B.5 Information systems#

HERs are information services that provide access to comprehensive and dynamic resources relating to the historic environment of their locality for planning and development control as well as public benefit and educational use (English Heritage 2010).

As information services, HERs make full use of a range of computer software from databases and GIS, to scanning and image handling software, as well as word processing and spreadsheet software. HERs are generally heavily dependent on digital resources. Databases and GIS hold information about monuments, archaeological events, sources of information and often development control processes. Fieldwork reports will often be held as digital copies which may be held in a digital document storage software and linked to the HER database.

HERs will often still have physical documents, books and maps which need to be stored, though storage space for many HERs is continually being reduced, putting even greater emphasis on scanning and other digital solutions. This increases the need for appropriate data standards. Data Standards are covered in more detail in subsequent sections (B.7, B.8, B.9, C.7, and C.10).

B.5.1 HER databases#

Although a few SMRs began to computerise their records in the late 1970s the main impetus to computerisation came from English Heritage in the early 1980s. 'Version 1' SMR systems were text files based on a paper report-form used by English Heritage to record scheduled monuments (known as AM107). These systems were quite limited and, when the more flexible Superfile package became available, English Heritage provided financial support to enable its adoption by SMRs.

During the 1980s SMRs were developing bespoke systems in Superfile, dbase or other programming languages based on the AN32 recording form promoted by English Heritage. When the OS Archaeology Division transferred to the RCHME in 1983, the OS card index and the National Archaeological Record (NAR) began to be computerised. Recording standards and data dictionaries were actively developed by the RCHME for its own computer records. Following the transfer of the lead role for SMRs to the RCHME in 1989 came the publication by the RCHME and ACAO of *Recording England's Past* (RCHME and ACAO 1993a and RCHME and ACAO 1993b), the first document to promote both a data dictionary and reference data lists for use by SMRs.

During the 1990s much work was undertaken by the RCHME's Data Standards Unit (now part of Historic England) in partnerships with English Heritage and ALGAO to develop the data model for recording SMR-type information. The event-monument-source data model began to be introduced in the early 1990s when it was adopted by the RCHME for its MONARCH database, by English Heritage in its data standard for urban archaeological databases and by Northamptonshire SMR and a few others. Throughout the 1990s there was considerable discussion about this data model led by Glenn Foard, Steve Catney, Neil Lang, Nigel Clubb and Steve Stead. The establishment of the Data Standards Working Party, now known as FISH (the Forum for Information Standards in Heritage), a group dedicated to developing data standards for monument inventories, can be seen as a direct result of the general climate of discussion and debate (see also B.8).

The modern generation of HER databases aim to comply with the MIDAS data standard published by the RCHME in 1998 (Lee 1998). These databases enable information about monuments, buldings, landscapes, events, sources and the management process to be recorded with equal weight. The HBSMR software developed by exeGesIS SDM Ltd in partnership with the RCHME and ALGAO is one example of a MIDAS-compliant database that is now being used by many HERs. Other HER managers have bespoke systems based on MIDAS which have either been developed by IT consultants or in house by the host authority's own IT department. These can be web or server-based solutions which use a variety of software applications (e.g. Microsoft Access, Oracle or SQL Server) and are often networked to allow access to multiple users. Such database systems are now commonly linked to GIS and often also support links to other digital objects such as images, reports and research data.

In deciding which which database platform to use HER managers will need to consider what functionailty they require as well as issues such as stability of software programs, performance, robustness, backup management and security. Server-based relational database management systems(RDBMS) such as SQL Server or Oracle will generally speaking suit very large databases with a high number of concurrent users, as they also have better stability, performance, security and backup procedures. However, desktop applications are generally easier to use, give more control over the database and have a cheaper license costs, perhaps suiting smaller databases with fewer concurrent users. exeGesIS SDM Ltd has developed a SQL Server backed version of their HBSMR software.

As in England the four Welsh Historic Environment Records had their origins in paper records in the 1970s, but from the early 1980s moved through various computer driven systems until the mid 2000s. In 2004 the four Welsh Archaeological Trusts, who curate the HERs, embarked on a collaborative venture which culminated in an open source, MIDAS compliant, web based database system, running in MySQL, having an integrated web GIS and image management system, to accommodate all four Regional HERs. The software, which continues to develop, has an integrated public front end, accessible through the Archwilio web site, and also delivers HER data through an android app. The software has the advantage of general accessibility through any internet browser and no ongoing licensing costs. The system is now managed by the HEROS (Historic Environment Record Open System) partnership.

Scottish SMRs as a rule received their core data as a download from the National Monuments Record for Scotland. Software was either developed in house, or latterly has been purchased from commercial software companies.

Nationally agreed terminology (thesauri) can be incorporated into database systems (through features such as controlled terminology fields, standard queries and reports), to facilitate their day-to-day use by HER officers and ensure consistency of recording (see B.7). The terminology is now largely the responsibility of FISH and the FISH Terminology Working Group, although some of the word-lists are managed behalf of FISH by Historic England. Some of the most commonly used are available to view online via the Historic England website, or are downloadable from the FISH website in a variety of formats including PDF, XLS and CSV files.

More recently some of the cultural heritage thesauri and vocabularies produced by Historic England, the RCAHMS, the RCAHMW, the ADS and the University of South Wales have been made freely available as Linked Open Data as an outcome of the AHRC funded SENESCHAL Project. The project aims to make vocabularies available online as Semantic Web resources, beginning with current Heritage Data, with the intention of making other vocabularies available over time.

