9. Sites and Monuments Records in England — theory and practice

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9.1 Introduction

This paper arises out of some considerations for the development of the British heritage management systems commonly known as Sites and Monuments Records (SMRs). The theoretical premises outlined in Part One (Stead) were primarily developed in relation to the national development of the English Heritage Record of Scheduled Monuments. The practical implementation considered in Part Two (Lang) discusses the experience of the West Midlands Sites and Monuments Record in developing an alternative to its current software.

The parts may be read independently, but are intended to be complimentary. Many of the ideas are the result of discussions between the authors over the last three years who consider that the models presented offer a significant advancement over present methodologies for recording. It is contended that most SMRs in Britain will require a major reconsideration of techniques of data recording in the 1990's. These proposals offer a positive way forward.

9.2 Part 1: The theory of sites and monuments records

This part aims to set out the background of current English SMR practice, identify where this might be short of the ideal and suggest a general data structure to approach this shortfall. It does not pretend to be a finished data structure, merely the 'shape' which future data structures should emulate. This should not be seen as an English Heritage policy document.

9.2a Existing approaches

As an illustration of a typical SMR's current data structure, a simplified facsimile of the current approach used for the West Yorkshire SMR is as follows (and Fig. 9.1). For simple 'high impact' archaeological remains (e.g. a hillfort) a single data record is created. This record outlines current knowledge of the remains and locates it using a combination of National Grid References and political boundaries (in this case district and township name, but more commonly district and parish). This provides no spatial data so a map overlay is prepared, which presents a shaded area which corresponds to an area within which a planning restriction is deemed to exist. It should be noted that not all SMR's work in this manner but most use some kind of twin media record to perform similar tasks.

For a more complex 'landscape' archaeological feature a higher level data item is created: the 'group' record. In this approach the landscape is given a data record which cross-references all the high impact sites within it to each other and itself. However it does not acquire a planning restriction map outline for itself. Many SMR's use this or similar methods to cope with 'complex' landscapes (Chadburn 1989).

In summary, for simple or single period sites the archaeology becomes synonymous with the physical planning constraints. In more complex sites records are created which do not have a planning constraint attached but which have associated records which do.

9.2b Problems with existing approaches

These approaches present a few problems which are generally only appreciable in urban areas. Firstly, a record does not refer to an archaeological entity or to a land parcel but rather to an amalgam of both. This results in the record being cumbersome and inefficient.

Secondly an archaeological entity which is large, or partially destroyed, or whose extent is unknown, or which is fragmented, or multiparted is difficult to incorporate into the database. This often results in subtly different records as different workers enter them at different times.

Finally it is difficult to integrate with other data as the precise nature of each record is not always exactly defined. This is especially true when trying to integrate with GIS technology, which it has been suggested is essential (Lock & Harris 1991).

Other approaches have been used in order to avoid these pitfalls. Notable is the move to a completely land parcel based approach (cf. Chadburn 1989) which attaches all archaeological events (visits, excavations and finds) as well as archaeological entities to individual land parcel records. This address's the first problem but fails to tackle the other two.

9.2c New approach

The suggested new approach is to recognise the essential two part nature of SMR data and split the record in two: instead of trying to plaster over the gap. Thus an SMR entry consists of two parts, the physical and the archaeological.

Attached to the physical record (be it held in a GIS or a map based record) would be data items related to the physical world. These include political control (district, parish), level of planning constraint, land use, legal status and ownership as well as geology, landscape morphology and hydrology. The archaeological record would include details of things like site type, dating, form and materials.

