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The ArchéoDATA System — towards a European archaeological document

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10.1 Introduction

The aim of the ArchéoDATA System is to create a minimal context that permits not only the publication of better excavation reports, but also to improove the recording, analysis and conservation of archaeological data. To this end the ArchéoDATA System contains a series of methodological elements for the organization of the archaeological record in its entirety, both on a national and international level, which reflects archaeological realities and assures a better opportunity for research. To achieve this, a system has been devised that copes with the problem of archaeological research in a global manner, and not as a myriad of isolated entities. In this way, we may one day be able to create a European archaeological document.

ArchéoDATA System is the combined effort of the GDR 880 of the Centre National de la Recherche Scientifique, the University of Paris, the Sous-Direction de l'Archéologie of the Ministry of Culture and field archaeologists, in order to devise a system which will improve conditions for archaeological research. It is principally funded by the CNRS through it's Action Thematique Programée.

The theory behind, and the functional basis of, the ArchéoDATA System have been published in the CAA 89 conference proceedings. Its consultation is indispensable to the comprehension of this second and complementary paper.

We will begin with a rapid overvue of the ArchéoDATA System which incorporates the following:

- A code which relates the archaeological site with an administrative space by the use of international postal and telecommunications codes.
- A code that relates the archaeological site with geographic space through the use of the UTM coordinates.
- An inventory system that relates the finds to the place where they were found and that simplifies the selection and grouping of the archaeological material.
- Ten series of recording sheets and folders that cover different phases of archaeological work, starting with surveys, through excavation and finally to storage.
- A recording system which can be used manually, but which has been archaeologicaly reasoned and structured, from the beginning, to be efficiently computerized.

10.2 Site recording

We have adapted the Universal Transversal Mercator (UTM) coordinate system, which are used for the recording of site survey data, and applied them directly to the excavation grid itself.

For fieldwork we have developed two different ways of spatially recording the same archaeological phenomenon. The Universal Metric Unit, which rationalizes data handling in a global sense, and the Relative Metric Unit, which although it uses the same basic units, structures the same space in a more natural and intuitive manner.

The system used to identify any given point on the excavation grid should locate objects and phenomena in a natural way and the archaeologist should be able to easily visualise and utilise them spatially within the archaeological site. An effort has thus been made to take into account, in the grid numbering proposed, of everyday habits and routines. The unit numbers used are not too large so as not to be too complicated and difficult to retain. Instead, they rely on the successive re-use of the same basic block each time but on a smaller scale.

Common to both systems is their structuring in area, subarea and square meter, with the UTM unit being reserved for the UMU system.

10.3 The RMU system

As this was the basic system which was presented last year, we will only go over its underlying structure. (Fig. 10.1)

The RMU grid system is considered 'relative' in that it is not directly based on the UTM coordinates, but on geographical points chosen independently by the excavator himself. Even though an exact North-South orientation is not obligatory, it is recommended, as this would give the added advantage of enabling a later conversion of the RMU's into UMU's. The Northern orientation can vary up to 44 degrees to either side of the true geographic position and as long as this orientation is found on top of the grid.

10.4 The UMU system

The numbering of the UMU grid is based on the international UTM coordinates of latitude and longitude (Fig. 10.2). Each grid block is comprised of one hundred units numbered from zero to ninety-nine and related directly to the hundreds, tens and units of the UTM coordinates. It is by ordering the coordinates in pairs of longitude and latitude that any one point is designated. The ensuing number locates the exact unit directly on the earth's surface. When the excavation

