CHAPTER 2

SOME ASPECTS OF SMR MANAGEMENT IN AUSTRIA

CHRISTIAN MAYER
Department of Archaeology
Federal Commission on Monuments, Austria

1. INTRODUCTION

The Archaeological Department of the Austrian Federal Bureau on Historical Monuments is the Austrian Authority on archaeological sites. Consequently, this department tries to fulfil its duties using modern electronic techniques. Based on the legal obligation of recording any archaeological observations to this institution, the department runs a database on site information since 1994 which is the largest collection of data concerning archaeological sites in Austria. Some aspects of the data model and some remarks on the ongoing national archaeological survey will be given in this paper. The annual progress of the national archaeological survey is given in the annual report of the Archaeological Department, published in *Fundberichte aus Österreich*.

The following paper was originally designed as an preparatory text for the other participants of the Seville Workshop. It does not comment on the most discussed matter of that conference: information policy. Therefore some words shall be made about it. The Austrian law on historical monuments includes not only an obligation to report archaeological observations by the finder but also the obligation of the authority to publish these reports. The Department of Archaeology therefore publishes these reports augmented by drawings and preliminary reports on excavations yearly in the *Fundberichte aus Österreich* since 1921, thus giving the archaeological community an excellent base to build up a database according to each researchers intentions. Since some years monographs on sites and excavations are published by the department as well, giving everybody interested maximum access to the results of the site management by the Department of Archaeology.

2. DEFINITION OF ARCHAEOLOGICAL ENTITIES

2.1. Recording: representation, legal, conceptual implications

Within the Austrian national database of archaeological sites[1], a *site* is an area which produced archaeological finds and/or archaeological relevant features. It is bordered against the surrounding by recognisable topographical elements. For the definition of a site nei-

[1] Further details on the database of the database of the Department of Archaeology of the Federal Commission on Monuments are given in Mayer (1996) and Fuchs & Kainz (1999).

ther chronology nor it's character (settlement, etc.) is constitutive. The term site refers only to elements that could be excavated. The territory of a settlement is not included.

A site can be represented by a point (coordinates) or by its extension. Both forms of representation have their problems: Of course the first is inaccurate and not valid without some information about inaccuracy of the coordinates given. In addition, point representation relies on that point being a sample for the site as far as topographical properties are concerned. The representation by the extension of the site in question bears inaccuracy of different form: If the extension of a site is determined by surface finds, one has to take into account that the scattering of finds depends on many different factors like the depth of the topsoil of the site, agricultural activities on the site and land-use. The same factors influence the visibility of a site in aerial photos and not everything we can see on a aerial photo is an archaeological site. As experience shows, the loss of finds during centuries may even lead to the lack of any finds on the surface at all. Further there is a difference between the distribution of surface finds and scientifically important features like houses, pits, etc.

A compromise between point representation and representation by distribution of surface finds is a representation by plots which records a site by a simplified area and covers of course any pair of coordinates within the site.

Of course, the legal side of site management has to take into account the problems mentioned, as both aspects of representation cannot represent a site completely. For legal purposes, it is inevitable to be able to proof that a place is an archaeological site but proof has to be defined in respect to the inherent inaccuracy of the definition of site. Being aware of this problem, archaeologist must influence the legislator and other authorities to take these facts into their considerations.

The conceptual implications of the inaccuracy of the term site are striking as in fact we never speak about a well defined item but of something that is similar to items in modern natural sciences: A site is –in most cases– a collection of points with a varying probability to meet phenomena of archaeological interest.

2.2. Archaeological topography: fragmented and continuous landscapes

From the definition of site given in the first paragraph of the preceding chapter it is clear that a mapping of sites produces the impression of a fragmented landscape. This impression is deepened by point representation. Considering the representation of a site by its extension apparently reduces this problem, but taking into account the inaccuracy of this form of representation, it seems questionable whether the impression of a continuous landscape due to representation of extension of sites is reliable. Anyway, there are partially continuous landscapes in archaeological respect as one cannot draw reasonable borders between sites but these are special regions and stem from unique natural conditions. But this should be clear in any case, that no technique of recording will cover all possible cases and free archaeologists from intimate knowledge of the working area.

As it seems, to regard a site as a collection of points representing varying probabilities to find something of archaeological interest provides, again, a suitable compromise

again. Generalising the definition of a single site as before, an archaeological landscape is a collection of points of varying probabilities meeting phenomena of archaeological interest. Since a degree of probability can be assigned to any point in a landscape such a display of archaeological phenomena displays a continuous landscape.

