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EULOGIA: A HYPERMEDIA APPLICATION FOR MUSEUM CATALOGUING ENRICHED WITH SGML ENCODING

The purpose of this paper is to introduce the main characteristics of an on – going joint project codenamed EULOGIA, carried by the Benaki Museum Byzantine Department (Athens) and the University of Westminster's School of Computer Science and Information Systems Engineering (London). The project is being realised in the University of Westminster's Artificial Intelligence Division in close collaboration with the Benaki Documentation Department.

The aim of the project is the design and development of a multimedia application exploiting University of Westminster's IDEAs system facilities, with the addition of Standard Generalised Markup Language encoding (SGML).

Our target application is based on the Benaki Museum Byzantine Collection of objects and icons. This collection embraces a wide variety of artefacts (more than 2000 pieces), varying from household objects and furniture, to ecclesiastical vessels, and from fine jewellery to architectural elements, representing different materials and techniques. The objects collection spans from the early 4th century AD to the mid 15th century; while the Icons collection covers a broader period, up to the 18th century. In terms of geographical expansion the Collection includes objects originating from almost every territory that belonged to the Byzantine Empire during its over a thousand years history as well as from areas under Byzantium's immediate political and cultural influence.

The multiple character of this Collection is therefore the ideal challenge for the testing of our system, since we envision the end application as a generic tool and we have focused our efforts in making provision to cover through its functions the complicated needs of all multicultural Benaki Museum's Collections.

Our aim from the first step was not to develop yet another multimedia application intended for the public, but an application to be used primarily as a research tool addressed:

A. To Museum Curators who need the help of an effective yet handy multimedia system to make best profit on the data they collect or compose.
B. To other Researchers wishing to obtain complicated information about the collections contents.

Secondarily, the system could be used to support exhibitions, offering museum visitors a valuable and attractive information resource.

As we all know from experience, although benefits from the implementation of various computer applications in museums are well appreciated by all museum experts, it is still rather difficult, – and not without reason – to

persuade museums personnel to invest a lot of their precious time and energy in learning how to use complicated computer systems.

What we needed therefore, was an easy-to-learn, easy-to-use, open system through which we could take immediate advantage of the knowledge museum curators possess and enrich constantly. Uncomplicated data updating mechanism is also very important, since one of the main characteristics of archaeological knowledge is that new information is added every day while older data never lose their value.

Apart from fully supporting visual data, the quintessence of archaeological information, the system should offer those facilities necessary to answer the complicated tasks curators have to fulfil. In preparing exhibitions, publications and educational projects or simply to answer a fellow researcher's request, collection keepers have to browse the material under their responsibility in different ways, tracing objects which are related in one way or another to a historical event, a place, or a person.

"Lord Byron in Greece", "Icons of the Cretan School of Painting", "Greece and the See" (through the ages) are only some of the exhibitions and publications carried out by the Benaki Museum during the past years. In each case curators had to retrieve objects related in heterogeneous ways to the conceptual threads of these projects.

EULOGIA is based around IDEAs, an electronic Documentation system that provides the author with a powerful information cross-referencing engine, which allows the generation of thousands of links within minutes.

It can use any form of text (irrespective of language and structure) as well as graphics, sound, and other external programs, to generate interactive systems that will help the reader to find the information required.

IDEAs sees all nodes in the hypertext as having the same importance. For IDEAs each node is text or picture, sound, application associated with a title. It will automatically link the nodes to every place in the network where their titles are referred and generates an index of all nodes. The system provides functions for the creation of hypertext links to the following types of objects:

- documents
- parts of text in a document
- photographs
- diagrams
- sound
- external programs
- knowledge bases

Its main advantage though is its ease of use. IDEAs has been designed having the untrained end-user in mind, taking into consideration that every information network that the system generates could become available to a large number of readers from varying levels of expertise.

The keyword/key-phrase search mechanism is able to locate information in related files and inter-connect objects stored in several physical files. To support the search and cross-reference mechanisms, IDEAs provides an advanced indexing machine that is able to rapidly update the indices and the cross-reference information whenever an updated file becomes available. It supports Synonyms as well, an important function for archaeological applications where standard terminology is not fully established.

