

MARS (Multimedia Archaeological Research System)

An open-source web database to manage all data from collection to repository.

Patrick Semal^a, H el ene Rougier^{b,a,c}, Isabelle Crevecoeur^{c,a}, Charles Dibie Krpa^a, St ephane Vanbegin^a, Els Cornelissen^d, Alexandre Livingstone Smith^d, Nicolas Cauwe^e, Eric Danon^a, Eric Brehault^f & Mathieu Le Marec-Pasquet^f
^a Royal Belgian Institute of natural Sciences, ^b Department of Anthropology, California State University Northridge, USA; ^c Laboratoire d'Anthropologie des Populations du Pass e, UMR 5199 PACEA, Universit e Bordeaux 1, ^d Royal Museum for Central Africa, Belgium, ^e Royal Museum of Art and History, ^f Makina Corpus.



Introduction

- The standardized recording of the complete information of an archaeological excavation is a complex task due to the multidisciplinary aspect of fieldwork. After the excavation, the scientific study of the field data and collected specimens involves again collaborative work from specialists of different disciplines. After subsequent publications, the artifacts and specimens become part of museum and/or university collections.
- MARS is a collaborative application developed by the RBINS and by Makina Corpus in order to manage this information. Funding came from the Belgian Federal Science Policy (BELSPO). The Paleolithic cave site of Spy (Belgium) was used as a case study and is available for a live demo.

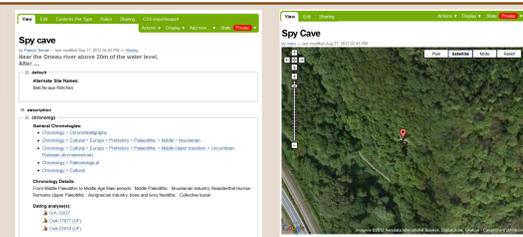
Goals and targets

- NESPOS already offers a centralized technical solution for the storage and sharing of information and data on Pleistocene humans. MARS is a complementary decentralized tool at the institution level that can be easily adapted for other periods and topics. It manages documents, pictures, 3D files, PDFs, and other format files in relation to an extensive, structured object database dedicated to the description of sites, their stratigraphy, and associated collections and repositories, in a similar way to the data model of NESPOS.
- Potential users of MARS are scientific institutions, administrations, and private companies involved in archeology, paleontology, and biological anthropology.

Technology / Workflow

- MARS is based on the Plone CMS which offers one of the richest WEB 2.0 Open Source applications. Plone is very stable and has the best security track record of any major CMS. MARS uses the most current version of Plone (Major 4.2). In MARS the basic set of objects available in Plone was enriched with new objects related to the data model.
- Access rights can be defined by roles, user groups and at the user level for each object. A complete workflow allows to start using a private status, then to share data with colleagues, and finally to share data with the whole scientific community after their publication by simply changing the publication status of objects and folders.

Site



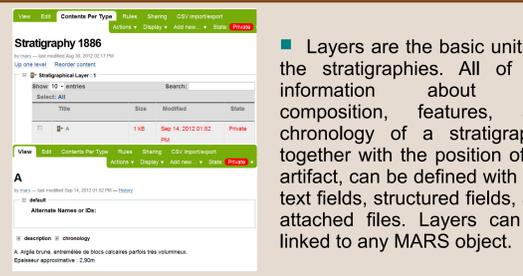
- The site object is containing the objects related to the location, the excavation(s), the stratigraphies and the archeological structure(s).
- The site is also defined by specific fields such as the site type, the chronology, the discovery, and the maps. Site objects can be related to all other MARS content(s).

