THE BEAZLEY ARCHIVE'S INFORMATION TECHNOLOGY
PROGRAMS IN CLASSICAL ARCHAEOLOGY, 1988-1998

To celebrate the tenth anniversary of the journal, the Beazley Archive offers a summary of its work over the decade. Like other academic projects it has welcomed the potential offered by the World Wide Web to present university resources to a wider public. Although it is hard to imagine the rate of progress over the next decade, in view of the probable advances in technology, the Beazley Archive will continue to make available programs on classical archaeology and art, with catalogues, gazetteers, and other tools of scholarship.

1. BACKGROUND

In 1998 the Beazley Archive consists of two inter-related parts: a traditional paper archive and electronic programs. The paper archive, consisting of photographs, notes, and drawings, was purchased by the University of Oxford from Sir John Beazley in 1966 for its Faculty of Literae Humaniores. Beazley had been the faculty's professor of classical archaeology and art between 1925 and 1956. He continued his research in Oxford until his death in 1970. At that time Beazley's personal archive was transferred from his home to the Ashmolean Museum. The professorship of classical archaeology and art had been closely associated with the museum since its establishment in 1885. The museum not only housed the University's collection of classical antiquities, it also housed its classical library, and a large number of plaster casts from the antique. One of the professor's duties was curating the cast collection which had been very substantially enlarged from the 1880's as a tool of academic research. Shortly after Beazley retired, the casts, numbering more than 800, were moved from the centre of the museum to a purpose-built gallery behind it. In 1970 the Beazley Archive was installed in this Cast Gallery. The joint affiliation with faculty and museum has determined the nature of the Beazley Archive's Information Technology programs.

The University has funded the maintenance and development of the paper archive. It has also funded the post of the Archivist since the mid-1980s and that of an Archive secretary since the early 1990s. Although it houses and maintains the electronic archive, funds for these posts and equipment have come from outside the University. The principal sources of funds have been The J. Paul Getty Trust (1985-1992) and the European Commission (1992-1998). As the Beazley Archive's electronic services have grown the problems of funding them have increased. A challenge to its IT programs

– and to others in similar projects – is to secure funding for established on-going programs and trained staff.

The electronic programs began in 1979 with a database of one type of ancient Greek pottery (Athenian figure-decorated, 625-300 BC). The structure of the database, held in FAMULUS files on the university's central computer, was based on extensive 'catalogues' which Beazley had compiled, revised and published in many editions from the 1920s through the 1960s. These 'catalogues' recorded information about the pottery in about twelve clearly defined categories. The volume of material (an estimated 100,000 objects) and the consistency of Beazley's documentation made transferral to a database relatively easy. The international academic community was familiar with Beazley's 'catalogues' and, therefore, readily understood his vocabulary which was transferred to the database.

Since the pottery database was on the University's central computer from the outset its structure underwent obligatory changes as new programs were installed. These were usually for the benefit of the scientists (the system's main users) and always entailed a significant amount of time for conversion of data into new formats. The long-term benefit to the pottery database of using the central computer was progressive conversions which kept data 'flexible'. Over twenty years no data have been lost and no data acquisition needed to be duplicated. An additional long-term benefit of using the central computing services was familiarity with its programming and telecommunications specialists; with their help the pottery database was one of the first to go 'on line' internationally in 1991.

Since 1992 the Beazley Archive has been able to include in its electronic services other types of objects Sir John Beazley had recorded in his personal archive, for example, sculpture and engraved gems. The Archive documents objects in museums around the world. One of the developments of the 'Information Age' has been using IT to make museums more accessible. The European Union research project scheme enabled the Beazley Archive to fulfil a dual role as university and museum research facility.

2. IT 1988-1992

By 1988 the Beazley Archive's database of Athenian figure-decorated pottery of the 6th through the 4th centuries BC was in its tenth year. 25,000 text records had been compiled from books and periodicals available in the Ashmolean and other libraries of the University. These had been held in Famulus files on the central computer. During 1988 the ICL computer was replaced by a DEC and the FAMULUS files were converted to the relational database INGRES. The conversion took much of 1988-1989, but it was successful, and searching the database became more efficient. By 1990 more

than 30,000 text records had been compiled and initial consultation began with colleagues on the continent about an on-line service.

