

## Archaeological computing in South-Western Europe (France, Spain, Portugal and Andorra)

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### 29.1 Introduction

To be able to understand the role of computer archaeology in south-western Europe, a short introduction to its development is necessary, as it has been more recent and different in its implementation than has been the case elsewhere. There have never been in these countries projects to implement the regular use of computers in the social sciences and the humanities. The use of a computer has always been thought of as a privilege, never as a necessity and the comparison with a country such as the United States is simply astounding. Although some archaeologists, especially in France, have been able to work with computer programmers from the beginning, this has always represented a very small and privileged part of archaeological research. The real start for computing has had to wait for the coming of age of the affordable micro-computer and for that the decision to equip taken by the end user himself.

The result has been that extensive computer application and development has been very recent in these countries and that its structuring has been much more independent. From the positive side we can take note that the time lost is being made up very quickly by the use of the latest generation equipment and with programs that can be readily adapted to their needs. The easier to use computers have led to a more intuitive and flexible approach to their use and the possibilities offered, such as creating graphics with some programs and integrating them along with other types of data, have been a boon to the newly computerized archaeologist.

The development of data processing and analysis through centralized computers in the Northern European and Anglo-Saxon countries made command line computing the normal environment for archaeological data use and made the transition to the CP/M and MS-DOS micro-computers a normal procedure. While this has also been the case in Southern Europe when the rare decision to computerize was taken by a national or regional administrative authority, it has usually been different if taken by the archaeologist himself. The rule that those who have been accustomed to using mainframes have little problem in a transition to IBM type PC's and that those who are just beginning prefer the Apple Macintosh is quite true, but it has also appeared that many of those of the former, who can, go directly to this computer. Due to its graphics capabilities, intuitive interface and numerous programs particularly well adapted to archaeology, the Macintosh has prevailed, by a very wide margin, as the computer of choice for the archaeologists in these countries. The determining factor for its use has been financial, the minimal Macintosh Plus being approximately twice as expensive as an IBM clone's base price, but if this hurdle can be surpassed, its use is assured.

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The computerization of excavations is now proceeding at a high rate, but it is usually being done in an isolated manner and with only short to middle term views on the exploitation of the data recorded. While it is true that the dynamics generated by this new individual initiative has led to some highly innovative results, the authorities have now take up their responsibility and implement guidelines that will guarantee the perennity of the data recorded, without which they will see the irreparable loss of part of their cultural heritage.

## 29.2 France

The roots of archaeological computing in France are quite different from those of the other three countries in that it was one of the pioneering countries in its application, starting as far back as the middle fifties. Researchers such as Gardin, Borillo, Buchenshultz, Djindjian, to name but a few, have at different times, contributed incisively to the theory and practice of archaeological data analysis. These efforts have unfortunately not had a direct impact on computer use in field archaeology and little on typical post-excavation reports. The fundamental reason for this state of affairs is common to all four countries, an absence of governmental interest in promoting the computerization of archaeology.

It was the Apple II computer, around 1980, more than any other type, that introduced data processing to the French archaeologist, mainly those in the CNRS laboratories. The number concerned were relatively few and it has only been in the second half of this decade that extensive development has taken place.

The largest single integrated micro-computer installation dedicated exclusively to archaeology is that of the archaeological research laboratories of the University of Paris I (Sorbonne-Panthéon), situated at the Institut d'Art et Archéologie in Paris. This, until recently independent structure, is in the process of being networked on a low level and mainframe links are being experimented with. The installation consists of some fifteen computers, mainly Macintosh's from Pluses to Mac IIx, but also AT and PS 80 machines. A basic peripheral system with a laser printer, scanner, plotter, digitizing tablet, etc., as well as programs such as Oracle and AutoCAD, are at the disposal of the archaeologists. Several seminars have been held regularly over the years on computer applications and analysis in archaeology and these are destined to be intensified in the future.

