

## COMPUTERISATION OF THE NATIONAL ARCHAEOLOGICAL RECORD

### 1. THE NATIONAL ARCHAEOLOGICAL RECORD

The history of the National Archaeological Record can be traced back to the 18th century when the Ordnance Survey first began publishing archaeological information on maps. Until the 1920's the documentation providing the authority for the depiction of antiquities on the maps came directly from a topographical library. These were known as Object Name Books and were compiled by the Royal Engineers with help from the local sources. The general principles of a more systematic approach, based on a system of annotated 6" to the mile record maps held by county correspondents were laid down by O.G.S. Crawford, the Ordnance Survey's first professional archaeological officer (1920 - 40).

The Object Name Books were destroyed by enemy action in 1940, but the maps survived the Second World War to form the basis of the present system of card index and maps developed from 1948 onwards to provide accurate data for the mapping of antiquities. Together with related bibliographic and other records this system developed into the only national index to archaeological sites, and from 1974 (Hazelgrove Report 1974) was referred to as the National Non-Intensive Record. Following the recommendations of the Serpell Report (1979), this record, together with 13 former Ordnance Survey office staff, was transferred to the Royal Commission on the Historical Monuments of England (RCHME) in April 1983. The record is now renamed the National Archaeological Record (NAR) and is held in the Archaeological Records section of the National Monuments Record (NMR).

It now constitutes at a basic level the inventory that RCHME is required to compile, and continues to provide the documented authority for the depiction of antiquities on Ordnance Survey maps.

### 2. THE PURPOSE OF COMPUTERISATION

The card index developed from 1948 onwards has undergone some changes in format, but the general principles have remained constant. Each site or find is allocated its own unique record number within the 1:10000 scale map on which it falls, an area of 5 sq km. The blocks of cards for each map are in turn stored sequentially with each 100 km square, these being filed in an alphanumeric sequence for the whole country. This sequence is followed by the accompanying archaeological record maps. The record as a whole is then filed in a topographically based sequence, that of the Ordnance Survey national grid. This was certainly the best arrangement for fulfilling the foremost requirement, that of providing data to the OS for its published maps, but for other purposes it was restrictive. Period maps, such as those of Iron Age and Roman Britain, were compiled by examining the entire card index for relevant entries; outside these major tasks the production of lists of sites by type and by period has been impossible and although an additional card index was initiated to provide this data, insufficient funding was available for its continuation.

Various proposals for the computerisation of the NAR, formerly the Ordnance Survey Archaeological or National Non-Intensive Record, were made prior to 1983. The first proposal for a system for data retrieval and automatic map compilation was made by W. W. G. Stanhope-Lovell as early as 1965, as part of the staff suggestions scheme, but was rejected. In 1974 the OS Archaeology Advisory Committee's working party investigated the level of archaeological recording and made various recommendations which included "that immediate steps be taken to investigate the application of advanced data processing methods to the Archaeology Division". A similar recommendation was made by the Council for British Archaeology's working party on archaeological records to the RCHME in 1975. (Council for British Archaeology 1975). Various reports were prepared internally as a result of the above recommendations (copies held in NAR files) the latest being a feasibility study by the OS computer replacement team in 1981. Pending transfer to the RCHME no action was taken as a result of any of these reports. In recommending the actual transfer, the Serpell report (Serpell 1977,130) noted that "the Royal Commissions would be well placed to coordinate work on compiling and digitising local Sites and Monuments Records" and that "in the long term digitisation of the topographic archive (of OS) and of the NNIR (=NAR) should further reduce the cost of period mapping."

Following the transfer of the OS Archaeology Division to the RCHME the urgent need for the computerisation of the NAR was recognised in various official policy statements. In the Organisation of Ancient Monuments and Historic Buildings in England. The Way Forward reference was made to the importance of "all the major bodies in the (heritage) field...using a single data base namely that provided by the National Monuments Record"(DOE 1982,12). In the debate on the National Heritage Bill, the Secretary of State for the Environment referred to the anticipated "dialogue between the two bodies (RCHM and HBMC) about relationships and working methods" and expressed the hope that "working arrangements will be made generally known to all concerned when they are sorted out". It was thought that "modern technology, using microfilm and computerised techniques, should progressively make access to NMR material more straightforward, with greater facility, speed and quality of reproduction, and, if need be, transmission of material. At the same time, the valuable original material will be safeguarded. (Hansard 5 May 1983, 470).

The purchase of a computerised system for the NAR finally happened in 1985, twenty years after the first proposal by Stanhope-Lovell. In the full study prepared by RCHME staff in advance of the purchase of the system, the effects of computerisation were set out as follows, reiterating the arguments set out in many previous proposals.