In EULOGIA application three categories of nodes have been formed:

A. A sequence of menu – nodes presenting the user a general overview of the collection contents and their classification.
B. General Information Nodes, offering additional encyclopaedic data about historical events, materials and techniques related to the collection objects.
C. Nodes about each object of the Byzantine collection.

The user may follow a sequence of menus to have a general overview of the collection contents (Fig. 1), or may search for a specific node or class of nodes using the search mechanism.

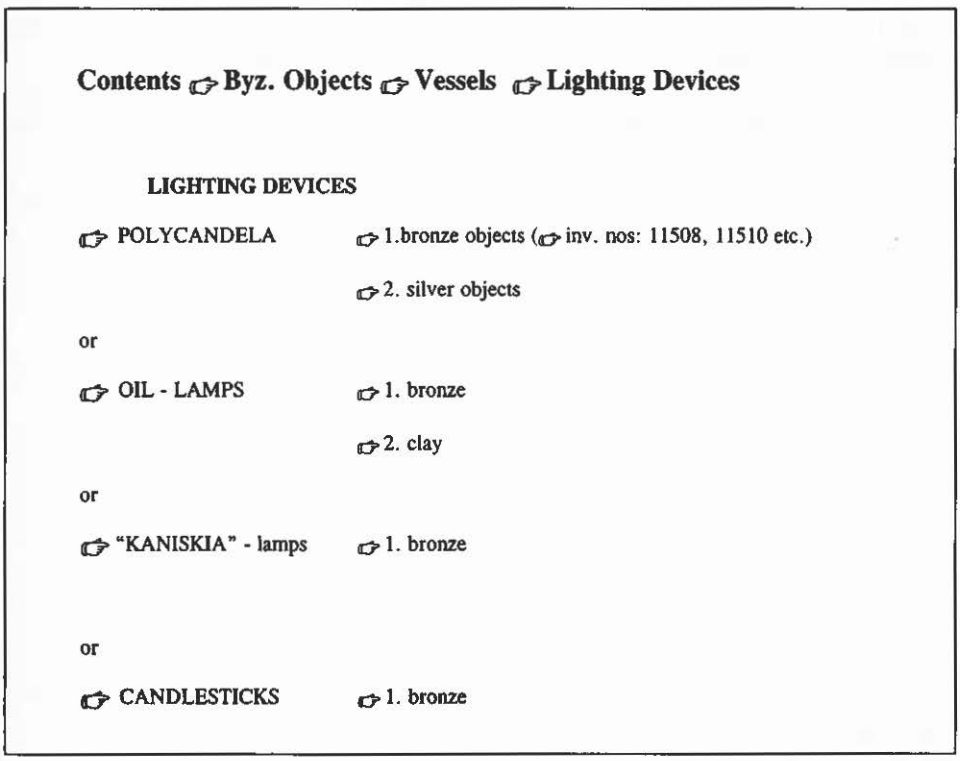

Fig. 1 – Example of a user's travelling through EULOGIA information nodes.

IDEAs keeps a path of travelling and helps avoid loops while reading by not allowing linking through anchors already seen; the user may always return to previously examined nodes by choosing them from the path – window. IDEAs also limits reader overload by highlighting each anchor only once per page.

Particular consideration has been given to visual data. The inclusion of high resolution images allows the user to zoom in the digitised photographs, to produce print outs of good quality, sufficient for research purposes and in the case of fragile museum pieces – such as textiles –, digitised images of high analysis help in their preservation as, in most cases, researchers will be able to study the objects without the need of accessing the originals.

Finally it should be pointed out, that this application doesn't intend to serve any management purposes (this wasn't necessary since the Museum is being using another system for this purpose). We could rather call it an intelligent, electronic, catalogue raisonne tool in the service of curators and researchers.

In developing this application two more crucial requirements emerged:

1. Since the Benaki Museum is already using another information system, with different structure and purpose, how could we interconnect these two applications avoiding double work and without losing much information.
2. How could we find a reliable way of exchanging on-line data with other museums in order to avoid the cost and delays caused by postal communication and unnecessary field trips.