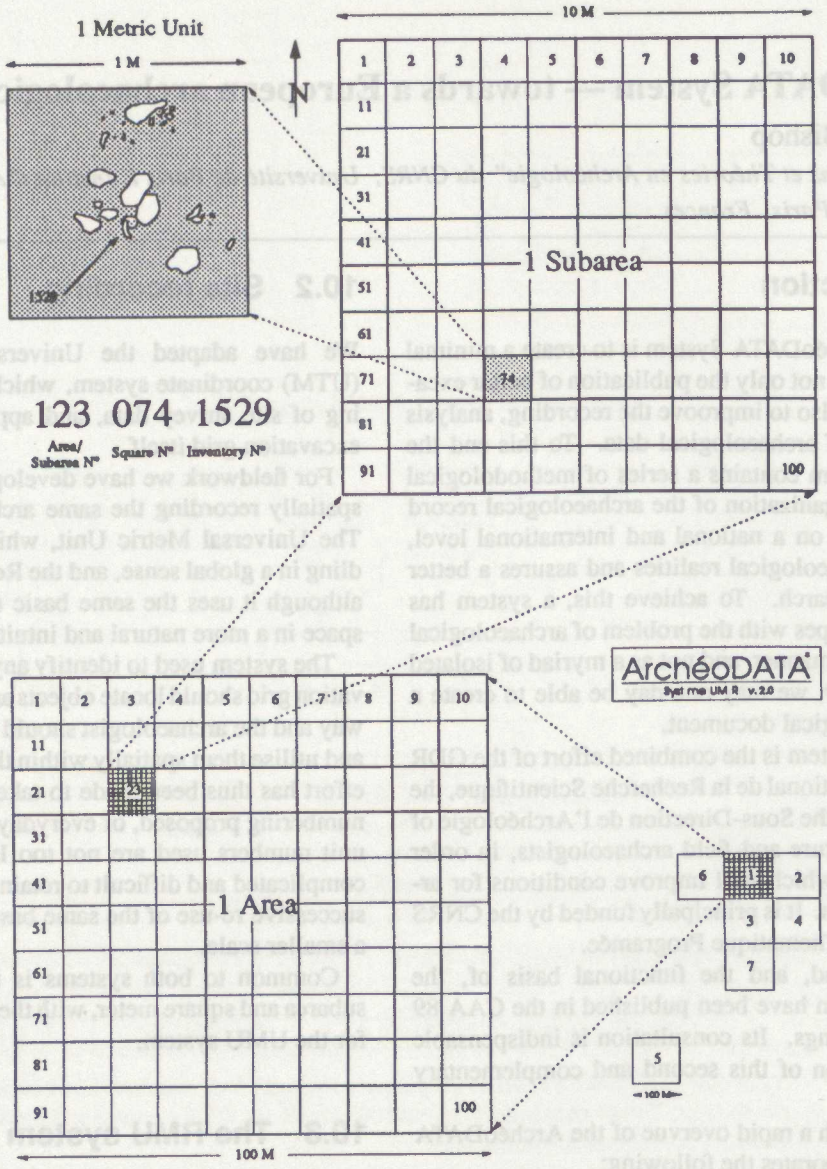

Figure 10.1: The RMU grid structure based on independently chosen 'relative' coordinates (not strict UTM) and adapted to a more intuitive, left to right and top to bottom type of organisation recording

grid is set up, the number of each square is determined directly by its UTM coordinates. Since no two places can have the same absolute coordinate, all excavation data is unique and it can be related to all other data recorded in the same way.

The inventory number structure is exactly the same as for the RMU system (Fig. 10.1).

The structure of both systems is identical as this is necessary for the future re-use of the data. Whatever system is chosen by the archaeologist, provision has been made for the automatic conversion of data from one system to the other (Fig. 10.3). This of course can be handled automatically in the background by the computer without any intervention by the archaeologist.

If this system is without a doubt the most interesting for the future, it is reserved at present to large or long term excavations, as the system needs great precision when set up, and the means to do so, by an archaeologist, will not be generally available in the foreseeable future. The archaeologist will probably use one of the small hand held GPS (Global Positioning System) satellite positioning units which have recently become available.

10.5 New recording sheets

After completing the recording sheets for the stratigraphic unit based recording system, work has been directed towards making up the three-dimensional recording sheets and folders used in the UMU and UMR systems. These sheets are innovative in that they clearly imply that, even in prehistoric period three-dimensional recording, the same archaeological hierarchy of feature and structure terms should be used, even if the stratigraphic unit is absent or difficult to define. A posthole made up of several stratigraphic units or one where it is barely discernable though texture differences, are both the same archaeologically: a feature. A semi-circle of postholes (features) should be interpreted as a structure, be it in a historic or a prehistoric excavation.

