response Example

The following is an example of a response received from the Image Similarity Service. The title content come from the **Metadata Aggregation System**.

```
<?xml version="1.0" encoding="UTF-8"?>
<imageSimilarity responseCode="200" correlationId="null">
```

```
<results>
        <result score="5.3410625">
                <id>EDR000023</id>
                <thumbnail>http://virserv101.isti.cnr.it/eagle-images/000023.jpg</thumbnail>
                <title>EDR000023</title>
        </result>
        <result score="0.22245051">
                <id>EDR005073</id>
                <thumbnail>http://virserv101.isti.cnr.it/eagle-images/005073.jpg</thumbnail>
                <title>EDR005073</title>
        </result>
        <result score="0.16435404">
                <id>EDR110628</id>
                <thumbnail>http://virserv101.isti.cnr.it/eagle-images/110628.jpg</thumbnail>
                <title/>
        </result>
        <result score="0.14074884">
                <id>EDR005014</id>
                <thumbnail>http://virserv101.isti.cnr.it/eagle-images/005014.jpg</thumbnail>
                <title>EDR005014</title>
        </result>
        <result score="0.12546638">
                <id>EDR005114</id>
                <thumbnail>http://virserv101.isti.cnr.it/eagle-images/005114.jpg</thumbnail>
                <title>EDR005114</title>
        </result>
    </results>
</imageSimilarity>
```

9.3.7   Get Metadata XML Response

The XML response complies with the requirements in *EAGLE_Adv_Architecture*.

This service returns the full metadata associated to an epigraph as described in **D3.1**. To retrieve the epigraph metadata, the service queries the Metadata Aggregation System.

The following is the SOLR query performed by this service to the Metadata Aggregation System:

*http://search.eagle.research-infrastructures.eu/solr/EMF-index-cleaned/select?q=__all:"**id**"*

where **id** is the epigraph ID.

9.3.8   XML Response Example

The following is an example of a response received from the Get Metadata Similarity Service. The full content come from the **Metadata Aggregation System**.

```
<?xml version="1.0" encoding="UTF-8"?>
<response>
<lst        name="responseHeader"><int        name="status">0</int><int        name="QTime">1</int><lst        name="params"><str
name="q">__all:"EDR000112"</str></lst></lst><result name="response" numFound="3" start="0"><doc><arr name="__dsversion"><date>2014-
10-08T11:59:49Z</date></arr><arr        name="__result"><str>&lt;result        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:dri="http://www.driver-repository.eu/namespace/dri"                              xmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:dnet="eu.dnetlib.miscutils.functional.xml.DnetXsltFunctions"                                    xmlns:dr="http://www.driver-
repository.eu/namespace/dr"&gt;&lt;header&gt;&lt;dri:objIdentifier&gt;378b3c99-21d3-47a5-ade8-
bb423e2aa39f_UmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZXMvUmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZXR5cGU=::0b4b1c3b5051f3a0f4eea2be1
36d7b34_transcription&lt;/dri:objIdentifier&gt;&lt;dri:repositoryId&gt;
                                378b3c99-21d3-47a5-ade8-
bb423e2aa39f_UmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZXMvUmVwb3NpdG9yeVNlcnZpY2VSZXNvdXJjZXR5cGU=
                                    &lt;/dri:repositoryId&gt;&lt;dri:dateOfCollection&gt;2014-10-
08T11:52:51+02:00&lt;/dri:dateOfCollection&gt;&lt;/header&gt;&lt;metadata&gt;&lt;eagleObject&gt;
        &lt;dnetResourceIdentifier&gt;EDR::0b4b1c3b5051f3a0f4eea2be136d7b34::transcription&lt;/dnetResourceIdentifier&gt;
```

<recordSourceInfo providerName="Archivio epigrafico di Roma" providerAcronym="EDR" landingPage="http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000112">http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000112</recordSourceInfo>
<editingInfo>
<dateEdited>1970-01-01</dateEdited>
<metadataEditor>STEFANIA VALENTINI</metadataEditor>
</editingInfo>
<metadataIpr uri="http://www.europeana.eu/rights/rr-f/">Reserved Rights - Free access via EDR</metadataIpr>
<title lang="la">EDR000112</title>
<description lang="la"/>
<entityType>documental</entityType>
<documentalManifestation>
<documentType>transcription</documentType>
<hasArtifact>
<dnetResourceIdentifier>EDR::0b4b1c3b5051f3a0f4eea2be136d7b34::artifact</dnetResourceIdentifier>
<recordSourceInfo providerName="Archivio epigrafico di Roma" providerAcronym="EDR" landingPage="http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000112">http://www.edr-edr.it/edr_programmi/res_complex_comune.php?do=book&amp;id_nr=EDR000112</recordSourceInfo>
<hasTmId>
<tmId>n/a_EDR::0b4b1c3b5051f3a0f4eea2be136d7b34</tmId>
</hasTmId>
<artifactTitle lang="la">EDR000112</artifactTitle>
<originDating notBefore="1" notAfter="50" datingMethod="http://en.wikipedia.org/wiki/Julian_calendar" evidence="" period="">1 AD - 1 AD</originDating>
<findingSpot>
<romanProvinceItalicRegion uri="www.trismegistos.org/place/033157">Liguria (Regio IX)</romanProvinceItalicRegion>
<ancientFindSpot uri="www.trismegistos.org/place/031683">Albingaunum</ancientFindSpot>
<modernFindSpot uri="">Albenga (Savona), regione Doria</modernFindSpot>
<modernCountry uri=""/>
<modernRegion uri=""/>
<modernProvince uri=""/>
</findingSpot>
<inscriptionType uri="http://www.eagle-network.eu/voc/typeins/lod/232">honorarius</inscriptionType>
<objectType uri="http://www.eagle-network.eu/voc/objtyp/lod/125">fragmentum</objectType>
<material uri="http://www.eagle-network.eu/voc/material/lod/48">marmor</material>
<conservationPlace>
<conservationCountry uri=""/>
<conservationRegion uri=""/>
<conservationCity uri=""/>
<museum uri="">ignoratur, periit</museum>
<position/>
<inventoryNumber/>
</conservationPlace>
</hasArtifact>
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SupplIt, 04, 1988, p. 261, nr. 10 (con foto) (G. Mennella) - AE 1990 (1)

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