B.5.2 Image management systems#

Local authorities often have access to large numbers of images associated with monuments or events in their localities. The processes of heritage management and education are frequently

enhanced by linking these images to the HER. However, if these images are not managed appropriately then a number of problems can arise. Some of these issues ? such as file naming conventions and formats - replicate many of the issues associated with other types of digital resource. The commercial quality of images and their immediate reuse potential means it is worth thinking about specific issues of intellectual property rights, scanning and cataloguing in more detail. Moreover, there are significant quantities of images already available to HERs from third parties, either through the retail market or under licence from public agencies.

Popular image management software combines tools for cataloguing image files with tools for reproducing images at a variety of scales. Digital image cataloguing is a rapidly developing field and it is worth ensuring that whatever software is used can support the emerging cataloguing standards. In some circumstances this may mean following formal image standards such as the Visual Resources Association Core data standard, especially if the images within the HER form part of a wider image collection held by a local authority (Grout et al 2000). If the HER is involved in creating images it makes sense for the master image to be captured at high resolution in terms of colour depth and pixels, even though the file sizes will be large. This is because many image-processing techniques effectively lose information, either through loss of true colour depth or through sampling of pixels. The master copy can be used to retain all this information, while flexible derivatives may be used for different purposes. This does however accentuate the need for strict file naming conventions which image management software should facilitate.

The immediate commercial value of images means that it is wise to pay particular attention to the intellectual property rights associated with images. This is especially true of high-quality ?master? images. The process of scanning images or slide collections is fraught with difficulties as it is often hard to identify rights holders. Moreover the relative ease with which images can be shared means that there is a greater risk of breaching the rights of the creator. Consequently, any image management system should include information about copyright holders and the terms in which an image can be used. Any act of copying can be an infringement and republication, such as on the internet, can lead to difficulties. Most image management systems allow for low resolution ? thumbnail? images to be produced which are of less commercial value. More sophisticated image management systems provide ?water marks? and ?fingerprints? to stamp copyright information onto an image before it is delivered, and to note the time and user name of the person who downloaded it. Such systems do not prevent copyright theft, but they do provide documentation to prove that an infringement has occurred and to identify the parties involved.

B.5.3 Archaeological science (see also B.4.4)#

Many HERs also have access to a range of scientific data, and again the processes of research, education and management are facilitated where these can be integrated into the HER database. Different types of information may be linked in a variety of different ways: geophysical data for example may be integrated into the GIS; microscopy and radiographs be linked to an image management system and scientific reports can be incorporated into grey literature or other published reports or linked directly as a source in their own right. Much scientific data, especially site-based recording should in fact be considered as any other archaeological information. Tools like OASIS and the FISH toolkit provide mechanisms by which such data can be supplied to HERs. These standards are discussed in more detail in section B.6, B.7.

A number of scientific disciplines have begun to experiment with very large, dedicated computing infrastructures to process, package and distribute data derived from sensitive recording devices. Devices like radio telescopes or experimental reactors produce prodigious quantities of data that is of interest to small but very specialised audiences around the world, who require dedicated resources to share and explore their data sets. These infrastructures combine protocols for the exchange of information with an investment in hardware, and are intended for foster a new generation of ?E-science? or ?E-research?. For example, a programme called UKLight is dedicated providing dark-fibre networks between a select group of research centres in the UK, while in the US a ?National

Lambda Rail? is being constructed to connect the major research institutions. Such developments have had little or no impact on archaeology so far but are likely to become more important in the future. The development and refinement of data standards are likely to be pre-requisite for participating in such systems.

B.5.4 OASIS (see also C.7.3)#

The OASIS project was developed in response to the need to provide a single unified index to archaeological investigations, a means of accessing the associated grey literature and as an online method by which the index could be maintained. The index relates largely to developer funded fieldwork, but also allows the indexing of fieldwork undertaken by local societies, volunteers and academic institutions. A major achievement of the project was to integrate the AIP records with the Excavation Index to provide a single concorded list, in 1998. The concordance programme delivered a fully unified record for archaeological interventions in England.

The OASIS data capture form was originally designed to help in the flow of information from data producers, such as contracting units and community groups, through to local and national data managers, such as HERs and NMRs. The resulting information can be validated by the relevant NMR (English Heritage's Excavation Index and the RCAHMS' CANMORE records) or HER and is passed onto the ADS for inclusion in its online searchable catalogue ArchSearch and either provide direct web links through to the grey literature reports or at least act as a pointer to the physical holding place of a report or archive. Grey literature reports are also being made available directly through the ADS Grey Literature Library, where there are now over 30,000 unpublished reports available.

The OASIS system is currently being reviewed by ADS with the aim of bringing the underlying technology up to date and provide a more flexible system for the variety of individuals and organisations who use it, from contractors and curators to museums and local societies. The OASIS project is discussed in more detail in section C.7.3.

B.5.5 GIS (see also C.11 and B.6)#

Almost all HERs now make use of Geographical Information Systems (GIS) which allow the capture, storage, manipulation, analysis, management and presentation of spatial information relating to the historic environment. These often link directly to the HER database but can also be stand-alone or integrated into corporate GIS systems. The most commonly used software are ArcGIS (ESRI) and MapInfo (Pitney Bowes), although there are numerous other systems available. More recently improved reliability and the development of functionality within free to use open source GIS software (for example systems such as QGIS) has meant that these are beginning to offer a viable alternative. More detail on the use of data in HERs can be found in section C.11 and B.6.