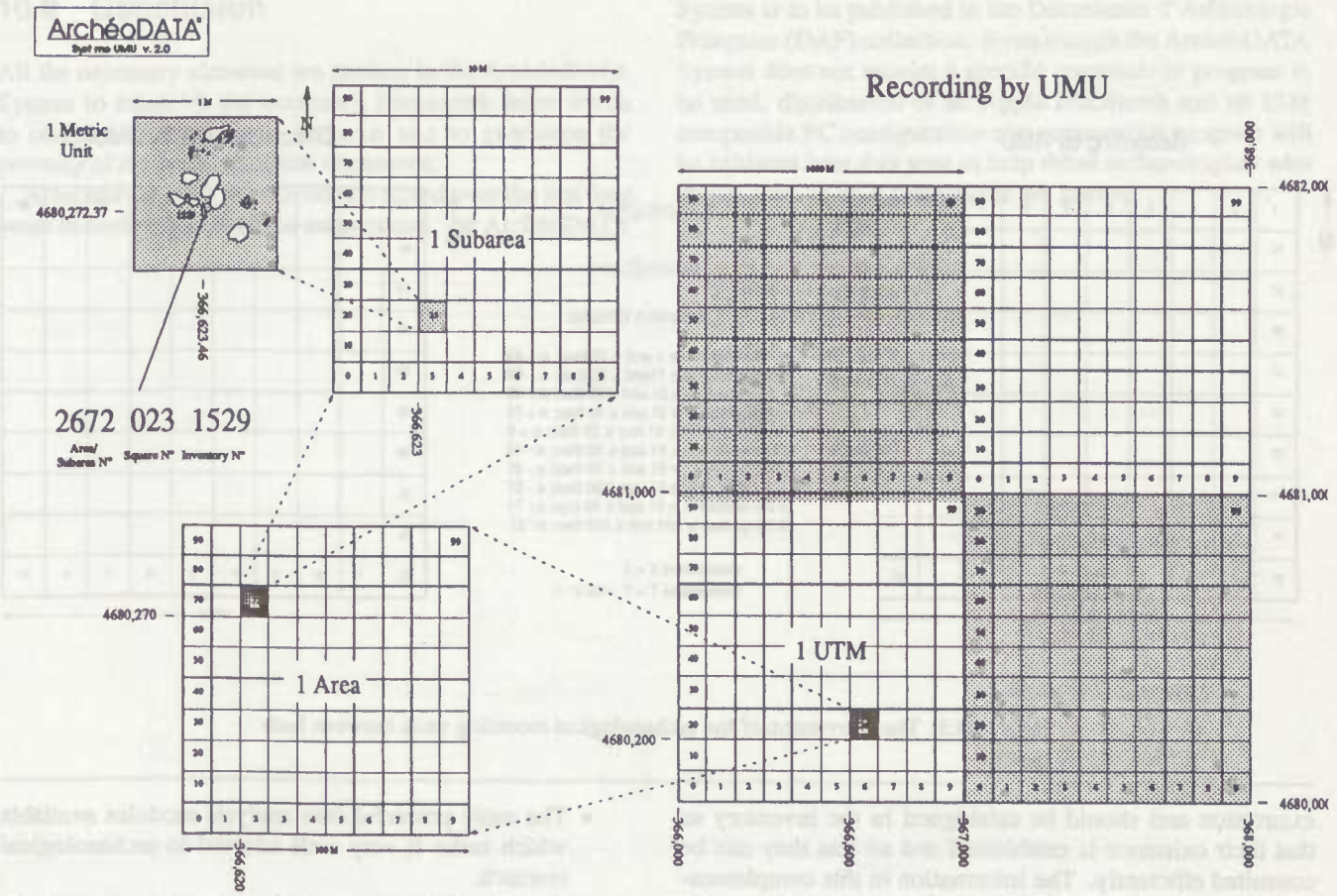

Figure 10.2: Recording by Universal Metric Unit based on UTM coordinates

sheet and a Structure folder (Fig. 10.5)

10.6 Site excavation recording

One of the least well resolved problems in field archaeology is the apparent opposition between the two main excavation methods: how to establish a transition between an excavation by stratigraphic contexts, to one based on three-dimensional recording, or how to incorporate the latter transientely in the former, thus adapting recording to specific needs. To be able to interpret and analyze data together, especially with the use of computers, it has to have the same data structure.

The evolution of excavation from a mainly university and research oriented enterprise to a rescue based profession has had a profound impact on archaeological recording. Until recently our profession has been divided generically into archaeologists and prehistorians. Each had their own problems and as such, only excavated their type of site with their own excavation methods. The growth of rescue archaeology, and the reorganization this has imposed on archaeological research, has made it more important to seek a solution to the problem. Today when an archaeologist arrives on a site he does not necessarily have a clear idea of what awaits him below the surface and he must be ready to record and interpret stratigraphicaly and three dimensionally.

The solution found for the ArchéoDATA System has been to develop a way by which data recorded by either method is compatible with the other and can be entered on the same database (Fig. 10.6–10.7)

The basic joint Metric Unit/Stratigraphic Unit system is planned for nine hectares (90,000 square meters), excavated in ninety-nine zones, numbered in the following manner: numbers 1 to 99 are reserved for the zones and from 100 to 999 are reserved for areas and subareas. If the UTM based Universal Metric Unit system is used, the area covered can be much larger. Although the example given is a three by three area square, other configurations can be used.

The metric grid used is that of the excavation, staying in the background until it is needed (see sections 10.1 and 10.2). In this way the potential for systematic three dimensional recording is always present without it interfering with the excavation work being carried out by context. It is in this manner that it has been possible to organize recording yet change from one system to the other whilst being able to use the data recorded by the two systems (Fig. 10.8).

