CHAPTER 4

ARM AND GIS IN FRANCE. FROM *DRACAR* TO *PATRIARCHE*

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1. INTRODUCTION

In the early twentieth century, French archaeologists began to realize the need for a national archaeological inventory and from 1945 onwards, legal instructions were issued to draw up a geographical inventory of archaeology. Several texts and reports, particularly those by two famous French archaeologists, J. Soustelle or C. Goudineau (Schnapp, 1984), discussed how to create an archaeological map for the whole country, intended to report on archaeological sites and monuments whether or not they had been studied. Following a number of local experiences the French SMR became a reality in several regions during the 1970s and 1980s.

One early example is the *"Carte Archéologique de la Gaule" (CAG)*. This was first created in 1930, then subsequently stopped and restarted at the end of the 1970s. It deals with the protohistoric, pre-roman and roman periods (that is to say 800 BC to 800 AD). Today nearly all the 95 French "départements" are published.

Rescue archaeology during the 1980s grew rapidly, so that it became increasingly necessary to establish documentary resources to provide archaeological background before any intervention event. In 1992 the ministry of culture, in association with *Association pour les Fouilles Archéologiques Nationales* (AFAN), allocated 17 millions francs a year to establish permanent staff for the *Carte archéologique*, that is to say about 2 or 3 people by region. From 2001/2002, these have been, or will be, recruited as civil servants for the French ministry of culture. 1992 therefore effectively constitutes the 'birth certificate' of the present system. Since that date, the number of recorded sites has, of course, significantly increased.

2. INITIAL ATTEMPTS AT COMPUTERIZATION

Early in this process, archaeologists identified the need to record sites in other ways than paper files, and began to study how to use computerization and to create databases. SMR development history can be divided in 3 main phases (see Guillot, 1992; Guillot & Leroy, 1995 and Arroyo-Bishop, 1998 for further discussion):

1979-1991: SIGAL 1 and 2.–the beginning of computerization.

1991-2001: DRACAR.–From a database to a GIS.

1994-2001: PATRIARCHE.–Reflection on a new GIS integrated solution.

2.a. SIGAL (Système informatique de gestion de l'archéologie localisée)

In 1975, the Jacques Soustelle report (Soustelle, 1975) outlined the need to establish a draft inventory for the archaeological resources of the whole French territory. This was in order to protect them from the risk of destruction resulting from the planning process, and to offer possibilities and tools to the *Comité Scientifique de la Recherche Archéologique* (CSRA) for managing and guiding archaeological research. This inventory put the archaeology on the same level as the *Service de l'Inventaire général* (created in 1964 by André Malraux, French minister of culture) and which had already started a complete inventory of the French architectural resources. In both cases the need to have a better knowledge of the real and potential archaeological resource is considered as the first phase of protection and of the first means of making choices.

SIGAL 1, the first computer application, was available in 1979, following two pilot projects in 1975 and 1977 (in Val de Loire). This encountered many difficulties: data were collected in the region on paper forms, which were then sent to the ministry of culture who undertook the task of computerizing it. When the regions had requests about sites, they were compelled to ask the ministry in Paris. At this time it was not possible within any region to have a direct access to the data, a situation that was very slow and inconvenient.

Soon after this, in 1987, SIGAL 2 replaced SIGAL 1. This new application offered the possibility of entering data using a slave computer based in each region. This system was prone to computer problems: there were difficulties in obtaining information from the server at a local level, and in the management of the overall computer system at a national level. One of the greatest problems during this period was that the *Carte Archéologique* had been defined as a national need, but the Ministry of Culture did not allocate any permanent staff for updating the data. Instead, the database was updated by temporary staff on short contract who were generally working on a thematic or specific basis. These constant changes of staff did not provide an homogeneous picture of the archaeological resource. Furthermore this database was not associated with a GIS and so it did not yet offer any means of mapping archaeological data.

Regardless of these issues, the number of sites has known at a national level increased during this period from 13,561 sites records in 1979, to 95,583 in 1991 (see Figure 4.1).

2.b. DRACAR: First Steps Towards GIS

In 1989, the computerization and networking group of the *Direction Régionale des Affaires Culturelles* (DRAC –see *Annexe 1*), led the ministry of Culture to reconsider the SMR and to create a new system called DRACAR. This kept the same protection and orientation aims as SIGAL, but was intended to be more than a single draft inventory of sites. DRACAR was designed to be an administrative tool for the *Services Régionaux de l'Archéologie* (SRA), within each DRAC and the system is organized into five items (Figure 4.2), providing the ability to:

- record and manage archaeological resources;
- record and manage archaeological events;
- manage planning requests;
- establish a file of partners and,
- establish a file of archaeological deposits.

