POLEMON: A PROJECT TO COMPUTERIZE THE MONUMENTS RECORDS OF THE GREEK MINISTRY OF CULTURE

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ABSTRACT

The POLEMON project aims at the deployment of coordinated information technology services for the recording, documentation, management and presentation of cultural goods, implemented at the national level.

A major priority of the Greek Ministry of Culture, which this project seeks to address is the computerization of the National Monument Record. The system will be geographically distributed and cover both moveable and immoveable objects. It will support a range of administrative functions, authority service, map display, images and text , and it will have a federated database architecture implemented over interconnected local and wide area computer networks. Here we present the rationale and basic requirements of the National Monuments Record information system, and outline its technical characteristics.

1. Introduction

The protection of antiquities and monuments in Greece was one of the first concerns of the new independent Greek state. During the War of Independence (1821-1829) sporadic efforts were made to gather and preserve antiquities and in 1829 the first National Museum was founded in Aegina. The Greek Archaeological Service, one of the oldest in the country, was founded in 1833 as part of the Ministry of Education (since 1971 under the Ministry of Culture) and in 1834 the first archaeological law, innovative for its time, was published.

A trait of this law, maintained in all subsequent legislature on.cultural heritage in Greece, was the ipso jure preservation of all artifacts and remains dated until the "end of medieval hellenism", i.e. the year 1453 when Constantinople was conquered by the Turks and Constantine the 11th Paleologos, last Roman emperor, was killed. A consequence of this automatic protection was the absence of a formal catelogue of protected monuments, except, of course, for catalogues of movable cultural goods in museums and collections.

The registration of protected monuments and formal cataloguing were legally introduced only in 1921, when protection was extended to works of art or

historical value, churches and other monuments and building dating before 1830. Protection to monuments posterior to 1830 was established by law in 1950. However, the protection of newer (i.e. after 1830) monuments is not automatic, but must be ordered by ministerial decree. In this case, the monument record is a constituent part of the protection, whereas for older buildings it is not.

The creation of a catalogue of the protected monuments of Greece was further necessary by virtue of the approval of a series of international conventions, such as on the illegal import, export and transfer of property of cultural goods (Paris, 1970), the protection of cultural goods in case of war (Hague, 1954), the protection of universal cultural and natural heritage (Paris, 1972), and the European conventions on the protection of archaeological heritage (London, 1969) and the protection of the architectural heritage of Europe (Granada, 1985).

Yet essentially the need for a National Monuments Record was truly compelling in view of the very fast rate of development in post-war Greece, with an enormous building activity in towns and tourist resorts and the mechanization of agriculture. The related conservation issues are addressed by Article 24 of the Constitution of 1975, which sets the guidelines for the protection of the natural and cultural environment, the forests, the monuments

and the traditional areas and elements. Along these lines a Monuments Record Directorate was created in the Ministry of Culture in 1977.

In 1994-95 this Directorate published the "Permanent Catalogue of Registered Archaeological Sites and Monuments of Greece "comprising 83 volumes. On the other hand, several efforts undertaken by research institutions to build computerized information systems for museums and individual units of the Ministry of Culture had already produced useful results. In 1995 the POLEMON project was launched to address the need for a National Monuments Record information system.