10.7 The inventory

One of the latest things to be added to the System a complementary general inventory. Everything that is found during excavation is recorded with the archaeological unit where it was found. An excavation or a survey also produces many other things: drawings, photographs, studies and analysis, all the excavation's recording books and binders, archival documents, donations, financial records, correspondence, *etc.* All of these things are also an integral part of the

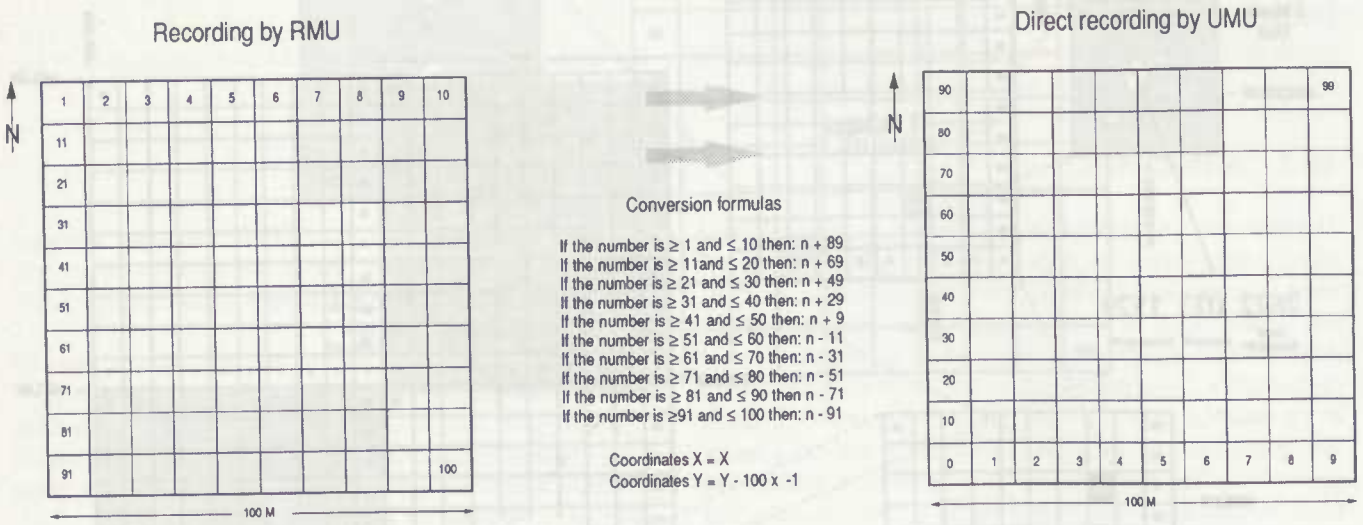

Figure 10.3: The conversion of the archaeological recording units between both systems

excavation and should be catalogued in the inventory so that their existence is established and so that they can be consulted efficiently. The information in this complementary inventory is recorded under Zone/Area '000', and is integrated into the general data structure.

10.8 The Geographic Information System

The use of a Geographic Information System has been envisaged for some time as a way to interface the components of the ArchéoDATA System. The extended relational qualities which it is able to establish between data and space has always seemed very well suited to archaeological work. The full system envisaged will handle all survey information and interface it with excavation and other data.

Work was to have started in January 1990 in collaboration with the CNRS's Laboratoire d'Informatique des Sciences de l'Homme in Paris, but this has been delayed. The project will be set up with the collaboration of the CNRS's new laboratories at the University of Paris X — Nanterre and with it's Centre de Recherche Archéologiques, near Nice. It is expected that in the future a network of users can be set up with the Sous-Direction de l'Archéologie (Ministry of Culture) and it's regional archaeological offices.

Although ARC/INFO had initialy considered as our first GIS development package, we have reecntly licensed TYDAC's SPANS, which has seemed to us to be a good choice for for several reasons:

- The more powerful data analysis modules available which make it very well adapted to archaeological research.
- Its flexibility and potential for extensive data analysis.
- The wide range of graphical representations.
- That it can run well on 386 micro-computers[1]
- That SPANS version 5 takes full advantage of the new user-friendly graphical interfaces now becoming available. The DOS version runs under Windows 3 and the OS/2 version under Presentation Manager.
- The possibilities of adapting the program to archaeological uses, and in particular, to managing the ArchéoDATA System.
- Import/export of AutoCAD standard DXF and other CAD files.
- Interfaces with Oracle databases.

The recent introduction of IBM's RS6000 RISC workstations[2] and the probable evolution towards even more powerful and economical machines is being taken into account for the full development stage.