2.3. Recording uncertainty and predicting risk

Within SMRs, uncertainty has three sources. The first source is the inaccuracy of location as discussed above. The second one is the quality of reports: either by inadequacy of the reports or by their age, information on the location of sites differ in quality. As long as different reports refer to the same site, data recorded are a interpretation of these reports. Of course interpretations always enhance uncertainty and infer an additional factor to prediction risk. The third source of uncertainty is the different regional density of reports or the lack of reports at all. As we can never be sure that no report implies no site, we have to count the lack of reports among report uncertainty.

All these components constitute a prediction risk which can hardly be balanced sufficiently by the skill and the experience of traditional archaeology. It is obvious that intuition has to be replaced by modern statistical methods. Of course, statistical methods have their own problems. Kvamme's technique of producing prognostic maps (Kvamme, 1990) for instance are usually understood as displaying the likeliness of finding a site at a certain point. Although being helpful, these maps offer only an information about a more or less well founded quantification of relative likelihood to meet a site at a certain point. Unfortunately this method does not give an idea of how many sites in a certain area have to be expected. Of course, this number of sites to be expected is a necessary condition to quantify the likeliness of finding a site at a certain point. But even if the actual number of sites would be known a relative likeliness would not necessary be a good weapon against the demolition of cultural landscape. The point I want to make is not that Kvamme's method is not useful, but I think that we should improve the methods in this field and enhance our knowledge on modern statistical methods. These methods are available and we should learn to work with them. Anyway, we should be aware that our combatants are usually better trained statisticians than most archaeologists, which would not leave too much chance to defeat their economic arguments.

3. THE TECHNICAL IMPLICATIONS

3.1. Geo-referencing and cartographic problems

The Austrian maps are based on a Gauss-Krüger coordinate system, which will be replaced in the next years by the UTM-System. Official maps are provided by the *Bundesamt für Eich- und Vermessungswesen* (Federal Bureau of Surveying), having a scale 1:50,000. Aerial photographs with elevation isolines in scales of 1:2,000 and 1:5,000 are available as well as all by products of surveying from the original coordinates to the early stages of map production.

The Austrian cadaster is based on the Gauss-Krüger system as well which makes the extraction of coordinates from cadastral maps possible. Nearly all products of the Federal

bureau for surveying are available in electronical form but –not surprisingly– cost a lot of money.

The Department of Archaeology of the Federal Commission on Monuments will edit the first of a series of archaeological maps in early spring of next year as a monograph including some comment on the accuracy of the data, a glossary or thesaurus and a brief comment on the history of research (statistics of report intensity). The maps scaled 1:50,000 are intended as information for planners as well as for the scientific community. The publications will contain a statistical description of the knowledge of the region mapped in statistical form, hoping to inspire enhanced interest of our academic colleagues for the unknown parts of the Austrian archaeological landscape. Full account of find reports are given to public by the annual publication *Fundberichte aus Österreich*, edited by the Federal Commission on Monuments since 1920.

3.2. Data structures

According to the definition of a site in section 1.1 a record about a site only contains a description of the key topographical features of a certain location. Data on dating, archaeological features, etc. are recorded according to their chronological position. The main data structure is therefore based on the distinction between site *(Fundstelle)* and *Fundplatz*. Whilst site contains only the description of a site, the *Fundplatz* contains the dating, the archaeological culture, information about features (pits, Houses, etc.), finds, literature and a set of coordinates. For legal reasons we found it necessary to link information on infected parcels to the record *Fundplatz* and not to the record "site" as this provides a more exact argumentation in legal context. Of course, when mapping or dealing with a site in some other way, the information on *Fundplatz* are fused according to the context of argumentation.

The national survey of the Department of Archaeology of the Federal Commission on Monuments collects all reports on archaeological finds, including information about sites already destroyed. This implicates that also reports are considered whose information about exact location, dating, features, etc. cannot be checked anymore. Therefore, reports are of different quality and exactness. As experience shows, these low quality reports play an important role in judging the archaeological landscape and to test prognostic models. Consequently, every information is recorded. For example if a site is dated as Neolithic and no further details known, only Neolithic is recorded.

The data model of the database of the Department for Archaeology of the Federal Commission on Monuments distinguishes between two categories of data fields. The fist category is connected to a thesaurus which accepts new entries by the user except for chronology. Traditionally all fields of that category have a thesaurus in the background but we found it more efficient to collect useful terms by filling into the database and rework the thesaurus from time to time. As we learned, the thesaurus becomes quite stable after some time and the number of synonyms is rather low. Consequently we refrained from a hierarchy of termini and coding, allowing great freedom in the description of a site. Technically these fields are a lists of termini describing a site in a certain respect. To carry out a query, a list of termini of interest is formulated and compared with these fields.