The coordinator of the archéo-informatique, is the MAII group of the GDR 880 (ex GS-72) 'Terrains et Théories en Archéologie' of the CNRS, which unites all the university's archaeological research laboratories. The projects treated here range from sites in or near Paris such as the Etiolles Magdalenian period excavation, to protohistory in the l'Aisn Valley and excavations in Spain, Syria, and Oman in the United Arab Emirates. The ArchéoDATA research project has its roots here and it is but one of the varied applications being developed for excavation and analytical work (see Arroyo-Bishop, this volume, chapter 10).

Among other universities with active research programs are the Universities of Paris IV (Sorbonne), Paris X (Nanterre), who's video disk and data bank work is quite well known, Lyon II (Maison de l'Orient Mediteranean), Bordeaux III, Lille III, etc. The Ecole des Hautes Etudes en Sciences Sociales organizes seminars each year that have archaeological computing as part of their themes.

The main centre for research on computer applications in archaeology is the CRA (Centre de Recherche Archéologique) of the CNRS at Valbonne near Nice. Founded fifteen years ago it has a section dedicated to computer applications. Among its contributions are a bibliographic database, publications which include a regular newsletter, the organization of national and international seminars and conferences. The Centre de Recherches Archéologique at Lattes near Montpellier and the Centre de

Recherches en Archéologie Urbaine at Tours, in the Loire Valley, have also contributed to putting into practice the application of computers in archaeology.

In Paris, at the Maison des Sciences de l'Homme, the LISH (Laboratoire d'Informatique pour les Sciences de l'Homme) has been the long standing institution for data processing and research as well as for training in the use and application of computing in the social sciences. Its primary archaeological orientation is on post-excavation analysis and methodology. The FRANCIS bibliographical database, for archaeology and history, is situated in the same building. The Laboratoire d'Archéologie of the Ecole Normale Supérieure, has also been notable for its research projects on data analysis.

The principal changes to the application of computers to field archaeology are coming from the archaeologists responsible for rescue excavations in as much as that the last decade has seen a huge increase in this sector and very substantial budgets to go with this work (a total of around £13,000,000 in 1989, or about ten times more than the government for programmed excavations). An example pioneering project, although modest in scope, has been the Lyon metro D line excavation through the Roman part of the city, which for four years used Apple II computers to record the excavation data. Long term projects which are in the process of computerizing their data are the future A5 motorway and TGV Nord railway line, which, over the next four years, could encompass up to a hundred excavations between them. The possibility of being able to analyse together the survey and excavation data from so many sites has the potential for being one of the most interesting research projects in France today. An example of the kind of computer implementation planned for urban archaeology is to be seen in the Carrousel phase of the Grand Louvre Project which will be the first to implement a large scale integrated system. The installation will consist of six networked Macintosh's along with all the necessary peripherals such as laser printers, scanners, etc. All context excavation work should be recorded within 24 hours of being completed and the data used to complement the excavation strategy.

Even though the Sous-Direction de l'Archéologie of the Ministry of Culture, which administrates archaeological excavations in France, has a computerized national survey program, it has been slow to implement computers on a daily level. It has only been this year that direct computerization of all the excavation permits has been achieved with the help of the Association pour les Fouilles Archéologiques Nationales, which is in charge of the financial and employment aspects of rescue operations. Apart from the national survey which is being done on the ministry's mainframe, practically all the machines being used are Apple Macintosh.

Several administrative regions, Rhône-Alpes, Aquitaine, Lorraine and Ile-de-France, have gained independent experience in computer applications and are carrying out training seminars to develop its use not only for administrative purposes, but also for its use in the field and for post-excavation work. Many regional administrations now seem to be receptive to financing the introduction of computers into their region's archaeological units.

### 29.3 Spain

One of the first changes due to the creation of autonomous regions in Spain in the early 1980's, was the transfer by the central government of the responsibilities for culture, i.e. archaeology, to them. This had the effect to greatly reduce the possibilities of the state to launch initiatives. Each of the seventeen autonomies voted into law its own legislation concerning its cultural heritage and has guarded itself from the others. As such, development of several national databank projects

faded and it has been up to each region to apply to itself the perceived interests of the moment.