These two records could then be related on a many-to-many basis to form the basic SMR. Groupings of physical records can be made to form higher level
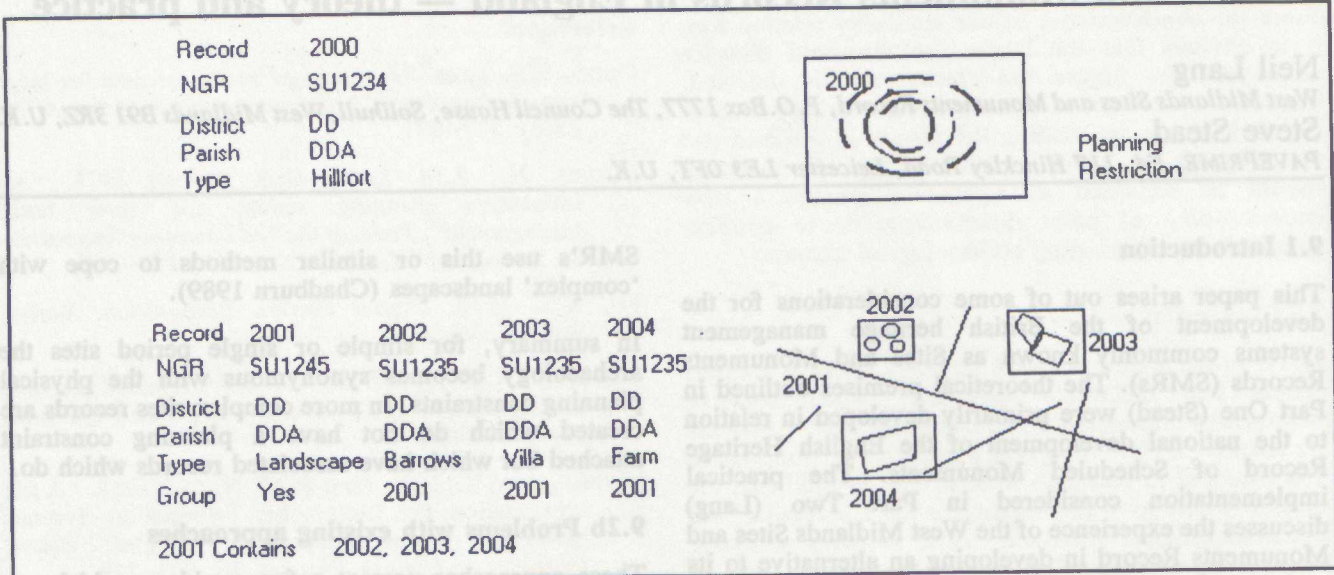
Figure 9.1: Data record for a single 'high impact' archaeological site.

entities; for instance conservation areas. Groupings of archaeological records can also be made thus forming higher level entities. An example could be the grouping of burgage plots, roads and town walls to form a town.

9.2d Parallels and benefits

This approach reflects much current thinking on the fundamental nature of archaeological data (Andresen & Madsen 1990, Stead 1990). In Fig. 9.2 regard layers as physical records, constructs as items which are created by grouping physical records and object as archaeological entities. This produces the same physical/archaeological structure proposed here for SMR's. The structure of the Record of Scheduled Monuments (Fig. 9.3) follows a very similar pattern with constraint areas being the physical record, monuments, the physical record groups and archaeological items, the archaeological entities.

This approach provides immediate tangible benefits. The data entities are defined in a manner which allows us to organize the data in a more usable manner both conceptually and within an object orientated relational structure. This allows more efficient storage and stops the shoe-horning of complex archaeological data into inadequate data structures. The new data structures are also consistent across scale and complexity which will make linking to other data easier.

There are also possible future benefits as we look at more complex analytical tools and conceptualisations of archaeological data and processes. Adams (forthcoming) has suggested that there are two essential processes in the archaeological record, the interaction between human beings and the physical world to produce the archaeological record and the interaction between archaeologists and the archaeological record to produce archaeological data.

The relationship between the physical data and archaeological data can be seen to be created by the former (i.e. human being/physical world) and relationships between our groupings of these records to

be created by the latter (i.e. archaeologist/ archaeological record). This picture is obviously simplified and must be expanded to include the full scope of the difference between attributes (i.e. absolutes) and traits (i.e. data derived from the observation and recording of attributes).

9.2e Conclusion to Part 1

In conclusion, future SMR data structures must recognise the dichotomy between spatial/physical data and archaeological interpretations. If this difference is well integrated into the fundamental data structures of their computer records the expansion into GIS and the interchange of data will be greatly simplified.

9.3 Part 2: The practical development of an SMR

The content and structure of SMRs in Britain have been the subject of a series of studies during the 1980's, the majority of which concentrated on the counties of England. These have included David Fraser's influential feasibility study for the Monuments Protection Programme (IoAM, 1984), a conference on SMRs organized by the Association of County Archaeologists (Burrow 1985a), the summary results of an English Heritage review (Chadburn 1989), and a review conducted for ACAO by the present author (Lang 1990). Several specific papers on aspects of SMRs have also been presented in recent CAA volumes.