The possibility of an on-line service came closer to a reality with the launch of the EU's pilot X.25 Infrastructure (IXI) linking the UK's Joint Academic Network (JANET) to the continent. In anticipation of that service the Beazley Archive began to exchange files through electronic mail with a number of institutions in Europe and the United States. Users in the United States gained access via the National Science Foundation Network. In Oxford a 'screen mode' was possible but remote users could only use 'line-mode' efficiently and economically.

By the summer of 1991, when 36,500 text records had been compiled, and the X.25 service was operational, the University of Oxford began to install a fibre optic network. With the possibility of sending images in addition to text coming closer to reality the Beazley Archive began to make preparations for digitising images from its own photographic collection of nearly 250,000 prints. In the summer of 1992, when 41,000 text records had been compiled, the Beazley Archive's seven-year contract with the J. Paul Getty Trust came to an end.

3. IT 1992-1998 – POTTERY DATABASE

Towards the end of 1992 funding was secured from the EU for a research and development project in telecommunications (RAMA - which aimed to link the databases of seven European museums) and installation of the University's fibre optic network was completed. It became possible to acquire equipment for digitising images. It became clear that the Beazley Archive needed its own Ethernet system to link a mixed platform of PCs, MACs and Suns. The decision was also taken to run one version of the database on the central computer, for international access, and another on the internal network which could be updated daily and transferred at regular intervals to the central computer.

In 1993, when 43,000 text records had been compiled, the UK was preparing to launch Super-JANET with the capability of text-image transmission. 49,000 text records had been compiled by 1994 and 4500 images had been digitised, 50,000 text and 7000 images by 1995. When RAMA ended in 1996 there were 57,000 text records, 14,000 digitised images, and about 100 institutions using the text database on-line. By 1998 there were more than 100,000 bibliographical references.

In 1997 the Beazley Archive joined a new EU research project (MEN-HIR) which aimed to make high resolution images available on the World Wide Web with copyright protection. Participation enabled the Archive to use the MENHIR software to protect its own images for the Web.

In 1998 the Beazley Archive was selected as a suitable site for testing new techniques of watermarking and digital finger-printing developed by IBM and Datamark UK. With the availability of several means of image protection the Beazley Archive launched a multimedia version of the pottery database on the Web.

Access to the text-only database, which still runs over Telnet for those users who do not have other forms of access, and to the web-based version is restricted to protect the security of the text data (IPR of Oxford University) and of the images (copyright held by museums). On application passwords are given to one senior person per academic or cultural institution. All other programs on the Web are freely available.

4. IT 1992-1998 – MULTIMEDIA PROGRAMS ABOUT PLASTER CASTS FROM THE ANTIQUE

Early in 1993 the Beazley Archive began to participate in another EU telecommunications project (LACE – a prototype ATM demonstrator) which enabled it to begin programs about different types of objects and to present them in a format suitable for a wider public. Video clips were made of all of the casts displayed in the Gallery and these were digitised in British Telecom's research laboratory. A software designer and computer modeller was contracted to prepare a three-dimensional model of an ancient statue for incorporation into the multimedia programs. Like the digitisation of the video clips, the creation of the model proved to be too challenging for existing technologies. The ATM pilot, made by several computer and telecommunications companies participating in LACE was tested in the Gallery. Although it was technically successful the speed of the presentation for the multimedia programs was too slow for practical use in the Gallery. For that reason the programs – Catalogue of Casts, History of the Collection, How Casts are Made, etc. – were transferred to CD Rom using Director.

The image protection available for the pottery database and the development of the Web technology were decisive factors in transferring the multimedia programs from the CD to the Web. In addition to being available on the Web the programs are shown in the Gallery for students, senior scholars, museum visitors and school-children.

5. OTHER IT PROGRAMS

With the experience gained from adapting the pottery database for the Web and converting the cast programs, the Beazley Archive has taken the decision to use the Web platform for programs about other types of classical archaeology and art. From the end of 1998 it began Greek Pottery (an introduction to basic types as illustrated by examples in the Ashmolean Museum), Beazley's Drawings (1500 'tracings' with an essay on his method of attribut-

ing vases to individual painters), and Greek, Roman and Neo-classical Gems and Cameos (based on the Ashmolean's collection of impressions). Maps, Gazetteer of Sites (using a satellite map), and Catalogue of Museum Catalogues (used in compiling pottery, sculpture and gem programs) are accessory research tools being made for the site.

Content, design, web-page production, and programming have been carried out by the Beazley Archive 'in house'. Thomas Mannack has supervised the pottery database and been assisted by Claudia Wagner and Veronique Davis (Archive secretary). Florence Maskell and Ian Hiley have created the cast web-pages with Daniel Bone (Conservator); content has been prepared by Donna Kurtz, with John Boardman. Greg Parker has directed technical development of all programs.