As is the case elsewhere, the archaeology departments in the principal universities have experimented with data processing using their central computer installations, but there have been practically no funds to equip the departments with their own micro-computers and in many cases the little equipment being used belongs to the staff. Statistical and analytical studies have emanated principally from the faculties of the Automoma and Complutense in Madrid and the Autonoma in Barcelona, although interesting work is also being done in other parts, Jaen, Zaragoza, Valladolid, Valencia, etc.

Pioneering institutions in the use of micro-computers in Spain are the Departamento de Arqueología of the Colegio Universitario de Teruel which started working with HP-150's and is now using Macintoshes for research work. Special attention is being given to surveys and spatial studies as well as to on site work. The Centre d'Investigacions Arqueològiques de Girona, in the Catalan region, started out with a PC/dBase III underwater archaeology database and has since moved to a Macintosh II based system which now encompasses all phases of research. This centre has periodically organized seminars in statistics and computer applications and must be considered amongst the most innovative in Spain. To these we must add individual excavations and experiences, because it has been in many circumstances up to individuals to carry them out due to the infrastructure of research in Spain. Examples are the excavation of Calatrava la Vieja in Ciudad Real, which has been using computers for the last three years, and Arbeca in Lerida, which begins this year. The first on site use of micro-computers was in 1984 at the Roman-Medieval site of Villoldo in the province of Palencia. It was also in the same province that for the first time detailed archaeological computer techniques were taught in Spain. The 'Curso Internacional de Metodología Arqueológica' was held in the summer of 1985 and one week, of this one month intensive course, was dedicated, with the help of the CRA/CNRS, to computer theory and practice using Apple II and Macintosh computers.

Of the seventeen autonomous regions, the Catalan Generalitat has probably seen the most extensive use of computers for archaeological research. The last few years have seen the beginning of a computer bases archaeological survey and the implementation of some on site recording and about forty archaeologists regularly use computers for their daily work. Numerous seminars have been held, organised by the universities and government agencies, many in collaboration with foreign institutions (CDAR/Lattes, CRA/Valbonne, etc.).

The central governmental research organisation, Consejo Superior de Investigaciones Científicas, has helped several research groups associated with it use their central and micro computer resources, but no exclusively archaeological use has until now been implemented. The Museo Arqueológico Nacional, which is run by the central government, has been involved in the museographical use of micro-computers and has tried through collaborations to bridge the gap between itself and the field archaeologist. The Ministry of Culture is to set up a network between all the archaeological museums in the country so as to make their inventories known to scholars.

Several urban archaeological units have been using computers to record data. Most of the equipment used usually belongs to the municipality and the work is either done on PC compatibles or on a terminal to the localities mini. The cities of Zaragoza, Tarragona and Madrid work under this organization, while in others, such as Ecija in the province of Seville, it has been up to the local archaeologists to equip themselves.

## 29.4 Portugal

No single centre stands out in the use of computers in archaeology and most work is being carried out in an independent way by individuals or university departments. A notable example of this is the Alto Ribatejo spatial survey being computerized by members of the Scola Superior de Etnología at Tomar for the 'Erasmus' European research program. A wide variety of equipment is being used, including a Sperry mini, Amstrad and Macintosh, to advance the project.

Work is also being carried out at the Department of Archaeology of the Universidad Lusitana and the Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa, both of them in Lisbon.

## 29.5 Principality of Andorra

The only one of the four countries to have a development similar to that of some Northern Europe and the Anglo-Saxon countries is the Principality of Andorra. This is due to the highly centralized nature of the government and to the small Andorran population (22,000). The central computer system is based on an IBM mini and all annex departmental work is either done on terminals or IBM PC's. A certain number of programs have been chosen and are universally used by all the administration and all must conform themselves to this standard.

