ImageFinder Cultura: An Image Database System for Classical Archaeology

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Abstract

The Institute of Classical Archaeology of the University of Vienna (IKAWIEN) owns an extensive photographic archive. Due to a number of administrative and conservatory aspects the Viennese Institute of Classical Archaeology decided to install a flexible image reference database which is able to link images with complex text information. The objective of this project is to create easy access to large stocks of images. After a detailed definition phase the database system ImageFinder Cultura was designed in close cooperation with the company Docuphot AG, Switzerland. In the development of the database considerable emphasis was placed upon userfriendliness and high image quality, as well as adherence to scientific and scholarly criteria. Although the current prototype was optimized for the workflow and needs of the photographic archives at the IKAWIEN, it is versatile enough to offer attractive features and functionalities that can be put to advantageous use in a variety of other areas of art and research.

1 Introduction

Like most of the other cultural disciplines Classical Archaeology needs an image as a *medium for information*. As a result of the general dispersion of the original material neither research nor academic teaching would be possible without images. Therefore, the pictorial documentation of objects already has a long tradition in Archaeology. Nevertheless, theoretical discussions concerning these aspects are rather isolated (see for instance Rodenwaldt 1935; Fittschen 1974; Schubert and Grunauer-von Hoerschelmann 1978; Langlotz 1979; Förtsch 1995).

All over Europe, museums, universities, research institutes as well as private and public collections own large stocks of image material in their photographic archives which are - or might be - of great interest to archaeological research. A great number of these are fragile and imperilled historic photo material like glass-plate negatives or unique and early prints. Precious photographs are exposed to the risk of permanent damage or loss by poor storage conditions and environmental hazards. Even the simple acts of touching and handling can lead to an inexcusable deterioration of these originals. Therefore, the responsible persons are confronted with a pressing need for new solutions.

The Institute of Classical Archaeology of the University of Vienna with its different archives is confronted with much the same problems. This paper introduces our Institute's solution. The aim of our project is to create a flexible image reference database that enables interested users easy access to large stocks of images in a way that avoids the handling of fragile original pictures.

2 History of the project

2.1 The Viennese Institute of Classical Archaeology

The Institute of Classical Archaeology of the University of Vienna (IKAWIEN) was founded in 1869. The field of activity includes the whole spectrum of Classical Archaeology. Since the beginning, the IKAWIEN has placed great importance on a complete visual documentation of excavation results from the institutes own research sites. In 1873, Alexander Conze, founder of the Viennese Institute of Classical Archaeology, started with excavations in Samothrace. He was the first to use photography for the systematic documentation of field investigations (Maier 1994, 48). At the moment, the excavation sites of IKAWIEN include Limyra, which is located in Lycia on the south coast of Turkey, Velia in southern Italy and several smaller sites in the area of the former Austria Romana.

The other priority is the comprehensive visual documentation of the ancient cultural heritage in general. As a result of these documentation efforts the Viennese Institute owns an extensive photographic archive - divided into several departments - with photographic material from the nineteenth and the early twentieth century down to recent times.

In addition, the Institute of Classical Archaeology of the University of Vienna is closely connected with the Austrian Archaeological Institute. Both are located at the same address in Vienna, the so-called *Archäologiezentrum.* Last year the Austrian Archaeological Institute celebrated its 100th anniversary of Austrian excavations and research in Ephesus. Extensive image material from these excavations as well as from all the other activities exists in the archives of the Austrian Archaeological Institute. Together, both institutes own an image stock of approximately 250,000 photographs, drawings and plans.

Large numbers of the photographic items are fragile and unique historic photographs like glass-plate negatives or early prints. They are inadequately protected and not properly secured - for most of these photographs there exists no duplicate nor any form of electronic copy. The daily handling of this material endangers it in an unacceptable way. For this reason we cannot allow our historic photo material to be handled and examined by everybody. As a consequence, often, unique material has become inaccessible to academic research.