This paper outlines the structure of the database which will be used for the West Midlands Sites and Monuments Record in the 1990's. The West Midlands SMR commenced its programme of computerisation in 1987, rather later than many other counties. In many respects, this was an ideal SMR for developing new database software. The initial number of records to computerise was comparatively small (4000), the County is a 'manageable' geographical area, the SMR has been developed as one of the most comprehensive databases in the country in terms of the date range and range of site-types it records, and, since its transfer to
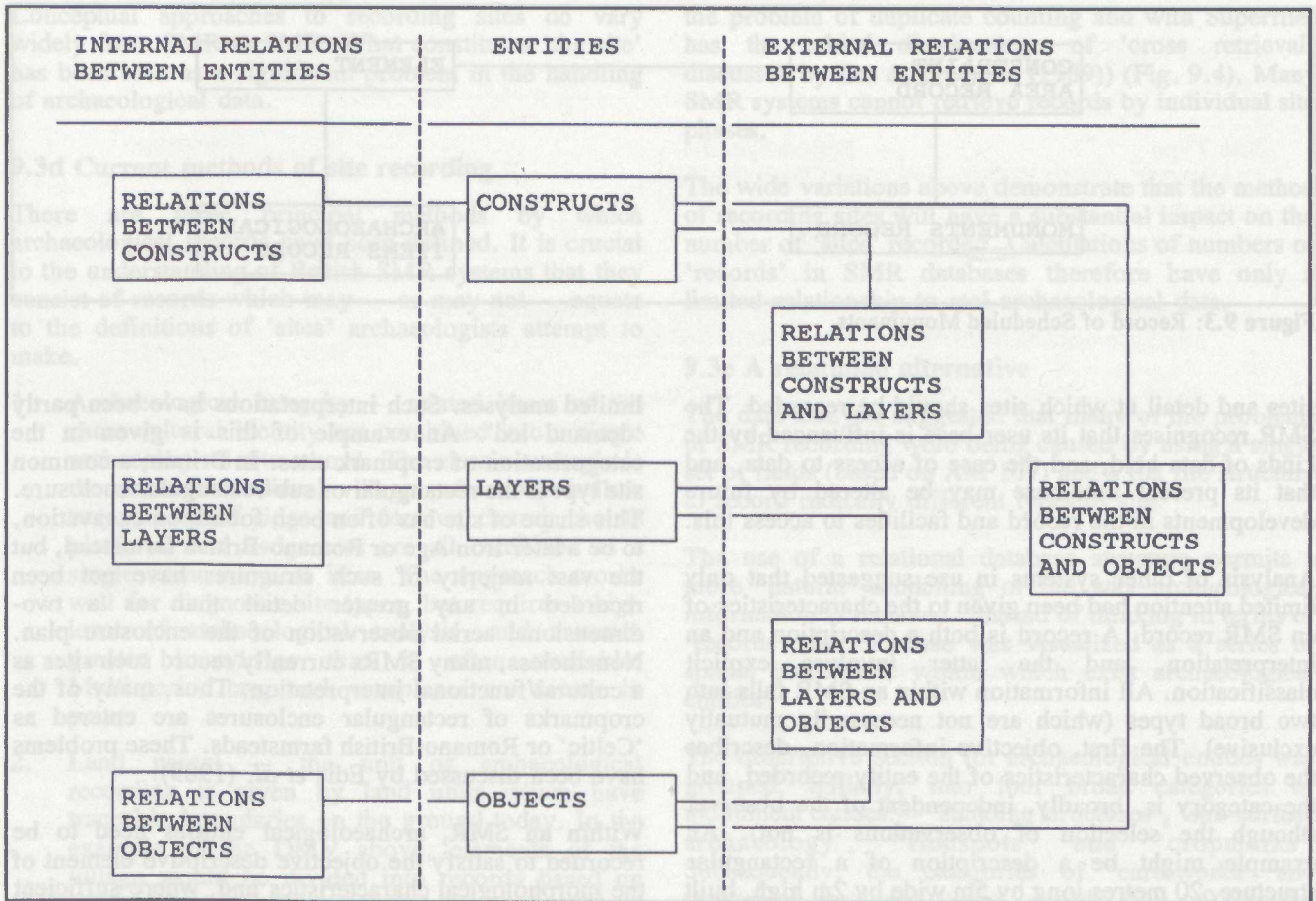
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Figure 9.2: The Logical Structure of excavation data (after Andresen & Madsen 1990).

the Joint Data Team, at Solihull, access to computer technology places it in a more advantageous position than many SMRs elsewhere.

In common with most other English counties, the initial software system was developed using Southdata's Superfile package. This program consists of one central data file (per database), indexed using sequential and BTree indexes, with a series of applications programs providing for the construction of variable length data forms for entry, and retrieval, a 'sort' program (generating a file of pointers to individual records) and a rudimentary report generator. Although an advanced PC database in 1982, when selected by English Heritage, it has subsequently been superseded by many other manufacturers. A review of the package, and its limitations, is given by Iles and Trueman (1989).

In 1989, the West Midlands SMR took a strategic decision to develop its own replacement software. There were several reasons for this decision; Superfile enhancements either commissioned by English Heritage or undertaken by Southdata were erratic and never offered the prospect of addressing its fundamental limitations. The West Midlands conception of a sites and monuments record structure (as distinct from the purpose of an SMR) was significantly different to those employed by most elsewhere. We believed that the data analysis necessary to produce record systems fulfilling the expectations of County Archaeologists (Burrow 1985b) had never been undertaken.