At that time, the attempts to decentralise DRACAR by making regional independent databases and to manage documentary sources were completely abandoned. Data coming from SIGAL had been integrated into DRACAR with the exception of the bibliography and the remains description. DRACAR is thus a centralized database, available on ORACLE and each of the 25 regions requests and updates DRACAR on-line across the Transpac network. The 26th "region" is the "*sous direction de l'archéologie*" which has access to the national database in addition to the 25 geographic regions. All the data are stored physically in Fort de Saint-Cyr (a small town close to Paris) by the computing department of the Ministry of Culture. Three versions of DRACAR have now been made available.

In 1990, a new report on archaeology by Christian Goudineau expressed the need to appoint permanent staff for maintaining the *Carte Archéologique*. As discussed above, the ministry of culture allocated 17 million francs, and established permanent staff for the *Carte Archéologique* two years later, in 1992. The number of sites has multiplied by 3 in the last 7 years such that, at the time of writing, more than 310,000 sites are recorded in the database (Figure 4.1).

The 1993 version of DRACAR was provided with an extension called SCALA, which transformed the database of site locations into a GIS (or perhaps a 'pre-' or 'proto-' GIS). Finally DRACAR, which has been linked with Arcview since 1997, has become, step by step, a GIS. Maps can be generated from data downloaded from the national database and visualized over the administrative boundaries (*BD Carto*), which the Ministry of Culture bought the *Institut Géographique National* (IGN), the National Geographical Institute. For specific maps, raster ground layers can be integrated with *Georefimage*, an extension of Arcview. Site location maps are mainly made to a scale of 1:25,000.

DRACAR is now a geo-referenced database that can integrate site locations according to the French Lambert grid. A query can be made by XYZ coordinates, defined by a radius and sites can also be located by a polygon. DRACAR can also integrate linear sites but, because there were no integrated map/database solutions, most of site locations have been made by a pair of coordinates. Furthermore, stabilization of the regional staff has now transformed the routine daily job of the *Carte archéologique*. Increasingly it has been becoming a documentary resources department, built around the archaeological sites. Nonetheless, DRACAR was not perfectly adapted to foresee the evolution of similar systems (see Figure 4.2) and some characteristics are far from ideal, notably:

- the outdated interface;
- centralization of data;
- occasional general failures of the whole system;
- problems obtaining answers across the network;
- limited research possibilities (resulting, for example, from a bad thesaurus);
- essential data missing from the database (particularly documentary sources *etc.*).

As it is a national database, the ministry was very conscious that underwater archaeology, especially the submarine archaeological record, was not integrated within the SMR.

3. PATRIACHE. THE CUTTING EDGE SMR IN FRANCE

Under pressure from users, and influenced by the development of parallel local databases, the Ministry of Culture decided to review the SMR database and create a new, interactive application. In 1994, an assessment was done and a steering committee was created to design PATRIARCHE: "*PATRImoine ARCHEologique*". The main requirements for PATRIARCHE have been that:

- local and national databases have to be separated;
- underwater archaeology should have a local database;
- it should be possible to integrate documentary sources;
- it should be possible to link PATRIARCHE with local external databases;
- the application should be interactive (data/maps and in network for all the curators);
- the application should be open to other heritage national databases.

