

## GIS APPLICATION IN ARCHAEOLOGICAL SITE OF SOLUNTO

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### ABSTRACT:

GIS (Geographical Information System) are useful tools for cultural heritage management; two fields of archaeological heritage involve GIS application: documentation and monitoring of archaeological finds. Documentation is really important in archaeological studies to produce knowledge. It is composed of Archaeological, Technological and Geographical component. GIS are useful also for preservation of cultural heritage. A way to protect archaeological heritage is the maintenance. GIS became tools to check the level of preservation of the monuments. Many disciplines are involved in conservative process and they need to be coordinated by unique system. The author made a GIS application in the archaeological site of Solunto, a Sicilian town founded in IV century BC. Its ruins were rediscovered in the XVI century and diggings go on since then. The model is a GIS application useful in archaeological research and in restoration management.

### 1.1. Introduction

The research made by the author during the course of Ph doctor in *Recovery and use of Ancient contest* in the Department of Project and Building Construction of Palermo University, was aimed to find the advantages of Information System applied to Archaeological sites. It dealt with the use of Geographical Information System in management of cultural heritage.

I studied different experiences in application of GIS for archaeological sites, in Italy but also outside, and then I made a model of GIS for the Sicilian archaeological site of Solunto.

### 1.2. European Union and cultural heritage

Cultural Heritage is an important resource of European Union that is aimed to develop public awareness of the value of the cultural heritage - architectural, archaeological, historical, artistic- in European people, with different proposal.

The first proposal is to discover the past. The second proposal is to protect the cultural heritage. It represents an important source of European collective memory and also an instrument for historical and scientific studying. The third proposal is to identify the threats to cultural heritage.

European Union wants to support the improvement of the knowledge and the dissemination of the culture and history of the European peoples, the conservation and safeguarding of cultural heritage of European significance trough cooperation between Member States

In 1985 European Union stipulated the *Convention for the Protection of the Architectural Heritage of Europe*, in Granada. Members states of the European Union recognize in the architectonic heritage the expression of the diversity of cultural heritage as the most important evidence of our past and common good of Europeans. So they are engaged to institute a legal system of protection of the heritage and to avoid that the cultural goods could be destroyed. The Convention of Granada is only one of the stages to institutionalize the protection principle in the management of the European cultural heritage.



Figure 1. Archaeological site of Baia (Naples)

### 1.3. Archaeology

Archaeology is an important area of cultural heritage; it covers a long span of time and a great variety of subjects. The earliest subjects of archaeological studying date from the origins of humanity. Archaeological Heritage is the materialisation of oldest part of the historical memory: it is comprised of all of the material products created by human activity throughout history. All remains, objects and any other traces of history from past, are considered elements of the archaeological heritage. The notion of archaeological heritage includes structures, constructions, buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water. Archaeology constitutes an outstanding instrument for a better knowledge of the past and for emphasising the cultural diversity discovered in the past.



Figure 2. Tiberio's Cave in Sperlonga (Rome)

#### 1.4. European Union and Information technologies

European Union has started a strategy to implement, through some program like *E-Europe* (European Council, Feira, June 19th-20th), the use of Information Technologies in cultural heritage. Information Technologies are instruments of research on the field; are recording instruments for lab files; are used to query and investigate the data to produce knowledge.

In April 2001 all the nations of European Union met in Swedish town of Lund to deepen the principal points of view about digitisation estimated in E-Europe program. The paper is known as Lund Principles.

#### 1.5. GIS and Archaeology

A common application of information technologies to Cultural heritage is GIS-*Geographical Information System*. GIS are computer systems, invented in urban planning for creating and managing spatial data and associated attributes. It is able of capturing, integrating, storing, editing, analyzing, and displaying geographically-referenced information. This is done by using a location reference system, such as longitude and latitude. The power of a GIS comes from the ability to relate different information in a spatial context and to reach a conclusion about this relationship.