<div align="right">

Donna C. Kurtz
Beazley Archive
Ashmolean Museum-Oxford

</div>

ADDENDUM: TECHNICAL

Since the Beazley Archive IT work began in 1979 there have been great changes in computer hardware, software and communications technologies. In many respects the Archive has been at the forefront of technology, due to its involvement in EU research and development projects, and so has been able to offer the best service possible to scholars and researchers.

1979 saw the first use of a data processing package on the University mainframe (an ICL 2980 running VME) called FAMULUS. This was a tagged-text retrieval system where fields are tagged with a label. A text editor was used to create the files, which were then sorted by FAMULUS. Connection to the mainframe was through a telephone type system, called Gandalf, to dumb terminals.

In 1984 the University Computing Services converted the FAMULUS files into an IDMS database (a network model database system). They also wrote a data-entry and retrieval program in FORTRAN with embed DML.

In 1987 the ICL 2988 was decommissioned, so the database was transferred to a DEC VAX running VMS. It was converted to relational model using Ingres. The data-entry and retrieval programs had to be re-written in INGRES 4GL and Pascal with embedded SQL.

In 1990, as an experiment, a temporary program was written to demonstrate the feasibility of using the Beazley Archive database on the VAX for international access, long before the World Wide Web. A remote user needed a dumb terminal emulator to access the VAX where they could search the database. This program was also written in Pascal, and became a more enduring feature than originally envisaged.

In 1993 the EU RAMA project created a system working through the Internet to connect the text and image databases of seven European museums. This was developed for different platforms at each of the museums. The Beazley Archive used a Sun workstation running Unix connecting to an INGRES database. Users at each museum could use a PC Windows based program developed in C to browse the text and images of all the museums.

RAMA provided an early method of viewing text and image databases anywhere in the world, however it relied upon a proprietary interface that had to be re-written for each computer type. By 1997 the World Wide Web had matured enough to allow a similar text image database to be accessible to anyone with a Web browser.

The database was converted to Microsoft Access and put on the Archive's own Web Server running Microsoft Internet Information Server on Windows NT 4. An interface was written using Active Server Pages and HTML.

EU research projects MENHIR and SICMA-EAST developed an ISO approved technology to protect images by registering them, issuing a unique licence plate number, and combining copyright information and metadata into the image file. JPEG tiled image pyramids were developed to allow fast transmission of high resolution images over the Internet. The Archive's participation in these projects enabled the technologies to be used to enhance the Web pottery database.

To protect the images further, visible watermarking and invisible digital fingerprinting developed by IBM and Datamark UK were integrated.

At the same time as the developments on the Web, the University VAX was decommissioned and the text-only version of the pottery database was transferred again, to a Digital 2100 running Unix. The database still runs under INGRES, but the interrogation programs had to be re-written in C.

The power of the World Wide Web has opened up the opportunity for a far richer multimedia presentation of the resources of the Beazley Archive. An initial attempt at multimedia was made in 1993 during an EU project LACE, using proprietary software developed by BT on Sun Microsystems. However, since then technology and software has advanced so that commercially available multimedia packages are available off the shelf. The Archive spent some time using Macromedia Director on the Macintosh, before the Web was a powerful enough medium. Now the Archive is using the range of Macromedia packages again to develop its future multimedia programs because of the ability to create Shockwave movies that will run on the Web and that will link to Access databases.

GREG PARKER
Beazley Archive
Ashmolean Museum - Oxford

ABSTRACT

The Author offers a summary of the research work carried out over the last decade at the Beazley Archive, which consists of two inter-related parts: a traditional paper archive and electronic programs. The electronic programs began in 1979 with a database of Athenian figure-decorated pottery. The structure of the database was based on extensive "catalogues", which Beazley had compiled and published in many editions from the 1920s through the 1960s. Since 1992 the Beazley Archive has been able to include in its electronic services other types of objects Sir John Beazley had recorded in his personal archive, for example, sculpture and engraved gems. In 1998 the Beazley Archive was selected as a suitable site for testing new techniques of water-marking and digital finger-printing; with the availability of several means of image protection the Beazley Archive launched a multimedia version of the pottery database on the Web. With the experience gained from adapting the pottery database for the Web, the Beazley Archive has taken the decision to use this platform for programs about other types of classical archaeology and art.