#### 1. With regard to Shortcomings in existing information

(a) Indexing. Computerisation will enable all sites recorded in the NAR as satisfying specific criteria to be identified easily and listed as required. The retrieval criteria will be a combination of items of data (fields in computer terminology) either alone or in combination with a variety of output requirements. It will thus be possible to provide catalogues indexed to items of information such as period, type, or bibliographical references, which will be of especial importance to the principal users of the NAR.

(b) Compatibility with other record systems. Computerisation will enable RCHME and HBMC to avoid duplication of record keeping by linking or integrating their respective systems. It will provide the means of cross referencing the NAR to other RCHME sources, particularly the Archaeological Excavations Index, the Air Photographs Index and Survey reports made by RCHME for inventory and other purposes. It will also provide the means of ensuring that bibliographical references are in accordance with nationally or internationally defined standards.

(c) Duplication of data entry. Computerisation will obviate the necessity of recording many items of data more than once.

(d) Enhancement of the record. Computerisation will speed up the compilation/revision of the record where data is being accessed from already computerised databases. This will apply particularly to the records for sites that are Scheduled Ancient Monuments (digitised records already held by HBMC) or Listed Buildings (digitised records being compiled by some counties or contractors). For counties with particularly good computerised Sites and Monuments Records that are compatible with the NAR, it will be possible to access some data in digitised form with only minimal editing being undertaken prior to inclusion in the NAR.

## 2. With regard to the Organisational responsibilities of RCHME

Collectively, the ways in which computerisation will remove many of the present shortcomings within the record will also enable the NAR to fulfill more adequately its wider organisational responsibilities in accordance with the Royal Warrant.

### (a) Principal users of the NAR

The Ordnance Survey. In the revision of basic scales and derived mapping, computerisation of the NAR will obviate the time consuming procedures of manually extracting and replacing in the index large numbers of individual record cards. Some data on the publication mode of antiquities is already held in digitised form by OS and when cross-referenced to the NAR will permit thorough analysis of the consistency and archaeological accuracy of current publication modes.

It is in the production of period maps, however, that computerisation will most enhance the NAR's ability to meet its responsibilities. Computerisation will enable the rapid production of gazetteers to accompany maps, such as that of Roman Britain, avoiding not only the need for manual compilation by extracting record cards from the index, but also subsequent total retyping.

The digitisation of the textual data for different types of site on a particular period map and the use of digital plotting equipment will obviate the need to plot points on the map manually. It is estimated that computerisation of the record would have reduced the amount of time spent on the preparation of the 4th edition of the Roman Britain map by 3 years.

The ability to produce catalogues through a computerised record will also greatly facilitate the production of other publications, such as memoirs to accompany outdoor leisure maps, town maps etc.

Other parts of the RCHM. Computerisation will facilitate the production of catalogues of sites, variously indexed, prior to programmes of field survey by RCHM regional offices. At present these can only be produced manually and are indexed only by OS 1:10 000 sheet numbers. The computerised NAR will also contribute to the production of the national inventory as required by the Royal Warrant, in a constantly updated, albeit basic and summarised, form.

HBMC. Computerisation will enable HBMC to use, in conjunction with its Scheduled Ancient Monuments Records, the information already maintained and regularly updated within the NAR, thereby ensuring that its records are directly linked to the latest cartographic information and avoiding duplication of entry of certain items of data that are at present independently included in both records. Duplication of data entry arises particularly through the preparation of AM 107 Sites and Monuments Record forms from the Field Monuments Warden scheme and other HBMC projects relating directly to the enhancement of Sites and Monuments records. Computerisation of the NAR will also permit the production of catalogues of sites by type and period that will be of particular use to HBMC in any proposed national reassessment of sites scheduled as Ancient Monuments. So far, 26 counties in receipt of grants from HBMC have enhanced their records to achieve compatibility. Rapid assimilation of new data from these county based records into the NAR will facilitate the production of nationally based catalogues. For the 20 counties that have less compatible records or none at all, the computerisation of the NAR will be quite crucial to the production of nationally based catalogues.

Having the records for Listed Buildings will ensure that the NAR is able to produce catalogues linking the data from the current resurvey to all other archaeological data relating to those buildings and other sites already held in its records. As with the data for Scheduled Ancient Monuments, the records will be directly linked to the latest cartographic information. Where HBMC or counties have already digitised this data, it should be possible to transfer it by machine to a computerised NAR.

County Sites and Monuments Records. Computerisation will greatly facilitate the provision of data to County Sites and Monuments Records, particularly through the provision of regularly updated catalogues of sites (a) indexed by County SMR numbers and (b) including the latest bibliographical references newly accessioned to the NAR. At present all new cards are copied manually in London or Southampton when requested by County SMRs; bibliographical references not yet incorporated into the main record can only be included by actually visiting the NAR and copying the data on the bibliographical references/mini-index cards (which are not easily photo copied).