The second category of data fields are free text fields which allow the user to type in texts without restriction. It seems not necessary to discuss the necessity and the usefulness of them in detail.

3.3. Computer configuration

The Department of Archaeology of the Austrian Commission on Monuments started its computer aided national survey not by implementing a GIS system but by implementing a conventional database, since it seemed not to be reasonable to invest our financial and personal resources into hardware and software which would run out of age before a reasonable amount of data would be available.

In fact, most GIS programs allow to call stand alone programs by a simple RUN-command so that the main masks of the database can easily be adapted to the technical environment of a GIS. Consequently, data- reading routines are based on SQL- jobs so that complex relational structures can be realized, without special file opening procedure that could restrict the portability of the program.

The database is programmed in MS- Foxpro under Windows NT, offering a dBase data file format. This product has been chosen in 1993 as it offers a full object-orientated programming surface and a SQL- command set, that can easily be replaced by MS SQL- Server routines. Foxpro can be run under UNIX as well, therefore a maximum of portability is given without rewriting the whole program or irritating the users by inevitable changes in the masks. The dBase data file format is quite old and not necessarily very compact but can be accessed by nearly all database programs and is open to SQL.

For the graphical part of the GIS we use GEO-CADdy by Ziegler Informatics, Stuttgart, GFR. The abilities of this product are quite more than ARC View but not as good as ARC Info as the transformation of coordinates from one geographic system to the other is not possible yet. Of course, geo referencing can easily be done and pixel graphics can be processed as well. In addition, GEO-CADdy has many graphical tools so the production of maps is very simple. The database interface accepts nearly all file formats, a simple RUN- command opens any standalone database program. GEO-CaDdy is able to query for objects of different sorts (points, areas, lines) or by overlying them.

4. INSTITUTIONAL AND LEGAL BACKGROUND

4.1. Institutional policies: centralisation vs. de-centralisation

Austria is a federation of nine states, each having its own legislation. Still Austria has a very strong centralistic component, as most laws are federal laws like the law on the protection of monuments. Consequently the Commission an Monuments is a federal organisation, having its headquarter in Vienna. To intensify local care, the Commission has a branch office or at least a department in each of the federal states. To three of these offices an archaeologist as member of the Department of Archaeology is attached. As far as sites are concerned, the major part of input into the database is done in Vienna,

since the most important libraries and the archive of the Commission are located in Vienna. In addition, archaeologist outside Vienna are mainly concerned with field work and legal duties. Furthermore, it proved to be very useful to have all staff members doing the input at one place as the coordination between them is much easier and more effective. Therefore we found it advantageous to do the basic input (archive information, literature, etc.) in Vienna and deliver the database to our staff members outside Vienna as soon all sources have been used here for further work.

4.2. Fund raising and staff training

In 1993, during the planning phase, we discussed whether to start our national archaeological survey with implementing a full GIS application or a traditional database. We decided to begin with a traditional database since the first national archaeological survey conducted by a traditional card filing system proved that the major part of the survey is archive work. In addition, using a GIS would only be effective if enough data is already in the database to perform useful queries. For second, the permanent updating of graphical data is more time consuming than the updating the archaeological data and requires a permanent line to other authorities which is not available to the Department till now. Thirdly, the management of graphical data and the hardware administration is extremely difficult and costly. Most of all, the members of the Department are busy with legal duties to a very high degree, so that they would run out of experience of using a highly complex application very fast. As a consequence, the quality of data input would become very heterogeneous and unreliable. In addition, working with electronic graphics requires an intimate knowledge of computers, which cannot be imparted to untrained users in a reasonable time span.

We therefore decided to separate the graphical data from the other and emphasise the training of staff members on the surveying of archaeological and administrative information. Since this work is more familiar with archaeologists the training of staff members is more effective and easier. The graphics especially queries involving graphical data is left to a single person.

Fund raising is the most difficult task for an authority being interested not to arise suspicion to be corruptible. Of course, lots of money for excavations come from investors but the spent money not exactly on their free will. Naturally some money can be raised for publications and little exhibitions, but the sums are small since there is no tax allowance for funding archaeology. In some cases we offer to organise the production of information brochures but we are not very successful in this respect. At the moment we are preparing our web site to have a forum for our sponsors. For this purpose, we approach firms that do not have professional contact with us to prevent the suspicion of corruptibility.

5. REFERENCES

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