It is important to foresee, from the beginning, the eventual implementation of this kind of program, so as to guarantee that all the data necessary for its use is recorded in a suitable and structured manner.

[1] This makes SPANS's implementation more acceptable, both materially and financially, to laboratories and institutions who are already equipped with these computers. This is not the case for programs such as ARC/INFO PC which are stripped down versions of the mainframe package and demand a workstation to run properly. An example of these units is the Magellan GPS NAV 1000 Pro which reads out directly in UTM coordinates and also gives the altitude.

[2] A powerful color system based on the entry level 320 model (27 MIPS and 7 Mflops) is now available to research laboratories for under £10000, or about the price of a name brand 486. The entry of Taiwanese and other Asian manufacturers into this market should also have its impact.

10.9 Conclusion

All the necessary elements are present in the ArchéoDATA System to establish the necessary framework from which to conduct archaeological research and to guarantee the perenity of the archaeological document.

After having been developed and tested over the last four years in several projects and excavations, the ArchéoDATA System is to be published in the Documents d'Archeologie Française (DAF) collection. Even though the ArchéoDATA System does not require a specific computer or program to be used, distribution of an Apple Macintosh and an IBM compatible PC configuration of a commercial program will be initiated later this year to help those archaeologists who do not wish to do it themselves get started.