It is often assumed that the widespread adoption of Superfile has been a major factor in shaping SMRs. In reality, the current structure and content of SMRs has little to do with the use of Superfile. The most significant input has come from the 'parents' of English SMRs, on the one hand the core of data used to generate the initial databases (derived from the Ordnance Survey) and on the other, the AM 107 structure used to record the Schedule of Ancient Monuments. Neither were designed for use by the counties, but both were readily adopted to create the basis of the present record structure. It should be noted that the content of SMRs has now developed well beyond the Ordnance Survey records, but OS recording interests have strongly influenced those of many counties.

9.3a Analysis of the West Midlands SMR

The West Midlands commenced its re-consideration of the database from first principles, beginning with the purpose and functions of the SMR. The analysis concluded that the West Midlands requirements were broadly in line with national trends. That is to say, the most significant function was perceived as development control (planning); secondary functions included supplying data for other local government archaeological organizations (such as the museums and district archaeologists), and our third main user group was academic and non specialist-public inquirers (Lang 1990). The main significant differences between the WMSMR and national trends referred to the range of
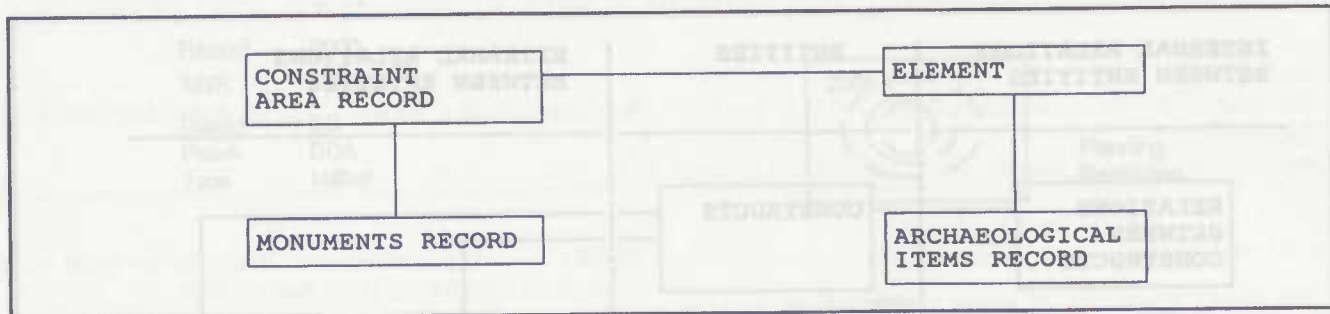
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Figure 9.3: Record of Scheduled Monuments.

sites and detail at which sites should be recorded. The SMR recognises that its user-base is influenced by the kinds of data held, and the ease of access to data, and that its present user-base may be altered by future developments in the record and facilities to access this.

Analysis of other systems in use suggested that only limited attention had been given to the characteristics of an SMR record. A record is both a description and an interpretation, and the latter involves explicit classification. All information within an SMR falls into two broad types (which are not necessarily mutually exclusive). The first, objective information, describes the observed characteristics of the entity recorded, and the category is, broadly, independent of the observer (though the selection of observations is not). An example might be a description of a rectangular structure, 20 metres long by 5m wide by 2m high, built of regular sandstone blocks.

The second category, subjective information, is concerned with the interpretation and classification of objective descriptions, the 'naming' of archaeological entities and their importance within the context of the region or country. For example, the rectangular sandstone building might be interpreted as a byre of the twelfth century AD, which is important because of its rarity, and its contribution to the development of domestic rural architecture, and has a planning constraint area larger than the area of the building because the sub-surface remains of external timber structures are expected outside the walls. In most SMR inquiries, it is this latter type of information — 'what is it/how important is it/what is the constraint area involved — which is most useful in fulfilling the planning function, the most important function of SMRs, as noted above.

Particularly within urban areas, the ability to model these different forms of information within the database is essential (Lang 1989). As Stead suggests in his paper, entities can also be drawn out to form higher level groupings. This provides an extremely flexible and powerful way of recording archaeological information, one capable of fulfilling both a planning function and facilitating research. An example of such an application might be the identification of plan-form units in urban areas.

9.3b The needs of the user

Many inquirers request catalogues of sites which may include highly subjective interpretations, based on limited analyses. Such interpretations have been partly 'demand led'. An example of this is given in the categorization of cropmark sites. In Britain, a common site type is the rectangular or sub-rectangular enclosure. This shape of site has often been found, on excavation, to be a later Iron Age or Romano-British farmstead, but the vast majority of such structures have not been recorded in any greater detail than as a two-dimensional aerial observation of the enclosure plan. Nonetheless, many SMRs currently record such sites as a cultural/functional interpretation. Thus, many of the cropmarks of rectangular enclosures are entered as 'Celtic' or Romano-British farmsteads. These problems have been discussed by Edis et al. (1989).

