

## “Space in archaeology” beginning of spatial studies in archaeology

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### **Introduction**

From the beginning of the human past man knowingly or unknowingly adapted to space. It is possible to say that space had been used to improve life and to create environmental landscapes in a structured way. In this sense it is important to study space when past societies are examined. Since the introduction of this new approach to the subject of archaeology in the 1960s an important new discipline was introduced to understand the past society (Fagan 1991).

To understand the space of past societies archaeologists usually used various methodological and theoretical techniques. Spatial analysis is the most widespread method. Archaeologists have long been aware of the importance of the spatial component of archaeological records. For instance, by using Maps, ground plans etc. Archaeologists usually deals with spatial data.

*“ as a discipline, archaeology routinely deals with enormous amounts of spatial data, varying in scale from the relative locations of archaeological sites upon a continental landmass, down to the positions of individual artefacts within an excavated context. Artefacts, features, structures, and sites, whether monument complexes, chance find of an individual object, scatters of plough soil materials or rigorously excavated structural and artefactual remains, are all found somewhere”* (Wheatly & Gillings 2002).

Over the past thirty years, the quality and volume of the spatial data we collect have increased spectacularly as new surveying techniques and equipment have become regularly available to archaeologist. Diachronic and visual analysis for the classification of the archaeological landscape is a key concept in understanding the complex evolution of the anthropocentric factors for settlement

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*Key Words: Cultural environmental, GIS, Spatial analysis*

patterns, use of resources, social, political, and economic relationships, which connect the study of the past with the present. Throughout time, people have been closely tied to their natural and cultural environments; these environments were a significant determinant in their choice of settlement. An understanding of the natural and cultural environment related to past peoples and their settlements is important. The study of changing human settlement patterns is part of the analysis of adaptive interaction between people and their external environment, both natural and cultural (Chang 1968). Natural and cultural environment are the most fundamental issues in settlement studies. We can call this cultural ecology. It is the study of the inter-relationship between people and their environment.

Emphasising the role of landscape and geography as conditioning factors for the form of historic settlement patterns, lead to the work in the 1910s and 1920s of researchers such as Crawford and later Fox. They used a series of archaeological and environmental distribution maps to communicate and explore change in a region through time (Trigger 1989 ). Both recognized that the past could not be fully understood simply from the examination and characterisation of de-conceptualised artefacts, or from the study of the sequence derived from individual sites in isolation. They were explicitly concerned with recording and analysing the spatial dimension of archaeological material (Wheatly & Gillings 2002).

### **Brief history of Archaeological Computing**

The decades since the 1960s have seen extensive and varied change within archaeology and its relationships with other disciplines. First through the development of new dating techniques, for example radiocarbon dating and more recently through the borrowing and adaptation of a whole series of new techniques from the fields of Anthropology, biology, botany, chemistry, computer sciences, economics, geography, geology, mathematics, pathology, statistics etc. After the arrival of computer-based applications for archaeological studies it rapidly changed approaches to discipline. Especially field archaeological approaches. Archaeological computing can now be seen as an integral part of the archaeological process, being used routinely on a variety of archaeological projects. We were use the term 'spatial technologies' to mean any technology concerned with the acquisition, storage or manipulation of spatial information.

With three different corresponding groups of works involved in computing archaeology from the beginning. The first group were mathematicians and statisticians. In the

late 1950s and early 1960s the first and second-generation computers were regarded primarily as calculating engines. Much of the work concerned mathematical and statistical techniques applied to archaeological data. For an instance, Sokal and Sneath (1963), Doran and Hodson (1966), Binford and Binford (1966), Graham (1970), Azoury and Hodson (1973). The second group of the people consisted of scientists and engineers concerned with scientific data from prospection methods (resistivity meter, proton gradiometer) for an instance, Linington (1972), Clark and Haddon Reece (1972), Atkinson (1963). The third group of people those involved in museum work. According to Cowgill (1967a, 1967b, 1968) site data was the first input of in to a computer in about 1959, on the Euratom IBM 650 at Ispra, Italy, on a collection of Eurasian Bronze age axes, was the first use of statistical techniques in archaeology using a computer (Wilcock 1999).