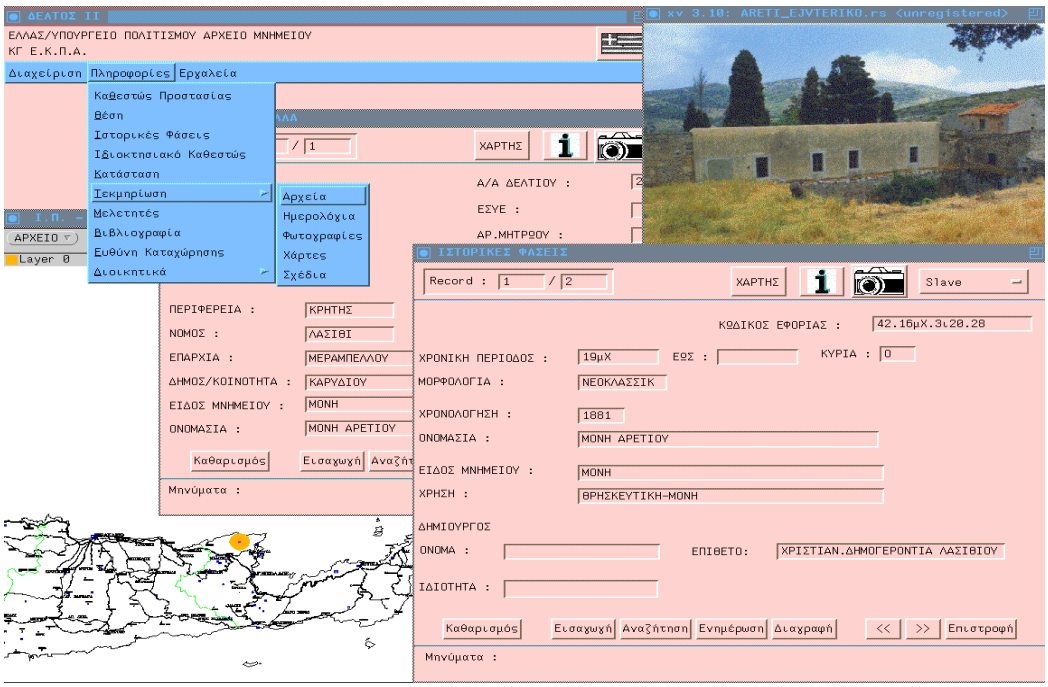
The POLEMON project is carried out by a consortium led by the Institute of Computer Science, Foundation for Research and Technology - Hellas (ICS-FORTH), and partners the Aristotelean University of Thessaloniki, Epsilon Software, Intrasoft, the Institute of Communications and Computer Systems, the Benaki Museum and the Ministry of Culture, and is funded by the General Secretariat of Research and Technology through the EPET 2 programme. A pilot geographically distributed system with four nodes is planned to operate in 1997. A second aim of the project is to bring to completion the development of an integrated museum information system, started in an earlier project, capable of exchanging information with the National Monuments Record information system.

2. Precursor systems

POLEMON builds on solutions achieved and experience acquired by members of the consortium in several previous projects, all of which resulted in working systems. These systems are:

DELTOS

DELTOS is a full conservation, documentation and administration management system for site monuments and preserved buildings developedby ICS-FORTH (Calomoirakis et al. 1993). DELTOS offers map display, supports large data volume, storage and display of multimedia data (mostly images and free text) and drawing facilities, and it is based on a relational database management system. For the requirements analysis of DELTOS ICS-FORTH cooperated closely with the 23rd Ephorate of Classical and Prehistorical Antiquities and the 13th Ephorate of Byzantine and Postbyzantine Antiquities. The DELTOS system is currently in use at the Archeological Museum of Heraklion, Crete.



. Figure 1: DELTOS :Monastery of Areti

CLIO

CLIO is a cultural documentation system suitable for both museum and site objects, also developed by ICS-FORTH (Constantopoulos 1994a). It is designed to support scientific research, rather than basic documentation, a function also provided by existing collection management systems. It can accommodate all the information which constitutes the current knowledge about a set of objects organised into collections. This information consists of structured descriptions and other multimedia data (images, audio and video recordings, text, etc.), and is characterized by a large degree of linking, variety of references and classifications, extensive use of abstract relations and the need for multiple (mainly referential) access. Information in CLIO is organized as a knowledge base according to a specifically developed

semantic data model (Christoforaki 1994). The functional kernel of CLIO is the Semantic Index System (SIS) (Constantopoulos et al. 1994b), a high-performance object- oriented semantic network database system built by ICS-FORTH.