Within an SMR, archaeological entities need to be recorded to satisfy the objective descriptive element of the morphological characteristics and, where sufficient evidence exists, the subjective interpretation of what the site is, what it was used for, its date and an assessment of its 'relative importance'. An index of the reliability of such assessments would clearly be beneficial. This would provide a more satisfactory compromise between users requiring interpretive catalogues, and the exclusion of speculative interpretation from quantification exercises.

9.3c Categorizing the data

The process of describing widely variant data categories was not facilitated by the restrictions of a single set of data fields applied to all site types, and identification of broadly-related site-classes was required to model this variation more effectively. But the group of descriptive fields are only one element of what may be termed an SMR 'record'.

An initial overview of the content of SMRs suggested that all data in a sites and monuments record may be categorized into four broad data areas. Locational (or header) information, (which usually includes a numeric primary key for the record), and fields providing spatial referents; descriptive information concerned with site characteristics; management information concerned with physical condition, status and formal or informal agreements; and bibliographic data, describing published and unpublished sources of information on the site (including maps, photos, etc.). Although all SMRs include these data segments, few SMRs have considered the possible implications for database design.

Conceptual approaches to recording sites do vary widely from SMR to SMR. What constitutes 'the site' has been seen as a significant problem in the handling of archaeological data.

9.3d Current methods of site recording

There are three principal methods by which archaeological records have been defined. It is crucial to the understanding of British SMR systems that they consist of records which may — or may not — equate to the definitions of 'sites' archaeologists attempt to make.

1. Archaeological integrity — related items of the same cultural identity are combined into a single archaeological site record. The classic example is the deserted medieval village, where the hollow way, traces of ridge and furrow, church, house platforms and hedgerows are all combined as a single archaeological item. The approach works well for diagnostic site-types, but requires a high level of archaeological analysis, and assumes greater knowledge than is often available. Multi-period cropmark complexes are a case in point.

2. Land parcel — the unit of archaeological recording is given by land units which have traceable boundaries on the ground today. In the example of the DMV above, elements of the village would be divided into records based on modern land use (i.e. entities contained within a modern currently identifiable land unit).

3. Recorded information — records are made up of items of information received. For a DMV, one record might be a structural analysis of the church, another an excavation of one of the house platforms, a third, an aerial photograph of the village. Although such an approach requires a low level of information analysis, it can present a highly confusing system, incorporating significant duplication of data, with limited facilities to retrieve and quantify sites within the database.

Beyond these basic approaches lie questions such as the degree to which sites are subdivided. Fieldwalking data provides a good example, essentially consisting of a series of findspots. These could be recorded as an individual record for each find, as separate records for different periods of material recovered, as separate records for each land parcel from which data has been recovered, or as one record for the entire survey.

The extent of chronological sub-division is particularly pertinent to standing structures. Many display distinct periods of re-building (such as medieval churches re-vamped during the Victorian period), incorporating characteristics which may be required to be retrieved in various degrees of detail. Other structures may have more subtle vestiges of different periods of alteration.

Most SMRs have either created separate records for the archaeological entities making up multi-period sites, (with the disadvantage of duplicating numbers of site-types within the record) or have adopted repeated fields within a single record (which may not get around the problem of duplicate counting and with Superfile, has the added disadvantage of 'cross retrieval' discussed by Iles & Trueman (1989)) (Fig. 9.4). Many SMR systems cannot retrieve records by individual site phases.

The wide variations above demonstrate that the method of recording sites will have a substantial impact on the number of 'sites' recorded. Calculations of numbers of 'records' in SMR databases therefore have only a limited relationship to real archaeological data.

9.3e A relational alternative

The data analysis suggested that many of the problems of SMR recording were being caused by using a single set of fields (based on AM 107) and a flat file structure to record radically different types of site.

The use of a relational database structure permits a more 'natural' modelling of the way archaeological information is received. Instead of thinking in terms of 'records', the database was visualized as a series of spatial boundaries within which exist archaeological entities.

The descriptive section for archaeological entities was grouped, initially, into four broad categories or monument classes:— 'standing structures', 'sub-surface archaeology', 'findspots' and 'cropmarks'. Subsequently, the categories of 'earthworks' and 'historical ecology' were added (Fig. 9.5). An explanation of each is given below.

(i) Standing structures — this category comprises all buildings, monuments, and other above-ground constructions excluding earthworks. This also includes provision for recording the internal details of industrial sites (such as the internal survival of machinery).

(ii) Sub-surface archaeology — deposits underneath the ground. This category is particularly aimed at recording urban stratigraphy, but can also be applied to rural archaeological deposits.

