New Developments at the RCAHMW

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Abstract

The Royal Commission on the Ancient and Historic Monuments of Wales has been applying Information Technology to develop new means of enhancing our archaeological and historical records and improving the services we provide. We are exchanging data with other record holders, such as the Archaeological Trusts with the aim to eventually produce an index of every known site in Wales. Geographic Information Systems (GIS) would bring considerable advantages for working with site data and though lack of an effective map base has limited development into this area, work is underway in the Air Photo Mapping Programme using GIS technology. Our records could be enhanced by holding archive images in digital format in order to link them with database records or to view them easily. We are considering the long term consequences of holding our archive data in digital format and the complexity of preserving such data.

1 Introduction

The application of Information Technology to Heritage Management is long established. Almost constant developments in technology increase the range of applications and improve existing uses. At the Royal Commission in Wales, we have been looking at ways in which IT can enhance our records and improve our services.

Among the projects which are under development and research are those involving digital image technology to assist in building survey and to enhance our database records, improving the accessibility of certain collections.

By exchanging data with other major heritage bodies in Wales, the Extended National Database (END) will improve database record coverage of sites for all those involved. CAD and GIS technology are being used to survey for existing sites and create new site records. They will eventually provide a means for those working with the database to access site and related data more intuitively and effectively by bringing spatial data into the equation of record location and creation. (See Fig. 1)

The Royal Commission in Wales is a much smaller than its sister organisations in England and Scotland. It is made up of only 37 staff, two of whom work within and manage Information Systems. The RCAHMW is also a relative late-comer to Information Technology; it began computerising its systems only five years ago. The question of resources, both financial and human is always a limiting factor when embarking on new projects in Information Technology.

2 The Extended National Database of Wales

A number of bodies in Wales gather and hold information on the archaeological, architectural and historical heritage. The Extended National Database (END) represents the coordination of efforts between these heritage bodies to develop a national index of sites and monuments. By gathering together the data from the National Monuments Record (NMR), Regional Sites and Monument Records (SMRs) and other bodies such as Cadw listed buildings and scheduled monuments, its aim is to set up a national index of every known site in Wales (ENDEX). The results will provide an integrated information service which could be subscribed to by other institutions such as museums, universities and the new unitary authorities.
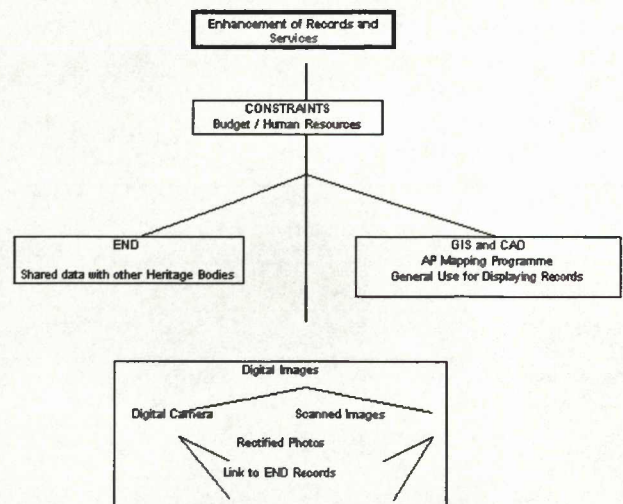

Figure 1: Latest Developments in Information Technology at the RCAHMW

In 1992, the new Royal Warrant directed the Royal Commission to "...provide for the survey and recording of ancient and historical monuments...of the life and people in Wales...from the earliest times...by collecting and exchanging data with other record holders and providing an index to data from other sources;...and by exercising responsibility for the oversight of local Sites and Monuments Records." Through the forum of END the Royal Commission is exchanging data with other record holders, and by providing funding and guidance it is fulfilling its

responsibility for overseeing the Regional Sites and Monument Records (SMRs).