Stratigraphy



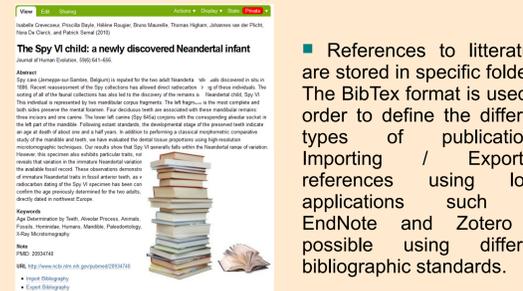
- Several stratigraphies can be defined for a single site. The stratigraphy encompasses the layer(s).
- Dedicated fields allow to describe the stratigraphy and to relate it to the chronological framework and to the bibliographic references.

Layers



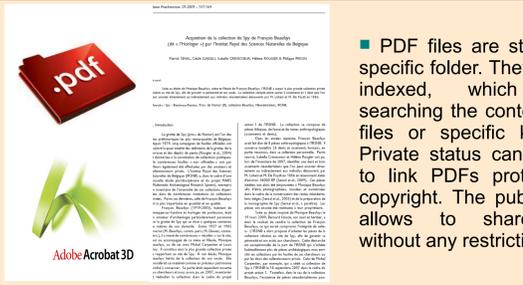
- Layers are the basic units of the stratigraphies. All of the information about the composition, features, and chronology of a stratigraphy, together with the position of an artifact, can be defined with rich text fields, structured fields, and attached files. Layers can be linked to any MARS object.

Bibliography



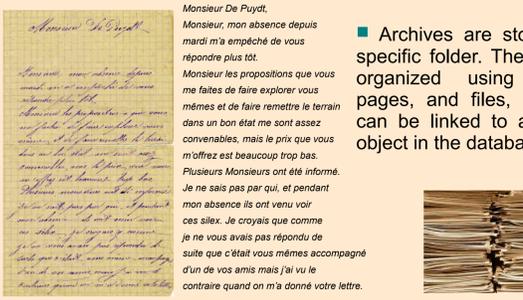
- References to literature are stored in specific folders. The BibTex format is used in order to define the different types of publications. Importing / Exporting references using local applications such as EndNote and Zotero is possible using different bibliographic standards.

PDF



- PDF files are stored in a specific folder. They are fully indexed, which allows searching the content of the files or specific keywords. Private status can be used to link PDFs protected by copyright. The public status allows to share PDFs without any restriction.

Archives

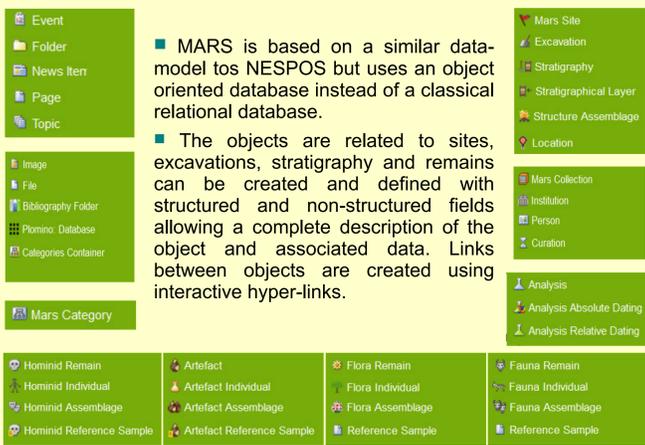


- Archives are stored in a specific folder. They can be organized using folders, pages, and files, and they can be linked to any other object in the database.

Categories & Thesaurus

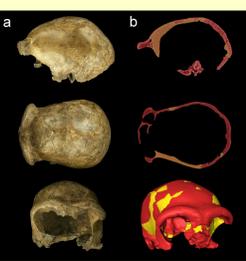
- The hierarchical path of the categories allows to search through the full path, from parents to childrens. Categories can be imported from a flat file and edited following the user requirements.
- General Chronologies:
- Chronology > Cultural > Europe > Prehistory > Palaeolithic > Middle > Mousterian
 - Chronology > Cultural > Europe > Prehistory > Palaeolithic > Middle-Upper transition > LRI

Datamodel



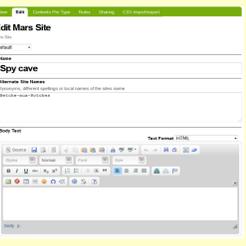
- MARS is based on a similar data-model to NESPOS but uses an object oriented database instead of a classical relational database.
- The objects are related to sites, excavations, stratigraphy and remains can be created and defined with structured and non-structured fields allowing a complete description of the object and associated data. Links between objects are created using interactive hyper-links.