(iii) Findspots — stray finds and artefact scatters, recorded not for their own sake, but for their potential to indicate preserved stratigraphic remains

(iv) Cropmarks — archaeological sites revealed as crop, parch, shadow or soil marks as a result of aerial reconnaissance. These are recorded primarily by morphological characteristics rather than by cultural interpretation

(v) Earthworks — as with cropmarks, this approach to recording details morphological characteristics in order to be able to compare sites on the basis of form rather than cultural interpretation.

(vi) Historical ecology — many sites have associated landscape features, such as hedgerows and woodland which have developed a complex ecology, managed alongside purely human constructions.

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│  Site Type                           Period Specific                      │
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│  [MOAT                ]              [MEDIEVAL        ]                    │
│  [MANOR HOUSE         ]              [C18             ]                    │
│                                                                           │
│  In this example, the record 4015 would be retrieved on a search model such as │
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│  or                                                                       │
│        Site Type=BARROW    Period Specific=MEDIEVAL                       │
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Figure 9.4: The repeated field problem in Superfile.

It is acknowledged that all of the above have elements of overlap. Earthworks could, of course, be termed 'standing structures', and cropmarks are no more than the surface indications of sub-surface deposits. However, each of the site-types detailed above has specific characteristics which can be described and interpreted, and are unique to that class.

An example of the approach is given by a moated site consisting of a twelfth century earthwork and a seventeenth century manor house constructed on the platform of the moat. Such a 'record' might consist of a header section, describing the moat location, related to a record for the earthwork, a record for the manor house, a record for the management of the site, and a bibliography of information about these entities.

The use of the relational structure enables group information to be substantially derived from the entities (individual archaeological items) recorded (Fig. 9.6). This approach largely circumvents the problem of 'site definition' since it is capable of extracting information at an appropriate level however the end user chooses to define 'the site'.

The DMV example is recorded as a series of individual entities, with their own constraint areas, and as a higher level entity, as a deserted medieval village with its own group constraint area. The details of 'the

Figure 9.5: Structure diagram of the SMR record.

DMV' are drawn from the tables recording its components. If the moat, in the previous example, was a contemporaneous associated feature of the landscape, information from the tables describing this could also be drawn into the 'DMV' record.
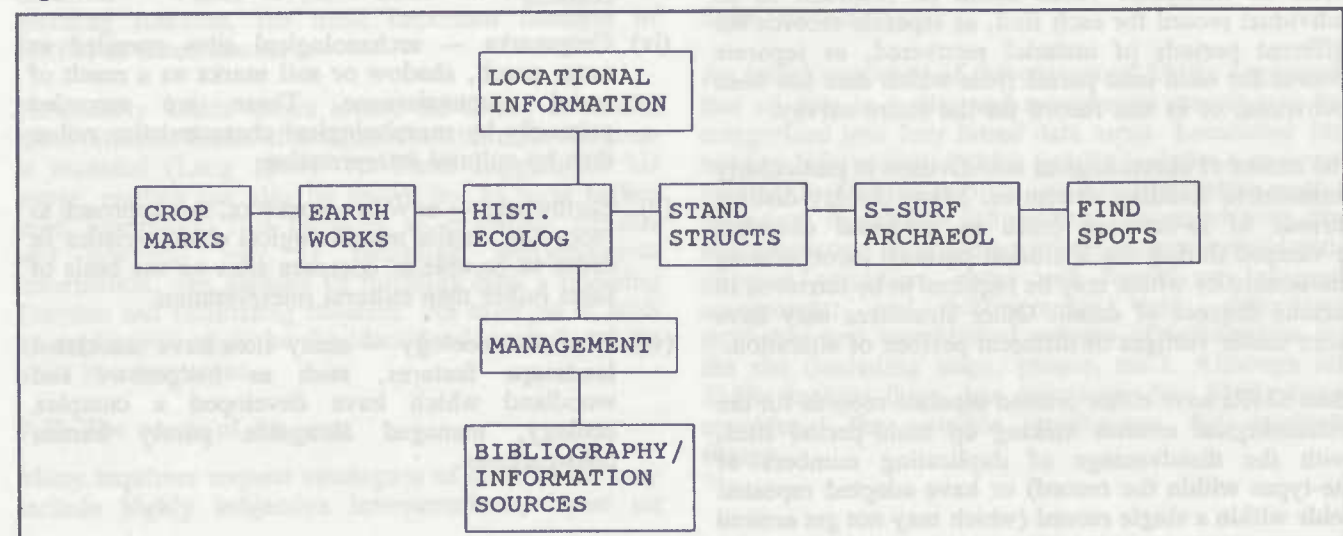
If resources were available, this approach could be decomposed further, into the individual contexts and finds of which a site is made. This would be particularly valuable in urban areas, in experimenting with site 'reconstruction'.