We should very briefly refer here to the Benaki main Information System, codenamed MITOS. MITOS consists of two linked parts:

1. An object oriented, knowledge based cultural data base, based on the Semantic Indexing System kernel, developed by the Institute of Computer Science-Foundation of Research and Technology – Hellas, Crete.
2. A Collections Management Sub-system aiming to the computerisation of the core procedures concerning museum objects.

The reliable data transfer from the EULOGIA hypertext application to the appropriate cites in MITOS system will be enabled through **SGML** encoding. Standard Generalised Markup Language is a tested and highly appreciated international standard, with flexibility and enormous potentials. It is a metalanguage for texts description; a system that allows authors to label the different elements of a text.

This descriptive markup language introduces the Document Type concept, in other words declares what the structure of a certain class of documents must be, through what is called Document Type Definition, **DTD**. Each Document in SGML must be structured according to a declared DTD and the SGML processor, the parser tests the document against the referred

DTD to ensure it matches. It is obvious that this mechanism is of major importance because several programs can be written making use of the information on the document structure embodied in the DTD.

SGML is machine, system and data independent, providing a general purpose mechanism for string substitution. It is ideal therefore to meet our requirements. Moreover, a large number of vendors produce a wide range of software for SGML applications, which makes things much easier.

In deciding to implement SGML encoding our first task was to model a hierarchical data structure meeting the needs of an archaeological Museum application. In designing this special DTD we tried to keep balance between the demand for simplicity and author's convenience, which was our main goal from the beginning, and the crucial requirement to encode as much information as possible.

We also had to work out the handling of certain complex issues concerning archaeological information:

1. We had to take under consideration the polysemantic character of the archaeological information.

The example, of a standard Museum Record is enlightening. The term COPTIC applied in a large number of records encapsulates in a single word indications about objects manufacture place, date and style. The inclusive term COPTIC should be therefore analysed in its semantic components (and this sort of terms are frequently encountered in museum records).

2. DATE and PLACE could not occur only once, because museum objects history may be related to numerous dates or places. This, for example, is the case of a handsome copper alloy candlestick, dating from the late 5th century AD, which in 1783 was attached to a disc. Both dates, late 5th C. and 1783 should occur under a Date field.

Considering all these factors we concluded to the following Data Structure (see Fig. 2):

Benaki Museum is followed by the specific *collection* (Byzantine Objects and Byzantine Icons in our case), which includes numerous *Inventory Numbers*. This element requires a unique numeral value, that corresponds to the basic museum unit. Attached to *Inventory Number* a tree of elements unfolds, analysing museum objects complex profiles.

We conceive each historical object's profile as the resultant of numerous actions or events, such as creation, donation or acquisition, which may be named actions-elements. To these actions-elements are given properties requiring the place, date and subject of each action, or any other additional information related to the event.

For example: action-element *Donation* has as named properties *donor*(s), a *donation date*, a *donation place* and *receiver*(s).