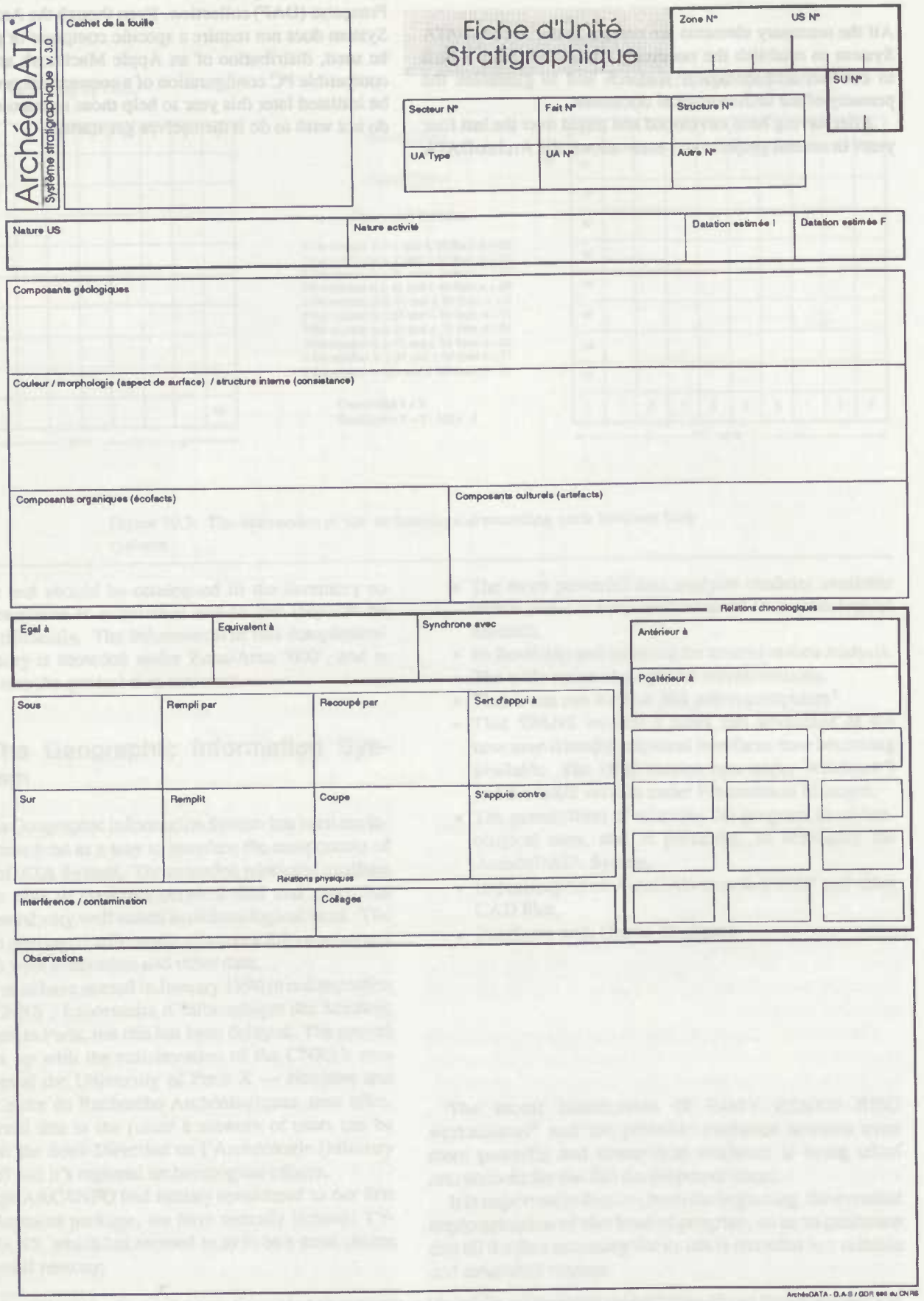

Figure 10.4: The first side of the Stratigraphic Unit recording sheet

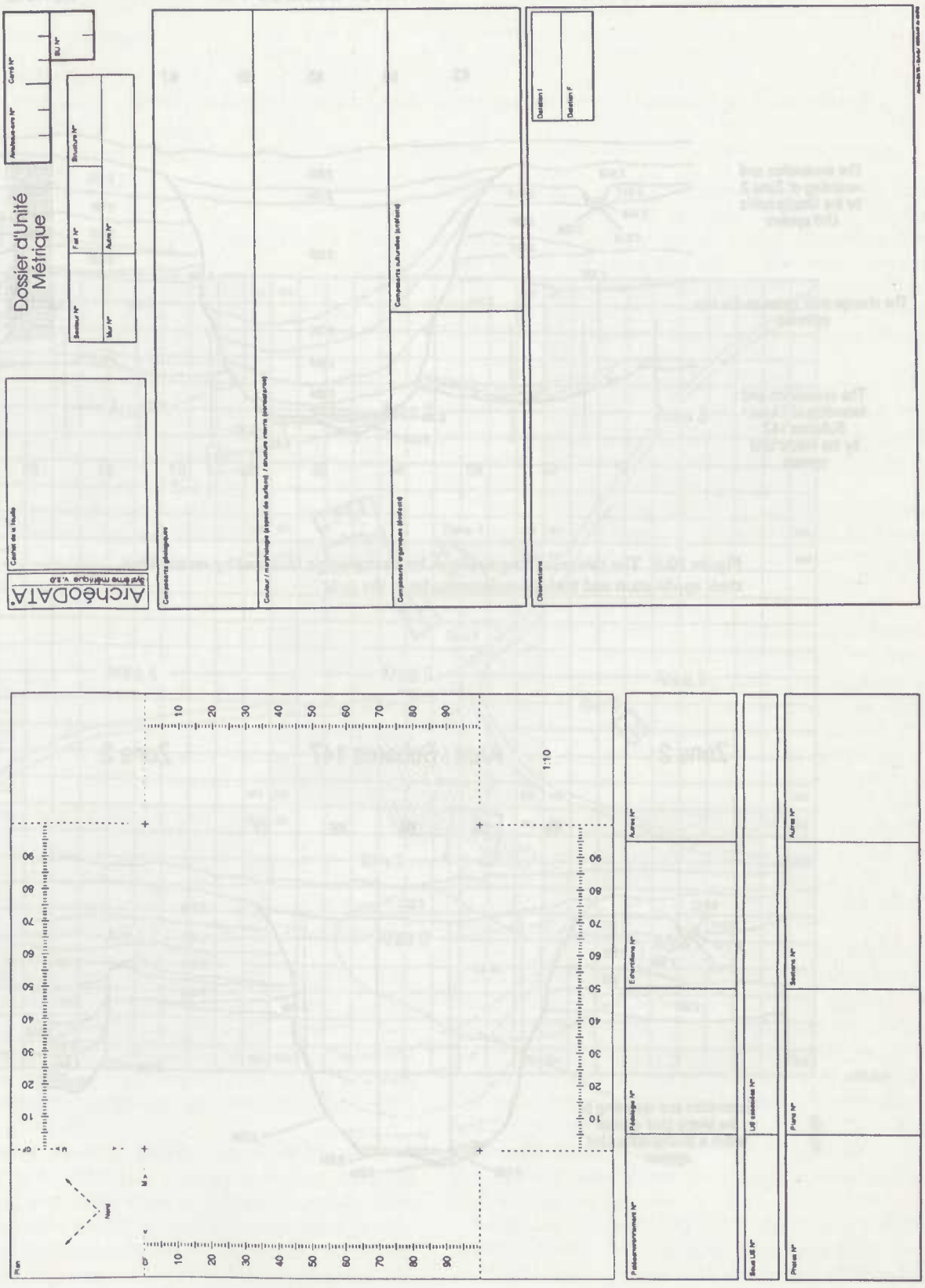

Figure 10.5: Part of the Metric Unit recording sheets

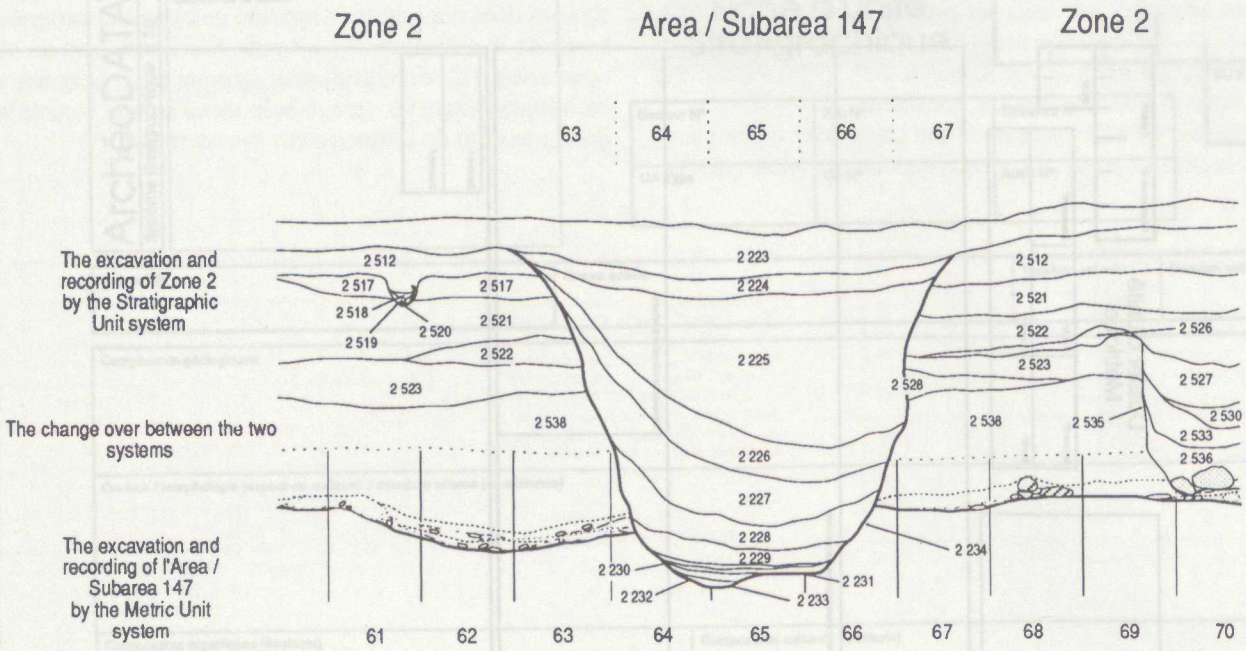