9.3f The spatial dimension

As summarized by Stead above, the problems of spatial reference have not been satisfactorily overcome by SMRs. Not all SMRs attempt to depict the actual physical area for which a planning constraint exists on the mapbase (for example, a buried moated site might be represented by a dot on the map rather than a depiction of the area of the earthwork or the planning constraint). Even fewer SMRs record the boundaries of complexes, such as landscapes (though sketch plotting of cropmarks is now commonplace) or areas of surviving urban archaeology.

The means of describing the spatial characteristics of a site will be an essential second phase of the West Midlands system, though the basic principles are

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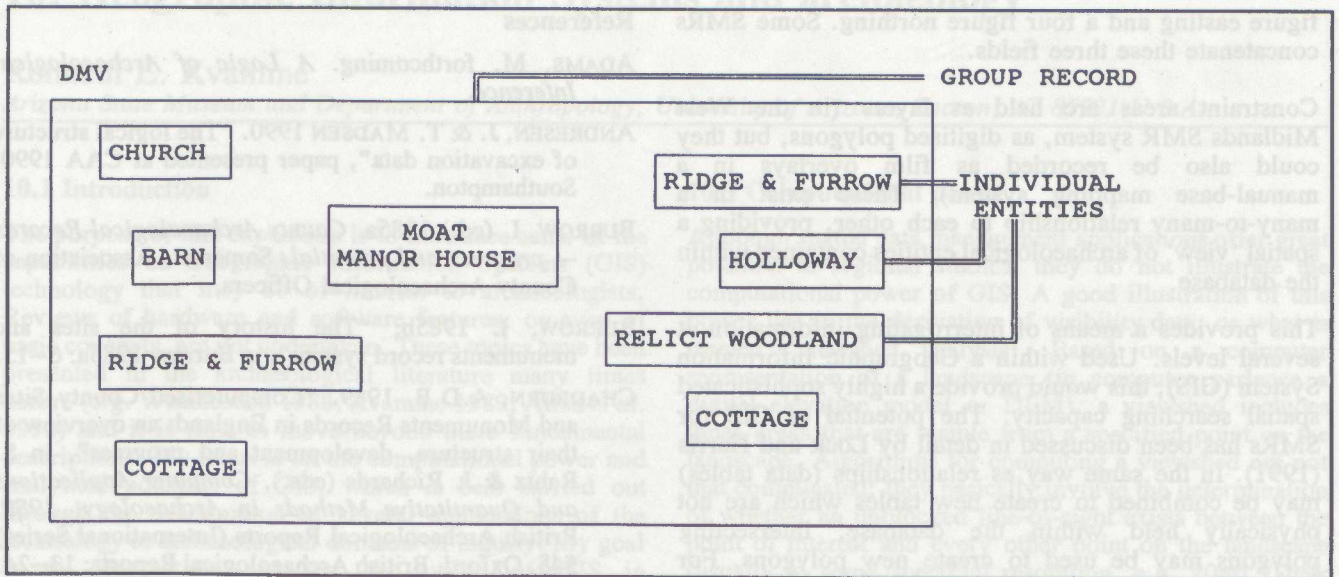
Figure 9.6: Group record.

already implemented in the manual map-base. The boundaries to which a site may refer are far more complex than is generally acknowledged (Fig. 9.7). First, there is the spatial boundary of the visible site itself, which may in turn relate to the boundaries of other archaeological entities. Secondly, there is the area for which a planning constraint is deemed to exist, which may, or may not coincide with the visible area of the physical site. Thirdly, there are 'natural' boundaries, relating to geographical, geological, climatological and ecological zones. Fourthly, there are political boundaries, (the County, Parish, District, town etc.) and finally, there are legislative boundaries

(constraint areas of scheduled ancient monuments, listed building curtillages, conservation areas etc.).

The spatial representation of sites in SMRs has generally included political and geographical boundaries as data fields, some (but not all) legislative boundaries as a map entry and a data field, planning constraint areas for most 'simple' sites and some archaeological complexes (e.g. some SMRs record medieval villages as physical constraint areas).

The conventional spatial co-ordination is provided by a national grid reference, giving a sheet letter, and a four