(b) Other users of the NAR

The Council for British Archaeology. Through computerisation of the NAR, the CBA will be able to receive newly accessed bibliographical data, which, with minimal editing, is likely to constitute between 40-60% of its annual bibliography for British archaeology. At present, severe difficulties are faced in producing further bibliographies or abstracts, which are at the same time considered by archaeologists generally to be of great value. Here the NAR will, therefore, be able to make a major contribution to an outstanding national need at the very minimal costs of catalogue production.

Other end users. Researchers and other end users will benefit considerably from a fully indexed record capable, through computerisation, of providing on screen or on printout responses to individual inquiries or catalogues to meet more general needs.

3. Data protection

Computerisation of the NAR will provide a much enhanced degree of data protection. At present the site record card is copied both on card and microfiche and held in the London office of the NMR. Each time a site is updated, a new card has to be filed in the London office. Other textual records including the Bibliographical Reference Index, the Accessions Register, the Author, Journal or Periodical, Class and Subject Indexes together with the record of books reference recorded have no security copy whatsoever. Computerisation will permit regular production of copies of all these records, in whatever format is determined by the proposed system. Furthermore, it will be possible to produce, in digitised form and through computer generated microfiche, copies of the NAR at yearly intervals to provide a record for archive purposes of the NAR at that point in time. This will be of especial value for data relating to publication, condition and ownership.

3. THE PROCESS OF COMPUTERISATION

Initial data input

Computerisation of the NAR was commenced in 1983 through a contract with a commercial bureau (Inter Building Record), digitising only the data held on the site records cards for administrative and classification purposes. Pending transfer to the computer system to be acquired for the NAR, this data was held as text files on magnetic tape or disk. It was recognised that some reformatting of this data would be necessary for whatever system was eventually purchased, but at the same time it was seen that to have all records for England computerised at a basic level from the time that the system was actually purchased would be most advantageous. This has indeed proved to be so.

A second category of data input to computer prior to implementation of the system for the NAR as a whole has been through the production of the well known site record cards. From January 1985 these have been typed from computer onto cards, thereby ensuring that the data typed at the keyboard is retained in digitised form for subsequent transfer to the NAR system. The cards have been produced using a suite of programs written in dBASE III, like ORACLE a relational database system, but running on an Olivetti M24.

The full system under ORACLE will also continue to maintain the existing card index until such time as this is thought to be no longer necessary.

### The Full Study

In May 1984 the preparation of the full study for the computerisation of the record was commenced, its scope following CCTA guidelines and as follows:

1. The current system

- Introduction
- Organisational responsibilities
- Information and document flows
- Data protection
- Data distribution
- Staffing and accommodation
- Shortcomings in existing information

2. The effects of computerisation

- Shortcomings in existing information
- Organisational responsibilities
- Data protection

3. A forecast of needs for equipment, accommodation etc.

4. A summary of initial moves towards computerisation

- Proposals prior to the transfer to RCHM
- Progress 1983-4

5. A description of proposed recording system for the National Archaeological Record

- Outline of proposed system for data input
- General requirements

6. A statement of the output requirements

7. A discussion of the need or otherwise for compatibility with Ordnance Survey systems

8. The proposed project plan for the implementation of computerisation

- Implementation plan
- Evaluation plan
- Requirements for computer staff
- Requirements for data-processing
- Requirements for training of staff
- Consultation with Trade Unions

Space (Time) does not permit all of the above to be set out in detail. Most relevant here is the proposed Recording System for the NAR.

It should be stated at the outset that computerisation was of a record already in existence. Furthermore, substantial moves towards computerisation had already been made by HBMC through its funding of County Sites and Monuments Records and implementation of its record system for Scheduled Ancient Monuments. The opportunity did not therefore exist to consider in abstract what form a National Archaeological Record structure should take, and, if it had, the debate on how to do it would doubtless have still been continuing.

A major change introduced in the system was to dispense with the existing separate bibliographical references. In the new system reference-recording of new source items will continue, but the references to individual antiquities will be immediately related to the main index of sites and the record maps.

In the proposed system the following processes are, therefore, to be undertaken in this sequence :-

1. Recording bibliographical or archival data relating to new source material for the NAR in published or unpublished form whether accessioned to the Branch Library or not

This process will provide the bibliographical or archival references for items of information relating to sites that will be entered in the Primary Recording and Detailed Recording processes. It will also provide a register of accessions to the Branch library, indexes to the Archives and Survey library and an index of bibliographical information.

2. Primary Recording

From newly acquired bibliographical or archival data, basic information relating to archaeological sites is added to the NAR. For sites already recorded in the NAR this information will relate to the bibliographical references and to whether or not revision through Detailed Recording (see below) is necessary. For new sites, basic information on the location and type of site will be related to a newly assigned NAR number which will also be marked on the relevant record map.

