

# **E-archaeology+: an integrated expert system dedicated to Archaeology**

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## **Abstract**

### **Motivation**

The development of this system started from the need for National Museum of Syria to gathering, retrieving and analyzing archaeology information. Starting from papers distributed in museums and excavation department and photos of monument, the big challenge was to answer questions focusing on first, dividing to main logical concepts; second, trying to build relations between these concepts. From this two view points, we start to build a union module to each concept discovering the workflow of museum, excavation, monument, photos department, restoration, and conservation department.

### **Results**

The project *e-archaeology*<sup>1,2</sup> we developed is a system related to document antiquities and monuments. It included specific fields devoted to major kinds of 'operation-trades' in Archaeology:

- Object Archiving (O.A), Museum Automation
- Object Tracking (O.T), Restoration Automation
- Excavation (EX), Excavation Automation
- Picture Archiving (P.A), Photos Department Automation
- Monuments (Mon), Sites and Monuments Automation

After defining the needed requirements, we started analyzing and designing this system. At this stage, the challenge was to obtain a correct reference of normalization. To be sure our system go in a correct way, we designed strategy of two phases. Phase #1 consisted in developing distributed databases under test to all concepts explained above depending on a system approach analyzing technique. Phase #2 consisted in developing one general data base to whole system. We choose to develop two kinds of Web Base Application, one depend on ORACLE with JAVA, and the other on SQL SERVER with IIS depending on ADO.

It thus acts, for each field, of specific information related to the types of operations. Thus, in the developed system, these operation-trades can be accompanied by an information system which the archaeologists use. The deployment of this system thus makes it possible to capitalize information related to the various operations trades and to produce a new

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<sup>1</sup> This concept was created by Vicken Abadjian

<sup>2</sup> Integrated Documentation theory: special data bases represent all kind of archaeological fields and relations between them that achieve to integrated information about the antiquities and the possibility of tracking it.”

informational inheritance, ensuring the traceability of the archaeological data in particular. It is thus a question of building an archaeological working memory and of capitalizing data bases relating to the archaeological activities.

For each 5 set of the operation-trades described, the collection of information is carried out via specific fields which inform about several aspects of the activity or of the object. For example, for Object Alignment (O.T) which is a special system for restoration, documentation for Tablet is carried out by informing the fields which relate to 'before, processing, after', i.e. the various stages of transformation of the object.

The Web Base Application systems called respectively DEMO and DGAM are under implementation with a Syrian/Italian project. With collaboration of Computer Science, Software Engineering department, Damascus University we developed these sub-projects:

- 1- OA project for museum related with distributed data on internet and testing the normalization.
- 2- Mon project for monument related with distributed data on internet and testing the normalization.
- 3- Building topology layers for advance searching on this kind of systems

### **E-archaeology+: Advance developing and improvement of the system e-archaeology by adding web- and text-mining functionalities**

E-archaeology is presented in the form of an expert system of archaeology data capture, storage and analysis. One will leave the possibility which it is deployed on a large scale, in a country, Syria, near a community of actors (although one can imagine another country). It is intended to constitute a general data base on the operations of identification, restoration or valorisation of all the archaeological inheritance by proposing means of acquisition of information on line on a country scale.

First additional feature:

To improve this integrated system, we are developing a set of functionalities supporting collaborative work and evaluation activity associated to e-archaeology considered as a Digital-Library data on archaeology activities and Cultural Heritage [1]. This part of the system allows to:

- locate members and organisations through a collective map
- Contribute to expand community map and organisation (define and redefine is proper presentation, support a new candidature of a new member, identify all organisations involved in the project among archaeologists...)
- Discuss and exchange ideas, information and document about the project through some collaborative functionalities (forum, mailing list, blogs, wiki, on-line meeting, etc.)

This part is an important dimension of the enlarged e-archaeology project: it concerns information management as an internal set of tools called "*Community Centre*". Some of the information of this module could be displayed to public through a web site, associated to access to the data base itself.

Second additional feature:

We are adding a second feature to develop a *knowledge mapping tool, accessible through the web, and a visual or graphical translation of data base*. We can imagine the great number of data in archaeological field and stored with Vicken e-archaeology system. Those data could be interrogated through linguistic categories but also associated through a visual displaying system of categories and sub-categories. This system will be end-user system, “user friendly” interactive and innovative, to provide a wide synthesis on quantity, quality, diversity of information associated to e-archaeology.

This ‘information cartography’ could integrate a GIS allowing navigation on data through a map of Syria.

First, a mapping tool exploits advantages of information visualization design: visual synthesis in information system, help in navigation activity in a complex environment of specialized data. The system could graphically display i) ‘salience’ of e-archaeology data base (example : the big place taken in archaeology field in Syria by Tadmor/Palmyra or the importance and the great number of Tablets); ii) a global vision of semiotic variety of documents and data (photos, text, films, etc.) c) the system could also include a analysis of dynamic evolution over time of E-archaeology data base itself (growth of collections, evolution of associated documents, identification of new sources of information, even community member activities if we agree that the first digital information to preserve over time is the project archive itself).

Third additional feature:

In order to use the web-mining functionality in a better way, we develop a text-mining integrated module to extract, in automatic way, information for the huge of electronic textual data. A system has been already developed by Text-mining group, Laboratory of Research in Informatics, University Paris 11 [2, 3] and can be easily adapted and applied for Archaeology research field. This module is closely related to the module of Web mining. It provides resources to the module of Web mining, for example in the form of lexicon or thesaurus necessary to acquire relevant information from the Web. It also makes it possible to enrich the data base directly by allowing the extraction of precise information on a given subject. This additional feature will be discussed in more details in joined article presented in this conference.

## References

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