Those involved in the END are the RCAHMW, the Archaeological Trusts and Cadw. The National Trust in Wales is currently computerising its records and is also seeking to become an associate of END. There are four regional SMRs in Wales which are held by the corresponding Archaeological Trust. They have existed as computerised records for nearly twenty years though their principle focus has been principally on archaeological sites. The Royal Commission has maintained a card index of sites in the National Monuments Record (NMR) since the 1960's which principally provides access to its collections, including material on archaeological, architectural and industrial monuments. It started its own programme of computerisation in 1992.

The information to be exchanged between the organisations are the fields common to each database, making up the Core data about a site. That is the minimum level of information and recording, for example, site location, type, and condition. Those organisations involved have agreed to move towards a common glossary and data dictionary, to standardise terminology. END is a forum for the discussion to establish Core data standards and database structures.

The work of END has been facilitated by such key factors as the close funding relationship of certain heritage bodies and the small number of organisations involved. Interaction between these organisations in the past has created many similarities between recording methods and data structures, and in the software used, thus facilitating the exchange of data. The long term goal is to have the records on-line and networked between the organisations with the paper map base replaced by digital maps.

Organisation	Current Figures
RCAHM(W)	46,000
Cadw Listed Buildings	17,500
Cadw Scheduled Monuments	3,000
DAT	29,000
GAT	7,000
CPAT	29,000
GGAT	20,000
Total	151,500

Organisation	Expected Figures
Royal Commission including Cadw Listed Buildings and SAM's	60,000
The Four Welsh Trusts	120,000
Total	200,000

Figure 2: Current and Expected Record Numbers in END

END has raised issues regarding the ownership, copyright and stewardship of electronic data, which is currently being debated between the main participants. Procedures for maintaining and creating records are under consideration, a difficult task given the numbers of records involved (see Fig. 2). Access to, and the use of the data is still being negotiated to safeguard the varied interests of source organisations.

3 Enhancing the electronic data

The Commission could greatly enhance its database records if it were able to *show* archive material along side its records and not just the references to that material. Photographs and plans could be on-line and available to users. This would greatly assist in identifying a record as relating to a site. Also, an image can convey so much more information and more immediately than any text record.

Developments in IT have made it possible for the above scenario to become a reality, at least in theory. Digitising large collections of images has been undertaken by many libraries and museums. If the resources are available there are many advantages in having digital collections: the need to handle the originals is kept to a minimum thus reducing the likelihood of loss or damage, producing copies is simple, and access is greatly facilitated. Other advantages of digital images are that they can be manipulated for publication or for other purposes.
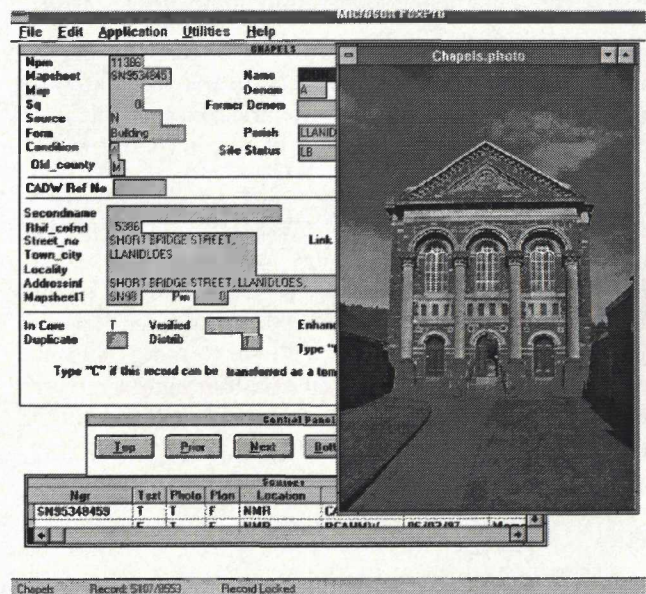

Figure 3: Digital camera image linked to Zion Chapel, Llanidloes in the Chapels Database, viewed on-screen in FoxPro 2.6.