Besides this, the administration of historic and contemporary photo material confronts the staff of our institute with increasing problems. Therefore in 1991, we decided to reorganise our visual archive completely. The installation of an efficient database for the archival and management of images as well as their retrieval became the central issue. At that time, analog videodisk-systems were the normal technological standard, but due to their high costs and low performance they were totally unsatisfactory.

2.2 The project group Archaeological Image Database

Rapid engineering progress brought digital techniques together with new possibilities for working with images. In 1994, the IKAWIEN installed a project group under the leadership of Prof. F. Krinzinger and with the financial support of the Austrian Federal Ministry of Science, Research and Art. As a first step, members of this team began to analyze the different image archives of the Viennese institute. Based on the results of this study, the group defined and compiled a specific guide on the compulsory functions of the future image database of our institute. Simultaneously, the group carried out an international market research for database systems. An invitation to submit products for evaluation was sent to 62 companies in 12 countries. For 14 months the team evaluated and tested hardware and software products.

In November 1995, the company Docuphot AG, which is located in Zürich, Switzerland, was finally selected as cooperation partner. At this time Docuphot offered an image database system named *ImageFinder PRO* for use in professional photo agencies (image archival, documentation, research and archive management). During the past year, the Institute of Classical Archaeology of the University of Vienna and Docuphot have joined forces to adapt and optimize Docuphot's image database for archaeological purposes.

The objective of this project was to create an image reference database which is capable of linking visual representations of artwork with complex text information as well as permitting swift and easy communication. In addition, this database had to provide easy access to large stocks of images in a way that avoids the handling of fragile original pictures. Special technologies , therefore, have to be applied to digitalize the photo material.

Our database prototype was given the temporary project name of *ImageFinder Cultura.* It was introduced to the public for the first time at the conference on *Electronic Data Processing in Archaeology* organized by the German Archaeological Association in Berlin on 23-24 February 1996. Since then, *ImageFinder Cultura* has been further developed. Moreover, we have presented the database to numerous interested parties from Austria and other European countries. A series of special presentations were staged at the office of the Austrian Archaeological Institute in Athens in May 1996. The aim of these presentations was to familiarize the staff of archaeological research institutes of other nations with the ongoing software development at the University of Vienna.

3 Hardware

3.1 Image processing

Because of our different visual material we decided to use a flexible high-resolution digital camera[1] for the digitization of the pictures. It is able to scan transparent images (negatives or slides, glass based or film type - up to 24 x 30 cm), photographic prints, plans and maps, etc. (up to approx. 30 x 40 cm) as well as smaller three-dimensional objects (such as coins, gems and other finds up to approx. $1m^3$) within 10 to maximal 28 seconds[2]. The digital data can be

used without difficulty as a copy for four-colour printing up to a format of 50 x 70 cm.

The medium and low resolution representations in the database serve as reference material for daily use. The high resolution digital reproductions, the so-called mother files, provide security copies and are stored on an external system. At the moment we use DLT-Tapes with a storage capacity of 20 GB. A change-over to the newest generation of CD-ROMs is under discussion. For the digitization station a PowerMac 9500 with 132 Mhz, 148 MB RAM and 2 GB HDD combined with an external storage medium with 16 GB is used.

3.2 Network

The software of *ImageFinder* was developed on the basis of the database programme *4th Dimension.* Therefore it is able to be used on Macintosh computers as well as on PCs with Windows. Networks with a Windows NT or Mac server can incorporate a mixed environment of PCs or Macs. Thus, the implementation of existing infrastructure will pose no problem.

At the IKAWIEN we opted for a Windows NT server and clients[3]. Eight workstations were purchased to enable each department of the institute direct access to the database. One workstation is reserved for the needs of the students. A floating-licence for the software permits simultaneous access for five clients.

4 Software

4.1 Archiving and documentation

During the development of the database considerable emphasis was placed upon the needs of scientific and scholarly work. A high image quality (see section 6) and userfriendliness were further important criteria, and consequently, the clear structure of the database is outstanding. On the main screen mask of *ImageFinder Cultura* the central element is the image itself, in a sufficient size to be identifiable. An image in full screen size is visible within seconds by pushing the image field with the mouse pointer.