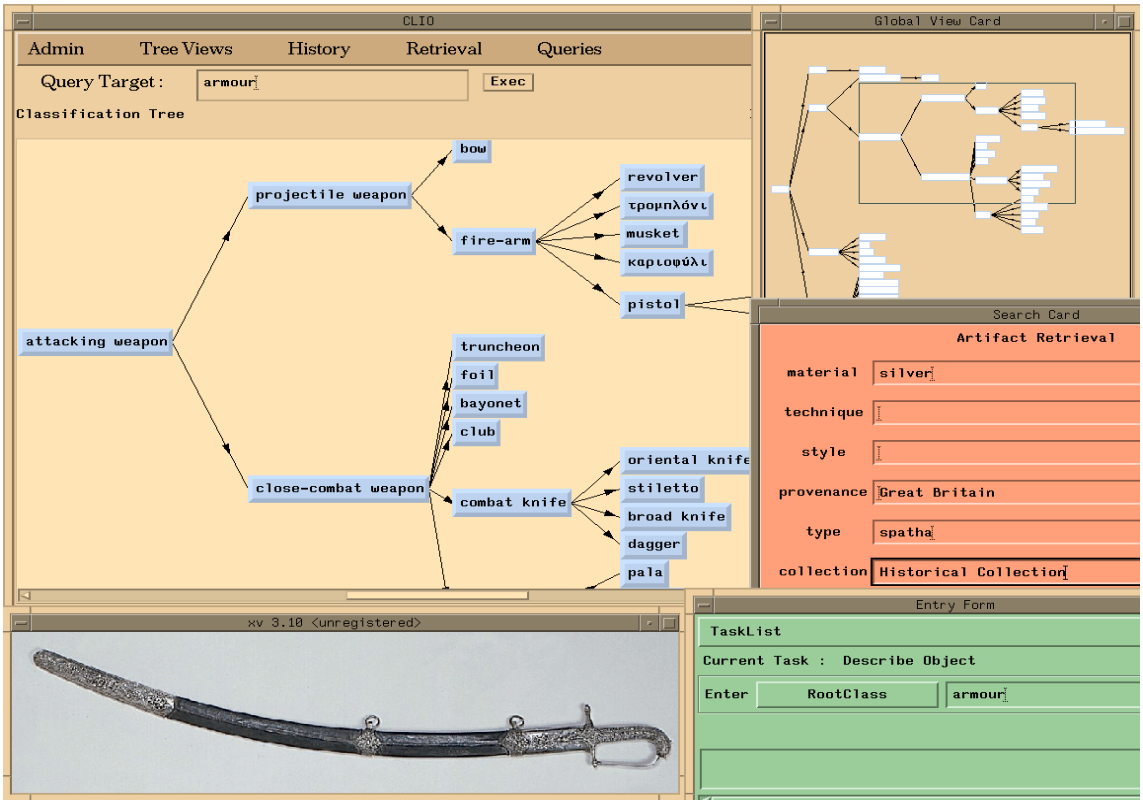


Figure 2: CLIO: Weapon classification. Artefacts from the Historical collection of Benaki Museum

Monuments Record of Central Macedonia

The objectives of the research project ``Monument Inventory in the Region of Central Macedonia''(Vlachos et al. 1992) of the Aristotle University of Thessaloniki were (a) the study of the contents of the Monument Inventory

of Central Macedonia, (b) the digitilization of information regarding a monument (digitized images texts, etc). and finally the creation of a digital map(scale 1:50.000) of the Region of Central Macedonia, containing either all monuments or groups of monuments with the capability of magnification in a number of predefined scales. In this project, they also participate the 16th Ephorate of Prehistorical and Classical Antiquities, the 9th Ephorate of Byzantine Antiquities and the 4th of Modern Monuments.

FEIDIAS

The Institute of Computers and Communication Systems of the National Technical University of Athens has undertaken since May 1993 the project `FEIDIAS- Electronic archiving of the Acropolis Museum' . FEIDIAS is a pilot project with research interests. The objective is the documentation of the Museum artifacts, development of a text index, scanning of images (old and new photographs), design of a multimedia database, image compression/decompression and processing, development of a collections management system for archeological artifacts, casts, photographs indices, installation and support of a local area client-server network, high quality photography.

3. Information and Basic Functional Requirements

POLEMON aims at building an administrative documentation system for the National Monuments Record. The analysis of the required data and

functionality takes into account the established structure of the services of the Ministry of Culture, the dynamic functions of its personnel in central and regional services and seeks to determine the minimum set of data necessary for monument management. Eventually the system must provide information on the history of monuments, their current state, related protection actions and various statistics, presented in list, table or map form. Monuments are distinguished into moveable and immoveable. Moveable monuments are in the jurisdiction of museums and collections and comprise individual moveable items or groups of items, but also architectural members, parts of or even entire immoveable monuments that have been displaced from their natural location. Immoveable monuments are individual monuments or groups of monuments in their natural location, or even sites, ensembles and larger areas.

The monument data are organized in three main groups. The forecasted usage patterns are further taken into account in determining group subdivisions. The first group of data concern the natural condition and a number of descriptive attributes, e.g., type, name, style, construction technique, material, creator, ornamentation, dimensions, weight, model, publication, moveable-to-immoveable correlation, current and previous index numbers, special characteristics, renovations, monetary value, non-authenticity, current use, state of conservation and needs, documentation, bibliographic references, record editorial data, etc. The second group of data includes spatial and temporal associations ofthe monument, as well as

information on property and protection status. Spatial associations refer to the current location of the monument or the one where this was found or made, represented hierarchically in geographical and administrative terms. Temporal associations include dating, historical phases and local historical periods.

The third group includes data pertaining to administrative functions, such as rewards, redemptions, expropriations, excavations, conservations, displacements, etc.