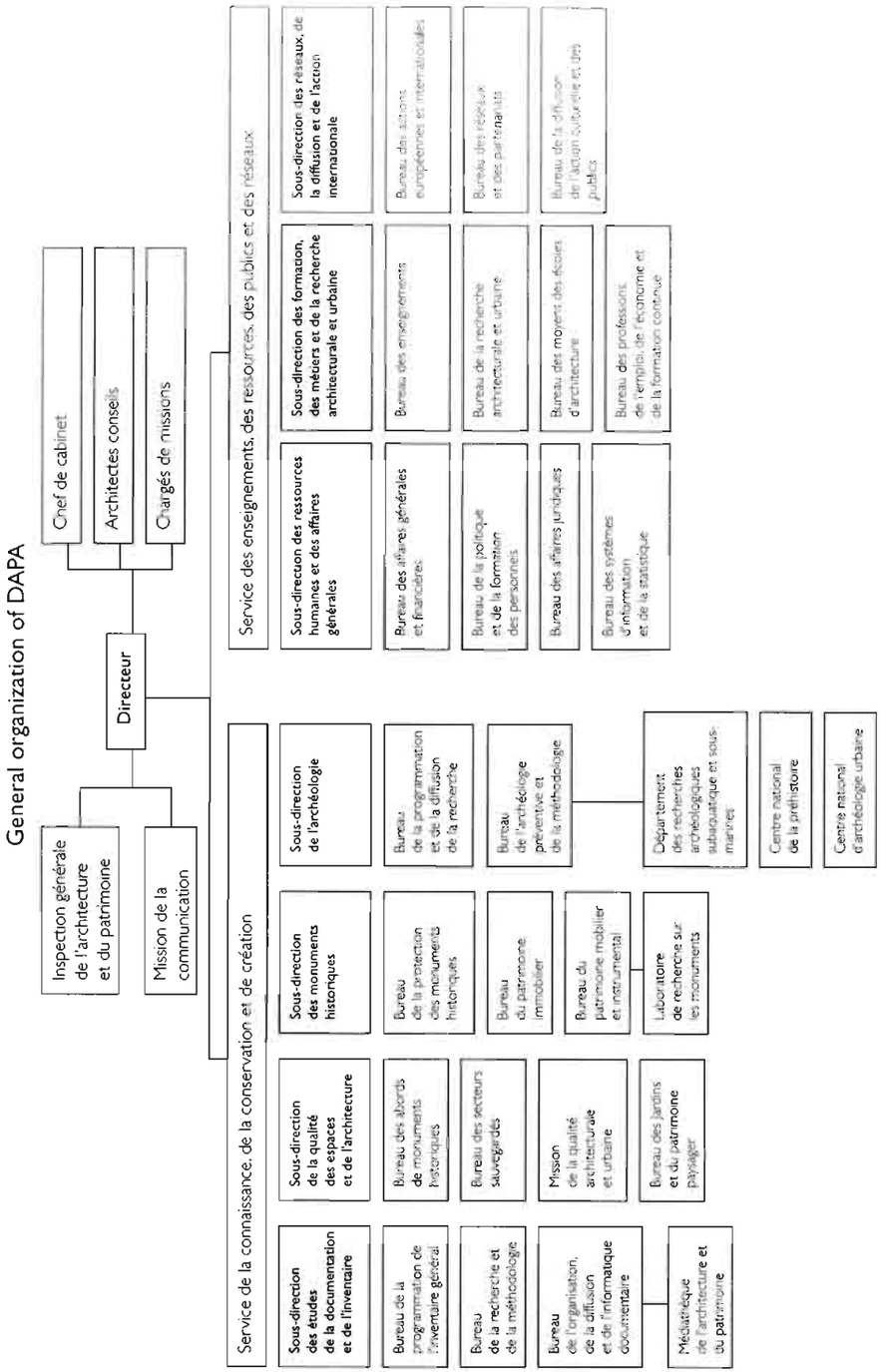
By 1999, PATRIARCHE had been developing by ESRI and by the computing department of the Ministry of Culture. It was created using ORACLE (SGDB) linked to the ESRIdata GIS, Arcview 3.2 and Business Object (for requests). PATRIARCHE is organized around five different items linked each other.

1. Archaeological entities (georeferenced data see Appendix 2).
2. Archaeological events (georeferenced data).
3. Protections (georeferenced data).
4. Documentary sources.
5. Addresses book.

The structures of the database show how PATRIARCHE is a scientific, documentary and administrative tool used for managing archaeology and for research purposes. PATRIARCHE is really a documentary and GIS application, and great care has been taken to qualify and describe the archaeological resource with a new thesaurus and to resolve issues of site location.

Thesaurus.–A steering committee worked for two years to create a new thesaurus, which is composed of three parts: *a hierarchic component* that permits interpretation of the different structures, a *list of words* that describe structures and a list of nouns that help with interpretation and description (notions of quantity, doubt, matter and morphology).

Chronology.–The chronology used in PATRIARCHE has two levels. For example '*medieval*' is part of the first level, while '*early medieval*', '*classical medieval*' and '*late medieval*' are part of the second level. It is also possible to give a cultural attribution such as '*Hallstatt*' or '*La Tène*' for the second Iron Age. There are also two other chronologies,



one for the underwater archaeology and one for overseas archaeology, especially the Caribbean islands and the French Guyana.

Sites Location.–PATRIARCHE permits us to integrate:

- Archaeological entities (defined in terms of chronology or functional coherence).
- Blank sites or negative events.
- Poorly or defined or undefined remains.
- Areas that may contain remains (e.g. crop marks).
- Possibilities of remains attested in one area by extra archaeological sources.
- Spot finds, artefacts not *in situ* or scattered finds on the surface that have been discovered by field walking.

GIS.–Since 1997, the ministry of culture has been using Arc view software (Figures 4.3, 4.4 and 4.5). Map layers for the whole territory were bought in 2000, the first part of a three year schedule. Each region now has *IGN raster, Scan 25* and *IGN vector, BDCarto* (presently administrative boundaries, and soon also a hydrographic layer) and *BDAlti* (contour lines). These layers have been bought also for the other heritage national departments.