The advantages of having site photographs on line is such that the Royal Commission has invested in a digital camera. It will capture images in the field and bypass the wet processing and scanning stages normally needed to produce digital photographs. The Kodak digital camera has a resolution of 756x504 pixels (approximately 180 dpi). The images being collected with the camera are not yet publishable quality. It is currently being used in a pilot study in the Chapels project to test its possible application to fieldwork. The Chapels project is recording information about 6000 non conformist Chapels and other religious buildings in Wales, including their architectural styles. A

photograph of a chapel related to a database entry and displayed on screen is very useful (see Fig. 3). There is also interest in the work of rectifying scanned photographs of buildings to produce elevation drawings, by surveying control points in the field and rectifying the photograph in Aerial (the Bradford rectification program) in much the same way as aerial photographs are handled. This allows a very rapid survey of buildings, particularly since the digital camera will also speed up the process of producing digital images for rectification.

At the moment, the small image files produced in the pilot study are managed easily. However, if large numbers of image files were to be held digitally then we should need to consider the most appropriate means of handling them. The solution may be thumbnail copies for on line use, with the high resolution scans held off line on such a medium as CD-ROM.

The creation of image data directly into digital format has consequences in the long term for the handling and preservation of the files. There are many other pictures and photographs in the Royal Commission which could be scanned for use in projects or by researchers. Materials in the archive could benefit from becoming digitised if their current medium is not stable and this would provide another form of conservation. The preservation and accessibility of this material must therefore be carefully considered.

The colour slides held in the Royal Commission are numbered in their thousand. They are a set of images which would be ideal to hold in digital format if resources allow. They are a working collection, frequently taken away and used to give lectures. Some of them hold unique site information, not recorded elsewhere. It was felt that these slides should enter the archive, particularly as they could suffer loss or damage whilst being used in lectures.

Currently, the slides are in storage and are being catalogued. If they are required for use in lectures they are copied. The life span of slides is only 30 years so the original medium of the slide is not ideally suited to the archive. Duplicating the slides is not the best means of preservation, and is extremely expensive. Creating digital images from the slides may be a possible solution. Once the slides have been scanned, further copying of the image will not cause the image to be degraded. Though the task would be initially expensive, creating digital images would allow the pictures to be accessed easily, related to the database record and duplicated quickly and cheaply. The question of preserving the files would remain of some concern given the current uncertainty over the long term preservation of digital data. This last point is particularly important since the Royal Commission is producing a lot of digital data of its own and is also receiving information in digital format for its collections, such as CAD drawings and database material.

4 Considerations for preserving digital data

The problem with archiving digital material is complex and relates to not just the life span of the physical medium but also the life span of the software and hardware platforms which are required to read the data and give it meaning.

Emigration and emulation are two possible solutions to hardware and software obsolescence. The first relates to transferring data to new platforms as they evolve, the latter refers to software which will emulate the environments of old operating systems on the new platforms. It may be preferable to keep the data that is archived in a basic format that is easily read such as comma delimited text for database tables, and .tif files for images, though this is not always possible and can be problematic. Archiving of digital data requires a large amount of investment in terms of management and maintenance. One advantage of digital data is that copying is easy and does not degrade the quality of the original, it is relatively fast and allows the data to be copied onto almost any medium, thus increasing its chances of survival.

It is not clear what the life spans of digital storage mediums are. Magnetic media can have a life span of a few decades though this will vary according to how well they are managed. It is possible however to delete data from them, accidentally or intentionally, and are they more at risk from damage caused by heat, dust, or mishandling.