In its largest part data value assignment will be made from predetermined value lists. This will support consistency by virtue of controlled vocabulary, avoidance of typographic errors, and promotes the development of thesauri which greatly facilitate both data entry and retrieval. Foreseen thesauri cover technical terms, names, place names, institutions, and postal codes. The geographical and administrative location of monuments will also be displayed on a vector map of variable scale. In addition, spatial queries such as on neighbouring monuments, roads or rivers at specific distances, elevation, etc. will be supported. Indicative photographic documentation ofthe monuments at various resolutions will be provided. Finally, any information displayed on the screen will also be available in printed form.

Following the organization of the Ministry of Culture in central and regional services, the information system is designed as a decentralized system comprising networked local data bases with local and remote services. The responsible for primary data entry and preservation lies with the regional services of the Ministry, while the Monuments Record Directorate is responsible for the term thesauri. Limited rights and responsibilities for updating local data bases will also be assigned to services jointly responsible for specific administrative functions on individual monuments.

Authorization control for both data entry and retrieval will be applied according to the user's administrative position, for local and remote operations. Remote operations will be performed by central as well as regional services. However, access to administrative data by regional services will be limited to cases of co-responsibility.

4. System Architecture

From a technical perspective the following requirements have a decisive bearing on system design:

a) Very large volume of data. A museum has under its responsibility and control tens or hundreds of thousands objects. The requirements analysis of the DELTOS (Bekiari et al. 1992) system showed that there are about

120.000 site monuments in Crete alone, while the estimated volume of data needed to describe these monuments, not includingphotographs, is in the order of hundred GB.

b) The nature and frequency of transactions. Data entry is massive and labour intensive. The main use of the system is to retrieve information for administrative and research purposes and to perform administrative functions. We estimate that the number of external applications connected to the system in order to retrieve data (information services, publications etc.) is likely to increase in time.

c) Heterogeneous systems (like relational databases - knowledge bases, relational databases of different vendors) will have to co-exist and co-operate.

To address the geographical distribution, we will implement a wide area network of interconnected local area networks. Each museum or unit that belongs to the Ministry of Culture will have its own local area network and application systems for administrative documentation.

We adopt the client-server coordination model for establishing logical roles - along with associated behaviours for applications that assume such roles- for executing distributed interactions over LANs as well as over the WAN. Roles and behaviours specify who can initiate interactions, who can respond, how

to retrieve results, how to handle errors etc.. The client-server coordination model offers simplicity in closely matching the flow of data with the control flow. The model also promotes modular, flexible and extensible system design.

For the implementation of the local administrative documentation systems relational database management systems will be used, supporting SQL. These systems are efficient in storage and retrieval of very large volumes of uniformly formatted data and provide efficient support for administrative operations. Also the systems will cooperate in a federated environment, having significant autonomy in their execution. Their participation in a federation indicates that they will execute user requests that access multiple databases.

The global access system of the federation will be built using SIS, an object-oriented semantic network database system, developped by ICS-FORTH in the last five years.

Its distinctive features are the user definable metaschema, the capability to classify multiply not only entities but also relations in an orthogonal way, high capacity and excellent performance characteristics. E.g. It exceeds RDBMSs by a factor of 30 in traversal speed. SIS also provides a generic graphical user interface with rapid automatic graph layout.Semantic networks have gained industrial interest side for hypermedia control (Schnase 1993:27-50)

and metadata management in distributed heterogeneous data access (Bernstein 1994:705-713).

We consider modular composition of the system enabling staged development and installation of autonomous subsystems. The modular structure allows the development of the system to be in line with actual needs and financial contraints. The general architecture of each unit of the National Archive fo Monument system is presented in figure 3.