In the left hand area of the main screen mask all the technical and administrative details of the original image are summarized (e.g. image code, type of image, access authorization, photographer and date of exposure, provenience and availability of the picture etc.).

On the right hand side of the screen you can see the basic scientific data such as: name of object, dating, measurement or artist. On spacious info-floats detailed data concerning each topic can be stored. The field 'artist' has a connection to a data sheet listing all that is known about one artist. In this way, a special database on artists can be simultaneously built up. Also a special module for bibliographical data is included. Furthermore, the user has a whole series of text fields available in which extensive texts can be recorded at any time. With the help of special tools voluminous manuscripts that exist already on other programmes can be transferred to these text fields.

In the lower area of the main screen mask there are eight channels which are the core of the scientific structure of the database. The first seven channels are filled with so-called thesauri, i.e. predefinable subject catalogues. These thesauri contain clearly structured information, systematically subdivided into main and subsidiary terms: place of storage, place of discovery/topography, civilization/epoch, object group, material, technology and iconography. Up to eight hierarchical levels are available within each theme heading. The eighth channel contains an alphabetically parallel list of keywords so that the contents of the image can be additionally broken down and classified.

On the one hand, this categorization allows a quick and constant study of the objects and prevents spelling mistakes. On the other, the channel portrayal system has the advantage of including as many keywords as required in the register. Several assignments under one theme heading are also possible. In this way, a large amount of information can be packed into the small space of the main screen display.

4.2 Research and visual editing

The research module of *ImageFinder Cultura* offers the choice of several different methods for searching. The search for keywords is based on the terms of the thesauri and parallel lists. Although the user does not have to know the hierarchical level under which the respective keyword is classified, this information is available at any time when required.

Besides this, a search in all full-text areas and a search for administrative criteria can be carried out too. It is also possible to undertake a common search for terms by combining the different search methods. The search result is shown in a split second

regardless of the number of data entries in the database.

For visual editing *ImageFinder Cultura* contains a selection of presentation tools. Search results can be edited on illustrated lists with related text information. In addition, the image result can be transferred to a digital *Lightbox*. With the help of this module the user can visually judge the images and enlarge, reduce or move them into the required order for his or her speech, lecture etc. just as with a conventional lightbox.

5 Thesaurus module for classical archaeology[4]

The thesauri now available in the database were assembled by the project group from varied sources of information which were correlated and further developed. Among them are various reference books such as the Thesaurus on Art and Architecture, the index of the photographic archive of the German Archaeological Institute (DAI) in Rome, the International Directory of Arts, relevant specialist publications, the structure of the bibliography of the DAI and much more.

The development of these thesauri is not yet finished. At present, a group of ten scientists is revising the whole content of this module. Here in particular, we are seeking further cooperation from specialist colleagues. In the field of the iconographic thesaurus for example, we are working together with the *Lexicon Iconographicum Mythologiae Classicae* (LIMC) department of the Austrian Academy of Sciences.

6 Reasons for high image quality

From the very first, our main aim was the best possible image quality combined with a large image area on the screen. Good image quality usually requires very large amounts of processor power and memory for each picture. With the help of integrated compression technologies, *ImageFinder Cultura* offers a solution in which data can be stored with an attractive image quality plus all textual information using only 120 to 150 Kb of memory per data record.

To obviate the need to continually refer to the original in everyday use sufficient quality of the image is important. It must be good enough to allow academic evaluation direct from the monitor or print-out. The details must be clearly visible to enable

scientific work. We are well aware that digital images and work on the computer can never entirely replace research on, and stylistic comparison with, the original. Digital images of acceptable quality can, however, help to build up associations with the object involved, enable comparisons to be made and differences to be determined.

A further point in favour of high resolution is the possibility to exploit those digital images for which we have the reproduction rights. They can also be used for the production of CD-ROM editions, and in the near future, we expect to be able to project information directly from the database onto a large screen during lectures.