3. Detailed Recording

The detailed record for each site is to include the categories of data currently recorded with some additions to meet the needs of major users. This will include further categories of additional information, when available, from OS topographical data files, on RCHM field report forms and other records, from HBMC records relating directly to the NAR, from county SMR's, and from other national and local sources.

The system purchased

Following the issue of an Operational Requirement to suppliers and the implementation of the Evaluation Plan, a system was purchased in January 1985, configured around a VAX 11/750 with the ORACLE relational database system. This met most closely the requirements set out for the proposed recording system and output of data. The ORACLE system will run on microcomputers and has now been installed on the NAR Olivetti M24.

The initial configuration has also now been expanded through the addition of a CALCOMP AO size drafting plotter and GIMMS geographic information system.

System design and implementation.

In the Full Study the proposed system was necessarily set out in machine independent terms. Following procurement of the system, a Functional System +Design for the implementation of the relational database system has been prepared under the direction of Simon Grant, of RCHME staff.

This has complemented the proposed recording system set out in the Full Study by examining more closely and in stages the work processes around which the system must necessarily be constructed.

(1) A procedural model has been prepared of all work/recording processes carried out at the NAR, defining the stages through which information passes on its way to incorporation in, or creation of, NAR records. Each stage is documented and represented on an overall flow diagram.

(2) From the above each process has been isolated and further defined in terms of the specific procedures that are involved in each. For example, in the process of book ordering, a member of staff will order a book from a publisher who will then supply it to a member of staff.

In this example, the entities may be defined as member of staff, book and publisher, the procedure may be described as ordering and sending.

All these entities and procedures have been grouped within working processes.

(3) The individual models defined above have been drawn together into an overall process orientated view of the whole system.

(4) The attributes or data areas relevant to each working entity have then been defined and depicted in diagramatic form.

(5) The final stage of this process has been to combine the elements into a fully comprehensive, structured definition of the working systems for the NAR defined by process, entity and attribute. This is the stage that design of the system has now reached. Implementation of the system will commence in April 1986. At the same time the basic data for the whole country, as input through Inter Building Record, is now being reformatted ready for transfer to the appropriate tables in the relational database structure as defined in the Functional System Design.



#### 4. FUTURE ENHANCEMENT OF THE COMPUTERISED NATIONAL ARCHAEOLOGICAL RECORD

Ongoing tasks will be Primary and Detailed Recording as defined above. Primary Recording will be undertaken from new sources as they become available to the NAR library, through the usual processes of book and journal purchase, etc. Detailed Recording will continue to be carried out for the areas of the record most out of date, for areas where OS basic scale mapping is to be revised and in advance of RCHME requirements, such as field survey of a particular area. Additional to this work are a number of specific tasks that will enhance the NAR so as to enable it to fulfill more fully its various functions within RCHME, beyond those which it met whilst maintained by the Ordnance Survey.

At a Primary Recording level all bibliographic references at present held in a separate card index from the main site record cards will be linked to their respective sites. Over 70,000 of these cards have not been accessed at all in the preparation of site record cards. Within RCHME, the data input to the Archaeological Excavations Index, the Architectural Records Section and the Air Photographs Unit will be linked through the relational database structure to that in the NAR. Looking outside RCHME, all sites recorded in county Sites and Monuments records not yet in the NAR will be added to facilitate future Primary Recording and to provide a comprehensive record at a national level. All data held on the HBMC Scheduled Ancient Monuments Record System is also being made available in digitised form to be permanently archived within the NAR.

At a detailed recording level, enhancement in the immediate future will be restricted to the input of all descriptive data at present held on the site record cards. This is likely to be undertaken largely through a bureau, with a few counties possibly processed by the county sites and monuments records, in instances where the NAR description has been incorporated without subsequent radical editing or rephrasing.

As the database is enhanced and increases in size, user demand is likely to rise and with it the number of services that are likely to be available. An increasing variety of output formats will be linked to a growing library of digitised surfaces residing in the geographic information component of the database system.

At the same time developments within the NMR as a whole are likely to link, so far as the user is concerned, the databases of the NAR, the Architectural and Archaeological Records Sections and the Air Photographs Unit which are currently separate. The first steps towards this have already been taken with the purchase for the London NMR office of a MicroVax II with ORACLE providing completing compatibility with the system for the NAR. Developments elsewhere in the United Kingdom may lead other national record systems in a similar direction. Here there can be seen the beginnings of a National Archaeological Database, not constructed out of abstract theory, but based on the systematic computerisation of the routine activities of data collection and dissemination within the component parts of the National Monuments Record.

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