### **Spatial analysis and GIS**

After the late 1970s and early 1980s we can see rapid changes in computer applications in Archaeology. Spatial analysis and Geographical Information Systems (GIS) became very popular in archaeological studies. Since early this century archaeologists have used a variety of techniques to analyse and interpret spatial patterning in the archaeological records. In essence these techniques can be generalized as being map-based or statistically oriented approaches many years ago one of the pioneer researchers, Clarke's, model of the Iron Age Settlement at Glastonbury (Clarke, 1972) remains a landmark in spatial analysis in archaeology. In that research he has permitted the combination of a variety of data types such as artefacts, structures, features, and environmental variables, so as to build up as complete an archaeological picture as possible (Harris and Lock, 1990). Clarke states,

*" the spatial relationships between the artefacts ,other artefacts, site features, other sites, landscape elements and environmental aspects present a formidable matrix of alternative individual categorisations and cross-combinations to be searched for information "* (Clarke, 1972).

GIS provides a another phase in the evolution of archaeological spatial analysis by authorizing much better suppleness to be applied in structuring the raw data and facilitating both map-based and statistical approaches more closely to complement each other. The development of Geographic Information Systems (GIS) has been a recent phenomenon, and its use in archaeological research is more recent still limited,

in fact, to the last five or six years. Even among geographers the definition of a true GIS is still a matter of debate (Berry, 1987; Clarke, 1986; Cowen, 1988) So it not surprising that some confusion should exist among archaeologists as to exactly what a GIS is, and its uses in archaeology. Several researchers have addressed the definition and distinguishing characteristics of GIS.

*".....a powerful set of tools for collecting, storing, retrieving at will, transforming, and displaying spatial data from the real world for a particular set of purposes "* (Burrough 1986).

*"An information system that is designed to work with data referenced by spatial or geographic co-ordinates. In other words a GIS is both a database system with specific capabilities for spatially-referenced data as well as a set of operations for working (analysis) with the data" (Star and Estes 1990).*

*"the basic premise is that a true GIS can be distinguished from other systems through its capacity to conduct spatial searches and overlays that actually generate new information" (Cowen 1988).*

*"While linking a database to the pictorial representation of geographical entities enable the researcher to address an extensive array o geographical questions, a computer mapping system is still not a GIS" (Cowen 1988).*

*"GIS are not simple graphic/mapping systems, but are systems that interrelate, manipulate, and analyse a variety of geographically distributed data in addition to mapping" (Kvamme,1987).*

GIS, is computer system its main purpose is to store, manipulate, analyse and present information about geographic space. The history of GIS applications in archaeology goes back to the 1970s. Cartographic and spatial analysis software was first used for archaeological analysis during the 1970s (Wheatly & Gillings 2002). At that time computer graphics and statistic programmes were mostly used to calculate and display trend surface from known locations. Within that time they were generally consisted of the density of some materials such as pottery or bone at series of locations or measurement such as settlement size or date. Some times digital elevation models (DEM) were used to display the result of analysis (Arnold III, 1979, Kvamme 1983a, Harris 1986) the use of GIS in archaeology began in the early 1980s, and

was first in the United States (Kvamme 1983a) followed by the United Kingdom (Harris 1985, Harris 1986) Netherlands (Wansleeben 1988) and other part of Europe. In the history we can see one of the bests example for archaeological application in GIS, was the work on early-mid Helladic settlement in the Messenian region of southern Greece (Chadwick 1978). Within that research he generated, combined and explored thematic layers containing archaeological data yielded by field survey and environmental variables such as geomorphology and water supply (Wheatly & Gillings 2002).

### **Conclusion**

In conclusion the performance of spatial studies, computer science has a major role, especially in GIS. In the modern field of archaeological research, spatial studies is a fundamental issue. Understanding the use of space is a vital part in studying past societies. For this several technological methods are used in modern times. We can get a clear idea about this usage from modern history of archaeology.

At present it can be seen that spatial studies are used for archaeological research. This paper endeavoring to investigate its historical background and how it is associated with archaeological research.

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