7 Future plans

We are continuously endeavouring to further improve this programme and to adapt it to the newest technological developments. We have never aimed at an isolated solution just for our own archives. On the contrary, we hope that this database system will also be put to use in other art-historical and cultural institutions such as museums or archaeological research departments. Therefore, one aim is to publish the database of the Viennese Institute of Classical Archaeology via the Web. This has been technically considered and will be implemented in the near future.

7.1 Museum module

The exchange of data could contribute greatly to the transparency of scientific research and university education. It could soon help to intensify communication between an interested public and research organizations, teachers and museums. In order to achieve this aim, we have taken the opportunity to introduce *ImageFinder Cultura* as often as possible.

We have already been successful in one major instance. Important Austrian museums have decided to cooperate with us in the development of an alpha-version of a museums module. This module covers all the applications important to the administration of a museum (e.g. administrative details of acquisition and provenance of the object, exhibition administration, documentation of restoration, etc.). At present, the prototype of this museums database is being tested in the museums involved.

7.2 Financial aspects: the EC-project E.I.S.S.

In addition to the development of the software components and all the scientific and archival motives for our project we are also concerned with an economic aspect. With an image reference database that includes functions for easy administration, image marketing and IPR-sales, photographic archives and museums have an opportunity to generate new revenue by participating in the commercial image market.

During our work we are continuously confronted with completely new trends in the commercial exploitation of cultural heritage. The emerging multimedia era with the challenge of high profits has attracted new players to the image market. Amongst them are a rising number of large corporations. Their technological potential and financial power carries the danger that the image trade will soon be dominated by a small number of organisations. If this trend towards monopolisation cannot be stopped, small and medium sized archives and museums run the risk of losing control over the use of their own visual material. The experience gained during the last few years clearly shows us that there is very little time left to develop and establish alternative concepts and solutions.

Due to this pressing need we decided last year to participate in an EC-project within the scope of the EC-programme INFO2000. Together with partners from different fields we developed the concept for a project called *Electronic Image Save Service (E.I.S.S.)*. The objective of this project is to develop an information and copyright reference database[5]. This database will be coupled with an image system to allow the owner of images to exploit their material and to control the distribution of exploitation rights

themselves. The definition phase of E.I.S.S. was finished at the end of June 1997. In the next phase IKAWIEN and its partners want to establish an E.I.S.S.-Center for the affairs of the various institutions in the science, research and museums community in Vienna.

7.3 The Database of the Ancient Monuments of Austria

We believe that digital archiving and research systems together with the development of an Austrian network will undoubtedly represent the way of the future. For the creation of such a network, museums and photographic archives of all kinds have to join forces with academic research institutions with similar interests.

Pictorial recording of our material culture should become a priority for all cultural institutions. Together with the Austrian Academy of Science, the Institute of Classical Archaeology of the University of Vienna has pursued the aim of an *Image Information Database of the Ancient Monuments of Austria* since 1993. Nineteen Austrian museums are interested in this project.

Such a database could be a pilot project for an European reference database in which as much information as possible concerning each aspect of European culture is registered. The development of such a database offering visual representations and comprehensive text information of all important art objects would also be of special interest to the art trade. The existence and easy use of a database for the identification and verification of cultural objects might be an efficient defence against art robbery. At the moment, an EC-project concerning this theme is in preparation.

Notes

1 Resolution: 4490 x 3480 pixel per channel; 12 bit per color (R, G, B); 36 bit per pixel.

2 Digitalisation time depends on selected resolution: 500 x 380 pixel - 10 sec.; 3000 x 2300 pixel - 18 sec.; 4490 x 3480 - 28 sec.

3 Hardware in details: NT-Server: Pentium with 166 MHz, 4,3 GB HDD (disk mirroring) and 128 MB RAM; Storage medium: DAT; NT-Clients: Pentium with 133 MHz, 1,2 GB HDD and 64 MB RAM.

4 For theoretical aspects concerning the use of thesauri see: Kopf/Szemethy 1995, 8.

5 For further information see: http://www.pira.co.at/EISS/eiss.html/; http://www2.echo.lu/info2000/en/mm-projects/eiss.html/.

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