Figure 10.6: The two recording systems, by stratigraphic Unit and by metric Unit, their application and their complementarity in the field

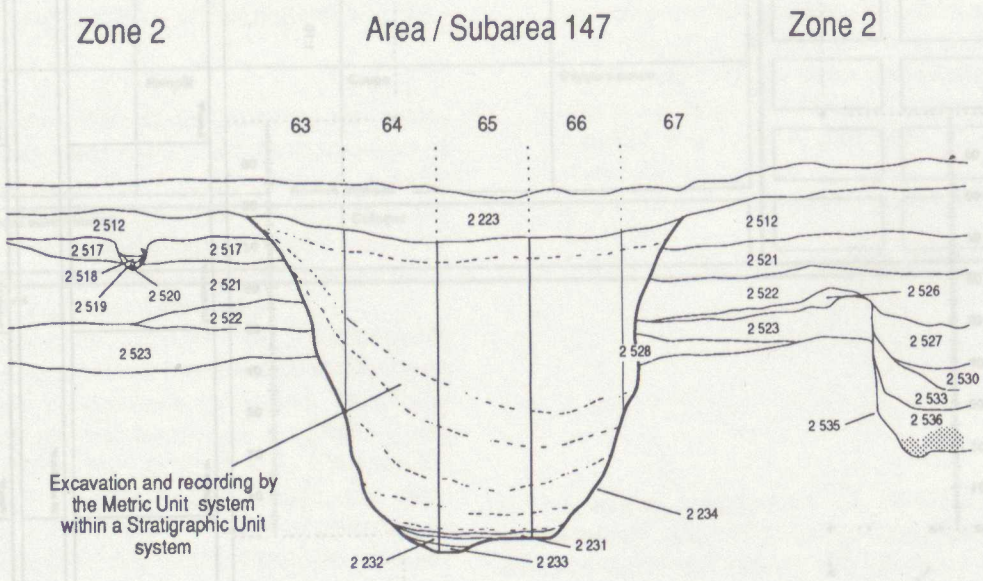

Figure 10.7: The excavation of a pit by Metric Unit within a system recorded by Stratigraphic Units