CD-ROM's and re-writable CD's are more robust than magnetic media and the data on them can not be altered or erased. Their expected life spans can vary between a hundred years plus or ten years. Not all CD's are designed for longevity and the quality of manufacture is very important in determining life span, particularly in the new generation of re-writable CD's. (Kodak's Photo CD is claimed to have a life expectancy of 200 years if kept in dark conditions, at 25 degrees centigrade and at 40% relative humidity). However, the claims are made from the results of accelerated ageing tests which have been carried out by the manufacturers themselves, and not an independent body. Early problems with CD's due to oxidation and delamination have been addressed by manufacturers. However many of those involved in preserving digital data are wary. A more conservative view of the average life of CD-ROM estimates 5 to 15 years before a physical problem could be encountered. Write-once-read-many (WORM) disks have an expected life-span of 30-40 years, they are more expensive but are considered more reliable by those concerned with preserving digital data. Both manufacturers and archivists would advise that the best security for data is in keeping copies on many different formats including analogue, and in different locations. The actual life span of a CD will in no doubt be foreshortened by changes in technology and the rapid obsolescence of hardware and software. It may be that questions relating to the longevity of the medium are redundant in some cases since the most important aspect of preservation may be the management of files and maintaining a viable path for migration to new platforms.

5 GIS and digital mapping

Information Technology can help to improve the way we handle our data and make the services we provide more efficient. Since our record data is spatially based it would seem fundamental that Geographic Information Systems (GIS) should be applied to the work we do, most obviously for placing record data in its spatial context and alongside

other spatial information such as survey results. Retrieving and manipulating data would be more efficient within a GIS. Developments in this area have been delayed by the lack of an Ordnance Survey (OS) map base because of high costs. As yet there is no service level agreement between the Welsh Office and the Ordnance Survey. We have purchased a 1:250 000 vector map of Wales from Bartholomew's, and a 1:50 000 raster map from the Ordnance Survey. The scale and functionality of these resources do not allow full development of digital mapping facilities. A number of OS Landline map squares are also purchased annually for specific projects. The Air Photo Mapping programme uses CAD and GIS to carry out a rapid survey of archaeological sites. A first level graphic record of all archaeology is made from a variety of air photo resources, working to quarter map sheet areas selected on the grounds of threat or conservation. Database records are also created from these at the same time (see Fig. 4). On average 60 to 70 new sites are found on a map sheet. At Sennybridge MOD range in Powys, the number of known sites increased by 80%. Eventually the plots will constitute an air photo layer in a GIS for use in combination with survey data, GPS plots and record data.

Changes are under way at the RCAHMW which will enhance our services and our records by facilitating access and management of them. Through the forum of END we may one day be sharing data with other heritage organisations across a network, probably over the Internet. GIS will allow us to map our information on sites along side graphical representations from aerial photographs and from survey work. Photographic and drawing material could be held digitally making it possible to view records and the collection material from a PC. With the growth in

applications we must look carefully at how to handle the digital material and develop long term management strategies for their future preservation.
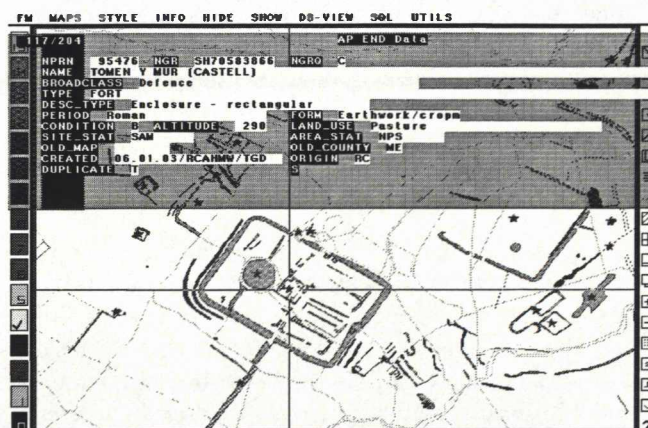

Figure 4: Tomen y Mur Roman fort, Snowdonia. Detailed site plot showing archaeology mapped from air photographs, viewed on-screen in FastMAP GIS.

Acknowledgements

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