It is self-evident, when it comes to museum applications, that almost all

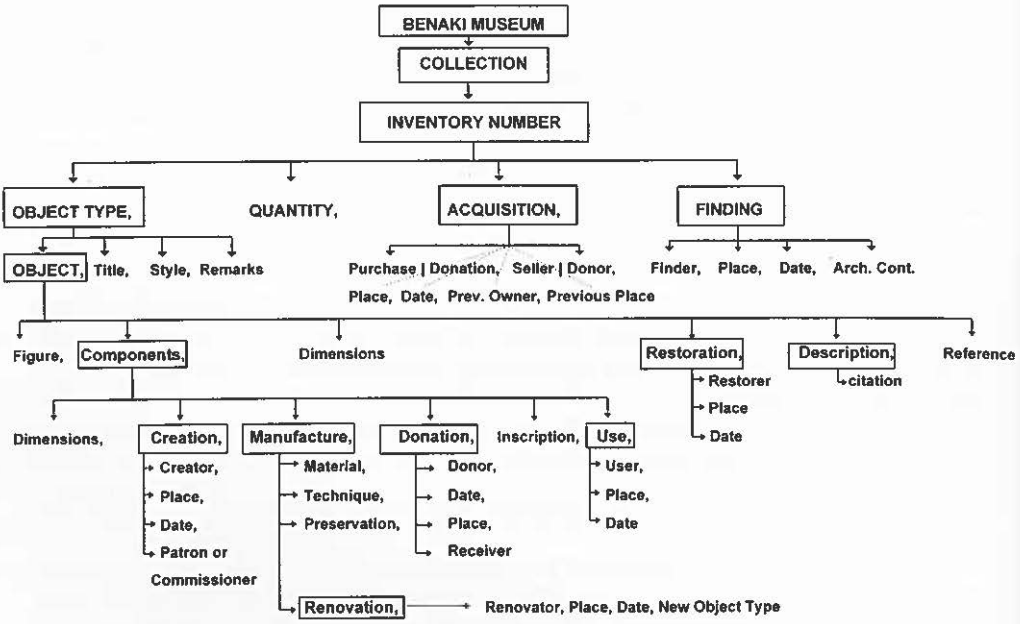

Fig. 2 – The proposed tree structure for SGML markup.

elements may have a zero value, if we don't have any information available (which unfortunately is the case quite often), except for the elements: *Inv. Number*, *Object Type*, *Object*, *Quantity*, *Acquisition*, *Material*, *Technique* and *Description* which should always be filled with the appropriate data.

Certain fields require as value a string under vocabulary control. These fields are: *Object Type; Object; Style*; *Place* (wherever it is found on the tree); *Date* (wherever found); *Material* & *Technique.*

Places and Dates are being declared in a standard way, with the precise chronology (in the rare cases where we are aware of it) preceded by the Century, for example: 15th C., 1453; and in the same way broader geographical terms preceding narrower ones: Egypt, Alexandria.

All terms are collected to form a thesaurus of established terminology used by the Benaki Museum Curators in the documentation of the Collections.

The important question is how more complex SGML encoding make this or any other museum application? We have to admit that SGML looks at first glance a rather "fractious" markup language, but then as soon as one understands the concept around which it is based, it becomes clear that implementation complexity depends on the demands and expectations of the user; on how deeply and explicitly the user wishes to analyse the structure of a certain class of documents.

The proposed structure may look rather complicated but let us com-

pare it to a published entry from a typical archaeological catalogue raisonne; in this category of publications we find each entry having a first part, usually in italics, which precedes the descriptive interpretation of the object. This part which could be named Objects Identity, encapsulates details about: object type, objects, inv. nr., materials, techniques, preservation, components and their dimensions, acquisition place and date, creation date, creator, style and Bibliographical references.

If we compare these data to the elements in the proposed structure we realise that the inclusion of SGML encoding will effect this category of texts only in terms of structure standardisation according to the predefined DTD.

Through the proposed structure markup, the main data about each museum object may be transferred from EULOGIA to MITOS system. As for the cooperation of SGML with hypertext systems in general, all that is required is a processor able to interpret SGML explicitly defined tagged links.

We hope that the above roughly described service, still under development, will offer the ground for a new type of electronic archaeological applications, by forming an accessible and explicit structure for the documentation of museum information.

Short Glossary

SGML: Standard Generalised Markup Language. An international standard, a metalanguage, that enables the description of structured information.
DTD: Document Type Definition. A DTD defines the structure of documents of a certain type, specifying the elements, attributes, entities and notations that may occur. Information can be marked up according to the appropriate DTD so that its structure is explicit and accessible.
Element: an information unit, viewed as a structural component defined by the DTD.

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ABSTRACT

The aim of the project is the design and development of a hypermedia application, exploiting University of Westminster's IDEAs system facilities, with the addition of SGML encoding support. Our target application is based on the Benaki Museum Byzantine Collection of icons and artefacts. However we envision the end application as a dynamic generic tool and we have focused our efforts in making provision to cover the multiple needs of all the Benaki Museum Collections through the application's functions. The project is being realised at the University of Westminster's Artificial Intelligence Division in close collaboration with the Benaki Documentation Department.

Particular consideration has been given to visual data. The main facilities of the IDEAs system include: free text search with no limitations in the quantity or structure of the source information, hypermedia facilities and automatic cross-referencing and updating between different frames of information.

The idea to include in our application Standard Generalised Markup Language encoding was germinated by our concern to find a reliable way of exchanging on-line data with other museums. We believe that the described service will offer the ground for a new type of on-line archaeological applications, by forming an accessible and explicit structure for the documentation of museum information.