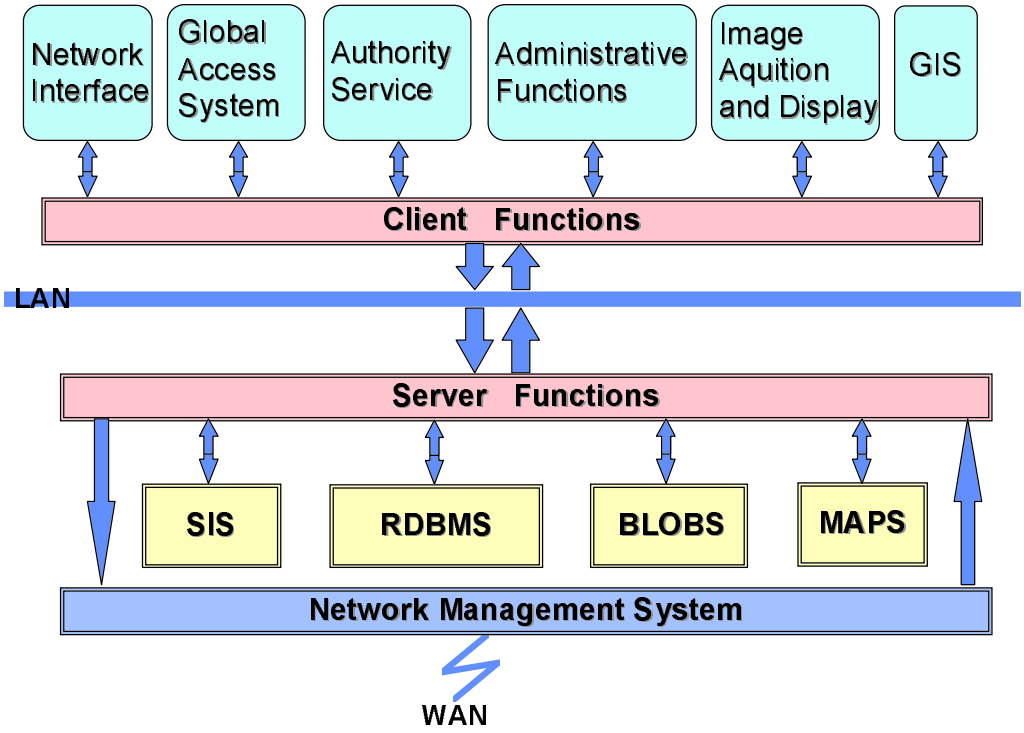


Figure 3: POLEMON NODE ARCHITECTURE

It consists of the following major integrated subsystems.

- Administrative Documentation System
- Global Access System

- Cartographic System
- Image Aquisition System
- Communication Interface
- Authority Service

The Administrative Documentation System is based on relational data bases. All units have highly similar data schemata and contain administrative data (e.g. museum code, name, type, administrative and general state etc. , design and cartographic data (connections with specialised data bases)) and may possibly contain images and text (which can be stored separately).

The Global Access System is based on SIS and contains the federated schema, which is an integration of mappings of multiple external schemas. It also includes the equivelances between federated schema and mappings and information on data location for driving a query generator from the federated to externals schemas.

The Cartographic System refers to the use of computer-aided design and geographical information systems techniques for the representation, storage, processing and display of the geographical and architectural characteristics of monuments and archeological sites.

The Image Aquisition system deals with image and text acquisition and processing.

The Communication Interface to the network handles functions such as query formulation, and query distribution from one network station to others, answer receipt and transmission between network stations, data transfer control(especially for multimedia data) and periodical data dictionary updates. One of the system units is responsible for the administration of the network using special programs for network management.

The Authority Service system creates, maintains and supports the access (through browsing and direct querying) of structured controlled vocabularies.

5. Pilot Application Plan

The National Archive of Monuments information system will be implemented on a private network, linking Athens (Directorate of Archive of Monuments and Publications of the Ministry of Culture, 1st Ephorate of Classical and Prehistoric Antiquities), Thessaloniki (9th Ephorate of Byzantine and Post-Byzantine antiquities in cooperation with 16th Eph. of Classical antiquities and the 4th Eph. of recent antiquities) and Heraklion (23th Eph. of Classical antiquities, in cooperation with the 13th Eph. of Byzantine antiquities and the 7th Eph. of recent antiquities). Each participating unit of MC will collect documentation information for selected groups of mobile and immobile monuments. This includes the predefined standardized record field information, as well as images, drawings, maps, documents, bibliography, etc. Initial stage of this task will be the definition of the groups of monuments, which constitute the sample to be documented in the pilot application. As

mentioned, we aim at the set up of real (not complete) scale pilot applications.

The museum information system will be installed in full operation at the Benaki Museum, on a network supporting all functions of the system

6. Conclusion

The POLEMON develops coordinated information systems to support supporting, safeguarding and promotion of cultural heritage. In particular, the prime goal is the development of a geographically distributed information system for the National Monuments Record of the Greek Ministry of Culture. The system will cover both moveable and immoveable objects and will eventually span all the regional services of the Ministry and the central Directorate of the National Monuments Record.

The system is designed as a federated database with map display , images, text and authority service , over interconnected local and wide area computer networks. A pilot system comprising four nodes over the country is planned for demonstration in 1997. Full scale nationwide implementation will follow.

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