4. CONCLUSION

PATRIARCHE is a national application, so it is a very large system and it has taken a long time to develop this tool. After some months of testing, five regions are now beginning to work with the application. In the first six months of 2002, PATRIARCHE will be installed in the other regions, including those overseas. New laws for rescue archaeology and planning have been passed and must be applied in 2002 and so the archaeological departments and the *Carte Archéologique* will have a big part to play in this.

Furthermore, one of the most important aims of the ministry is that exchanges increase inside the ministry itself, between other administrations involved in planning (such as environment, industry and agriculture) and also between research departments, such as universities, *Centre National de la Recherche Scientifique* (CNRS) or AFAN in France. Today, with the increasing use of the Internet, the Ministry considers that everyone might have access to information about the French national heritage. Patriarche could, in few years, be consulted on the net. As a result, a first steering committee is now considering which data (all of them or not?) should be communicated and how. Currently there are a great many questions, but as yet there is no definitive answer.

5. REFERENCES

Arroyo-Bishop, D. (1998): "GIS and archaeology in France". In Moscati, P. & Tagliamonte, G. (Eds.): *Methodological Trends and Future Perspectives in the Application of GIS to Archaeology. Archeologia e Calcolatori* 9, 31-45. Firenze.

Guillot, D. (1992): "The National Archaeological Record of France: advances in computerisation". In Larsen, C.V. (Ed.): *Sites and Monument. National Archaeological Records*, 125-132. Copenhaguen. National Museum of Denmark.

Guillot, D. & Leroy, G. (1995): "The use of GIS for Archaeological Resource Management in France. The SCALA Project, with a case study in Picardy". In Lock, G. & Stancic, Z. (Eds.): *Archaeology and Geographical Information Systems. A European Perspective*. London. Taylor and Francis.

Schnapp, A. (1984): "France". In Cleere, H. (Ed.): *Approaches to Archaeological Heritage*, 48-53. Cambridge. Cambridge University Press.

Soustelle, J. (1975): *La Recherche Française en Archéologie et Anthropologie*. Paris. La Documentation Française.

APPENDIX 1

The organization of the French *Ministry of Culture and Communication* and the administration of the archeological Heritage in Paris and the regions

1. *Ministry of Culture and Communication*

The Ministry in Paris:

1. The Minister and the Head Office: responsible for heritage management and in charge of the regulations and their implementation in all heritage matters.
2. Several Directorates including the *Direction de l'architecture et du patrimonie* (DAPA): responsible for compiling inventories, protecting, safeguarding and enhancing the archaeological, architectural, historic, ethnological and artistic resources in France.
3. Several Departments with responsibility for national Heritage including the *Sous-direction de l'archéologie* (archaeological department) and three national cross-departmental centres: *Centre national d'archéologie urbaine* (CNAU) is the National Center for Urban Archaeology; *Centre national de la préhistoire* (CNP) is the National Center for Prehistory and *Département de la recherche subaquatique et sous-marine* (DRASSM) is the Underwater Archaeological Research Department.

Scientific committee: *Conseil National de la Recherche Archéologique* (CNRA) is the National Committee for Archaeological Research (previously the *Conseil Supérieur de la Recherche Archéologique*, or CSRA). Created in 1994, it provides advice to the minister on archaeological excavations and large infrastructure works and presents proposals on national research programmes.

2. *Regional Bodies in French Regions*

Since 1977, the ministry has been represented in 26 regions (including 4 overseas regions).

The prefecture:

1. The Prefect and the general secretary office
2. Several regional departments including *Direction Régionale des Affaires Culturelles* (DRAC) which is the regional department for culture. DRAC is responsible at this level for pursuing the priorities set by the Ministry of Culture for the protection and conservation of the Heritage.
3. Several departments for the national Heritage including the *Service Régional de l'Archéologie* (the regional archaeological office). Together with the "Archaeological card" department, these are responsible for studying, protecting, conserving and promoting the archaeological heritage.

Scientific committee: *Commission interrégionale de la recherche archéologique* (CIRA) is the Interregional Committee for Archaeological Research. Created in 1994, there are 6 committees which provide advice at the regional level on rescue excavations and research regional programmes.

APPENDIX 2

In Patriarche the concept of archaeological site has been completely abandoned to the benefit of the archaeological entity. One archaeological entity is an archaeological item different from the other by its nature or its function, its chronology. The location of each of these entities is provided by Arcview GIS.

For example:

- church of the XIth century
- cemetery beginning in the XIth and ending in the XVIth century
- church and his cemetery XI-XIIth.

In this last case we can be able to create 1 or 2 entities.