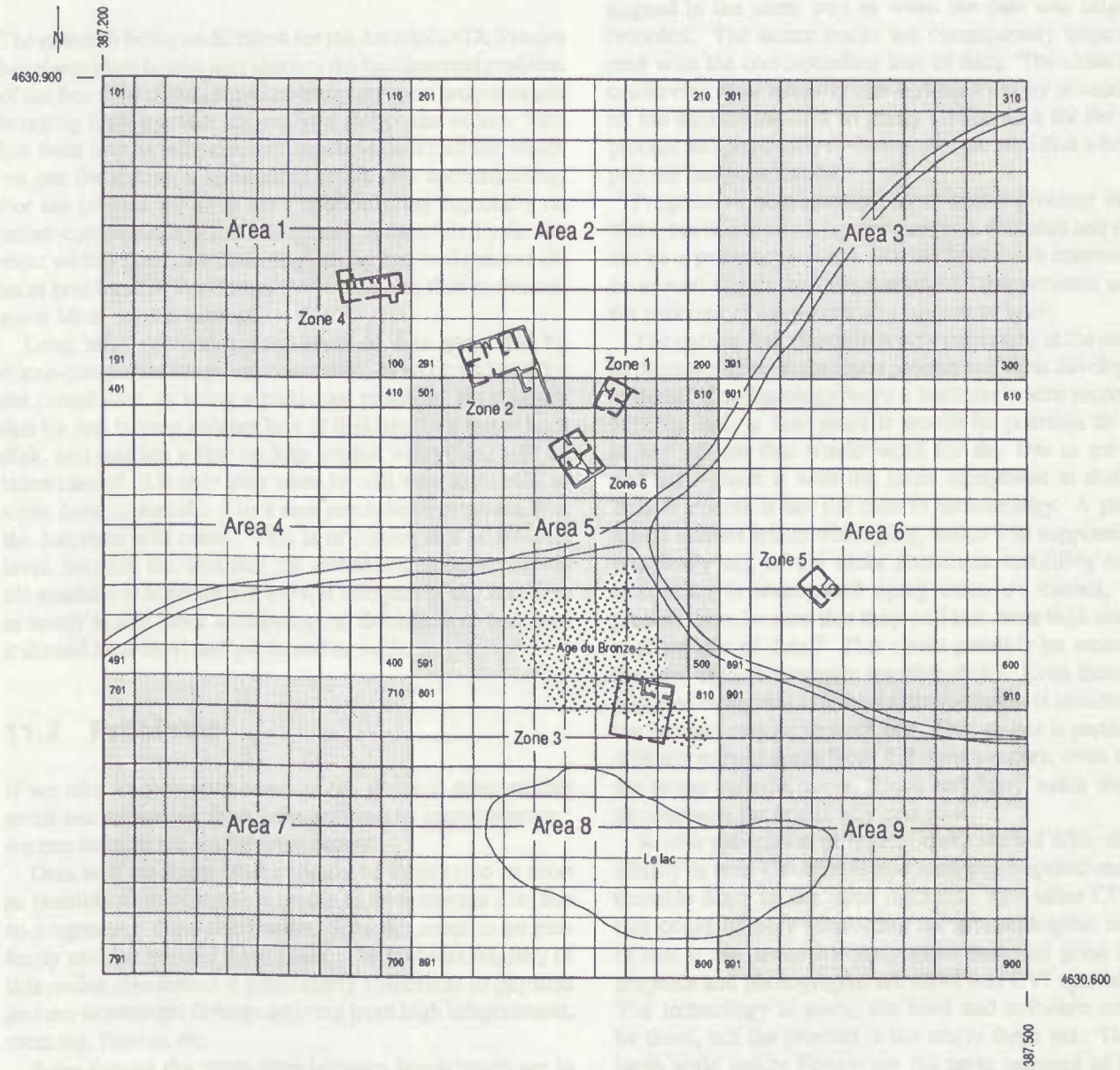

Figure 10.8: The basic ArchéoDATA configuration permits the recording of 99 Zones in a 9 hectare site. In the present example, a Bronze age settlement is found to be within the excavation of a Medieval deserted village. The medieval structures are excavated stratigraphicaly inside zones and the pre-historic remains three-dimensionally within Areas. The excavation of Zone 3 started stratigraphicaly, but changed to recording by Metric Unit based on Area 5 and 8.