The Servei Arqueologic had wanted originally to use Macintoshes, not only because of the possibilities of the graphical interface, but also because they realized the importance for research of being united with their Northern and Southern colleagues in the choice they made, quite important for a country that is very much attached to its Catalan roots.

The principal work being carried out is that of cataloging the countries cultural heritage through documents and surveys as well as by undertaking, where necessary, rescue and programmed excavations. The recent growth in the Principality's tourism and the huge amount of construction work going on in the narrow valleys has decimated many archaeological sites before the present action stemmed the destruction. The computer's initial task has thus been to coordinate the cultural and economic imperatives.

## 29.6 Addresses

### 29.6.1 France

B.E.M.A.  
54, boulevard Raspail  
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Centre d'Archéologie Urbaine  
Chateau de Tours  
25, Quai d'Orleans  
37000 Tours

Centre de Documentation Archéologique Régional  
Route de Pérols  
34970 Lattes

CNRS—Centre de Recherches Archéologiques  
Centre Informatique  
Sophia Antipolis  
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Institut d'Art et Archéologie  
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LISH  
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### 29.6.2 Spain

Centre d'Investigacions Arqueològiques  
Carrer Gaspar Casal s/n  
Casa de Cultura  
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Departamento de Prehistoria  
Facultad de Geografía e Historia  
Universidad Complutense  
Ciudad Universitaria  
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Departamento de Prehistoria y Historia Antigua  
Facultad de Letras  
Estudi General de Lleida  
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25080 Llerida

Departamento de Prehistoria y Historia Antigua  
Facultad de Letras  
Estudi General de Lleida  
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Museo Arqueológico Nacional  
Calle Serrano  
28001 Madrid

Seminario de Arqueología y Etnología Turolense  
Colegio Universitario de Teruel  
C/ Miguel Servet, 2  
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### 29.6.3 Portugal

Universidade Lusitana  
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Escola Superior de Tecnologia de Tomar  
Centro de Estudos de Arte e Arqueologia  
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29.6.4 Andorra

Servei Arqueologic  
Patrimoni Artistic  
Andorra la Veilla

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HyperCard as a teaching tool

Clive Taylor  
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30.1 Introduction - what is HyperCard?

HyperCard is an kind of software that comes first with an introduction of a Macintosh Plus or SE personal computer. Superficially it resembles simple data management programs such as Cardfile. In fact it is more powerful, which each file a 2 inch screen, and a sequence of which forms a stack. A reader may browse through a stack. In effect, he jumps from one card in a similar way will. This card may be divided into fields which can contain textual, numerical or graphic information. The information may be updated or created through the 'draw' and 'paint' parts of the attached program. It is possible to have a word processing program or a drawing facility may be added to the stack. A drawing program to be added, and also in a field may be selected to that will draw the field of a time.

One of the main reasons to make it more than just another data management program. The first is the human: a simple mouse will be pointed to, launch the program in place in a window card in the stack, or return to another stack. Without can be made possible, so that the program be pointing to the card on which the card jump to a card giving information about that card - a sort of automatic GIS, or a simple front-end to a program like.

A second aspect is the existence of a programming language HyperTalk, which enables users of software to create also be followed when a button is activated. We have yet to explore the full potential of this language, but have found the use of simple object-oriented variables, objects and a simple form from one card to the next, and how this be simulated, e.g. by a form, window or a series of effects.

30.2 Uses in the Institute of Archaeology

HyperCard is currently used in the Institute of Archaeology, University College London Institute of Archaeology, University College London in Archaeology (CHA) and in the Department of Archaeology (DA). While one or more of these purposes it is used at four levels:

1. An interactive program to accompany a lecture
2. A self-paced learning program for individual students
3. A self-paced learning program that require students to complete their own pace
4. A self-paced learning program that require students to complete their own pace

The first two purposes in the Institute of Archaeology are used at four levels:

1. The Institute of Archaeology
2. Department of Archaeology
3. Field Archaeology
4. London Institute of Archaeology
5. Institute of Archaeology
6. Department of Archaeology
7. Field Archaeology
8. London Institute of Archaeology