Multimedia



- All multimedia files can be uploaded in MARS as file, and used with user side applications.
- The large files like CT data are stored as blob objects in the file system.

Edition

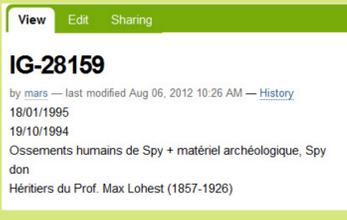


- In MARS, editing is based on a full WYSIWYG editor allowing to edit Rich Text fields with tables, figures, and complex layout. Copy/Paste from Word or Excel is possible but the HTML code is cleaned in order to fit with the CSS of the site.

Collections

- Collections are designed as object containers. They are also defined by specific fields characterizing their inventory number, origin, site, copyright, curation, repository, and free related items. Tables of content with a search function allow to select objects for viewing or editing.

Inventories



- Inventories are composed of classical Plone objects like folders, pages, and files.
- All inventories are fully indexed allowing a Google-like search of all folders.

Storage rooms



- In MARS, virtual storage rooms are available through a hierarchical structure of folders, pages, and images. It is possible to navigate or to search in the structure in order to find specific remains or collections.

Remains



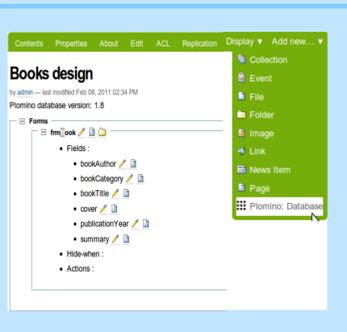
- The remains are the most detailed level of the MARS database. Each human, faunal or vegetal remain and artifact can be defined with specific fields related to their description, biology, chronology, technology, taphonomy, discovery, and administration.

Assemblages



- Assemblages and individuals are composed of the association of remains from different collections or even from different sites. Specific fields can be defined at this level to complete the data from the isolated remains as well as for the sex determination and age.

Databases



- Plomino allows to build structured databases with specific fields and items. The design and the edition of the database is based on a WYSIWYG edition. Some tools for searching, importing and exporting, reporting and synchronizing servers are included in Plomino, which is an add-on of Plone developed by Makina Corpus.

Search

- All of the information is fully indexed in MARS. Search can be done by several approaches from the Google-like search to the very specific search for unique value of a specific field. The search form can be customized with the WYSIWYG editor by all registered users and search values can be edited by anonymous users. Searching is possible in the entire site as well as in specific folders. References to literature have a specific catalog and a specific search interface.
- Search results depend on the access rights of the user.

Import / Export

- A simple structure of folders, pages, images, and files can be easily imported and exported through the use of a Zip file including the hierarchy of the structure and its contents.
- All Plone/MARS objects can be imported and exported through CSV files that preserve the relationships between objects. The files can be opened as spreadsheets, edited, and re-imported in the MARS application.
- Policies of synchronization can be defined in order to give priority to the server or client side.

Technical Support

- The application is multi-platform but a Linux server is recommended. The web client (browser) is totally open. MARS and Plone are open-source solutions. The sources of MARS are available at: <https://github.com/RBINS/mars>.
- Nevertheless, a commercial technical support can be provided by Makina Corpus, which developed the latest version of the application.



Makina Corpus
 36, rue Jacques Babinet, 31100 Toulouse, France
<http://www.makina-corporus.com>
 Eric.brehault@makina-corporus.com