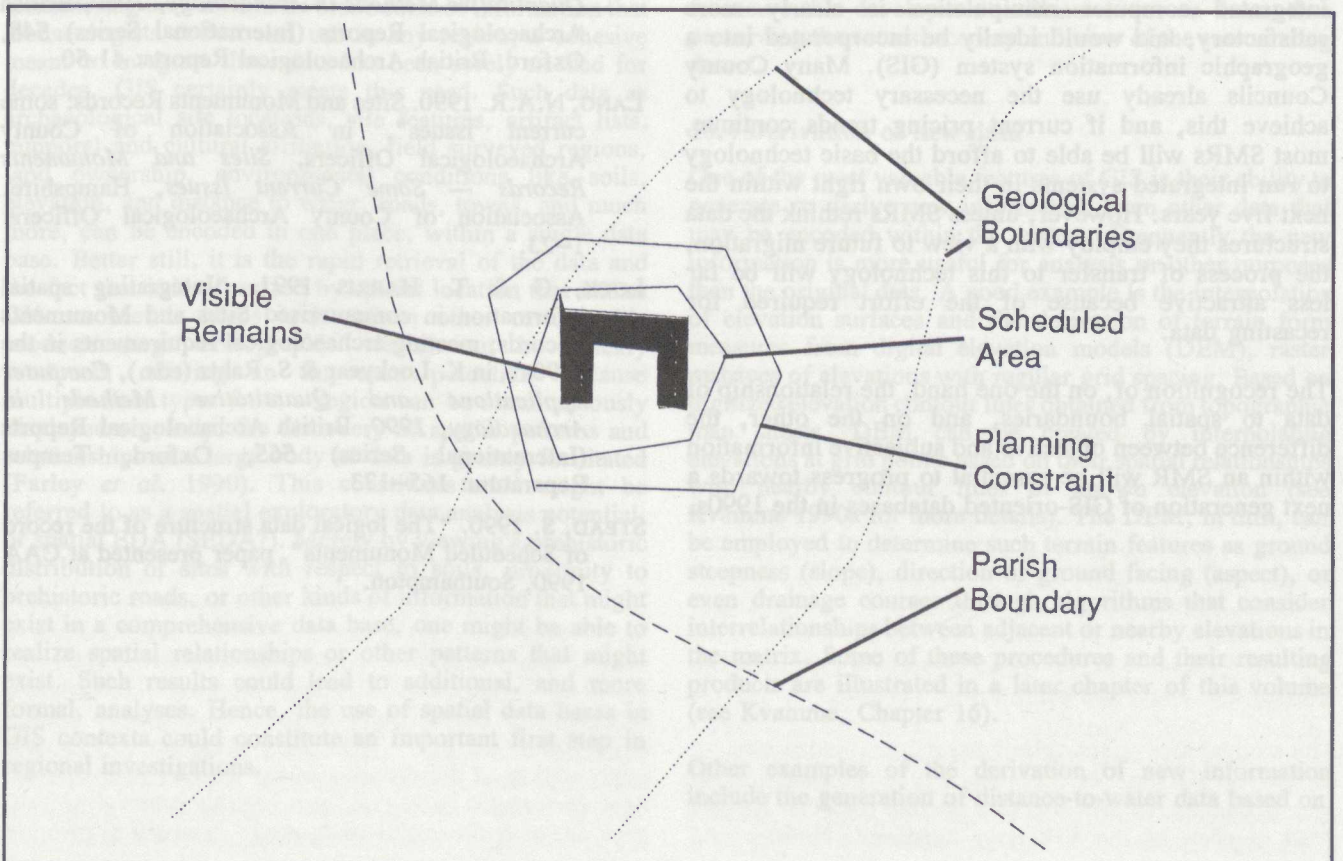**Figure 9.7:** Types of spatial boundaries.

figure easting and a four figure northing. Some SMRs concatenate these three fields.

Constraint areas are held as layers (in the West Midlands SMR system, as digitised polygons, but they could also be recorded as film overlays in a manual-base mapping system). These exist in a many-to-many relationship to each other, providing a spatial 'view' of archaeological entities contained within the database.

This provides a means of interrogating information at several levels. Used within a Geographic Information System (GIS), this would provide a highly sophisticated spatial searching capacity. The potential of GIS for SMRs has been discussed in detail by Lock and Harris (1991). In the same way as relationships (data tables) may be combined to create new tables which are not physically held within the database, intersecting polygons may be used to create new polygons. For example, in an urban area, a series of overlapping polygons depicting the extent of different periods of deposit could be used to automatically calculate the area of surviving multi-period deposits within a town, or deposits surviving to a given depth.

Systematic recording of watching briefs and excavated evidence could be used to develop predictive models of urban archaeological survival. Arguably this could be achieved through manual methods, but the computer offers a realistic capability of achieving this with the limited staff resources most SMRs have available.

9.3g Conclusions to Parts 1 and 2

The database structures discussed in this paper are capable of being implemented using relational database software and a manual map-base, though fully integrated computer manipulation is clearly more satisfactory, and would ideally be incorporated into a geographic information system (GIS). Many County Councils already use the necessary technology to achieve this, and if current pricing trends continue, most SMRs will be able to afford the basic technology to run integrated systems in their own right within the next five years. However, unless SMRs rethink the data structures they employ with a view to future migration, the process of transfer to this technology will be far less attractive because of the effort required for recasting data.

The recognition of, on the one hand, the relationship of data to spatial boundaries, and on the other, the difference between objective and subjective information within an SMR will be essential to progress towards a next generation of GIS-oriented databases in the 1990s.

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