Nowadays many archaeologists have begun to use Geographic Information Systems (GIS) to aid in mapping sites. These computer-based systems allow the collection, storage and manipulation of environmental, geographic, and geologic data, together with archaeological information, in a single database. Using this technology, archaeologists are able to create maps that simulate different environments and ways in which people might have used land, living space, and material goods.

Archaeological data are inherently spatial, and archaeologists are naturally concerned with the distribution of archaeological sites across the landscape. From these distributions, described as settlement patterns, we can infer a great deal about the social and political complexity of the ancient people's we study, the size of their domains, aspects of resource procurement.

GIS can be used as a database management instruments of great flexibility, they have been applied with greatest success to regional-scale archaeological survey, which is the systematic search for archaeological sites on the landscape.

#### 1.6. Experiences of GIS application in Archaeological site

In Italy an important experience is GIS application to archaeological area of Pompei. It is the biggest archaeological site of the world. In the 1999 was born the Vesuvian Archaeological Information System aimed to collect all the data about Pompei and about vesuvian archaeological sites.

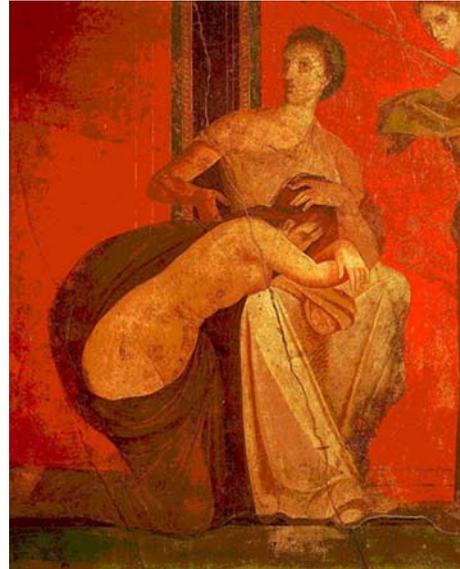


Figure 3. Painting in Villa dei Misteri in Pompei

A European nation who has invested a lot of money in the application of the GIS to the archaeological areas is Sweden. The author was in Sweden from April to July 2004 to study the use of the GIS in archaeological sites. Swedish example has been used like model for the realization of a GIS application to Sicilian archaeological site. The support of Professor Tor Broström and Gustaf Svedjemo of Gotland University was indispensable to the search. Important was also the contribution of Cristian Runeby for the information about Gotland Länsstyrelsen (County Council). The research focused on the analysis of National Heritage Board GIS programmes applied to the archaeological sites. I studied FMIS and Intrasis.



Figure 4. Viking grave in Sweden

In the 1998 the Riksantikvarieämbetet, National Heritage Board responsible of management of cultural heritage, started a programme called FMIS.

FMIS, Informations Systemet Om Fornminnen, is a programme aimed to get a digitisation system of all archaeological areas and monuments in Swedish land. The most interesting point of the programme is the database structure.

Another project made by National Heritage Board is Intrasis. It is an information system to record and to check the data about finds. It is aimed to collect, to record and to edit the data of

digging through the GIS application. The responsible was archaeologist Lars-Inge Larsson

The need to enhance the use of GIS in the public institutions, municipalities, cities and county administrations, is the reason of Strategis programme creation. Sweden is involved in improving Information Technologies also in the school. The University of Gotland started GIS course in archaeological studies.



Figure 5. Location of Solunto

### 1.7. Finality of the model

The GIS are useful not only to archaeological research but also for the preservation of cultural heritage. It could be used to protect the archaeological heritage, through the maintenance.

The GIS is useful to assure a periodical monitoring of monuments. A lot of disciplines are involved in conservative process. It is necessary to make an effective management GIS system to coordinate different disciplines (Chemistry, Physics, Biology etc), a periodical system to maintain artistic, historical and material characters of the monument; it guarantees the conservation, it is more effective and it assures the protection of cultural heritage instead of pressing actions. Knowing the historical, chemical, physical character of the monument is important to manage the preservation of it.

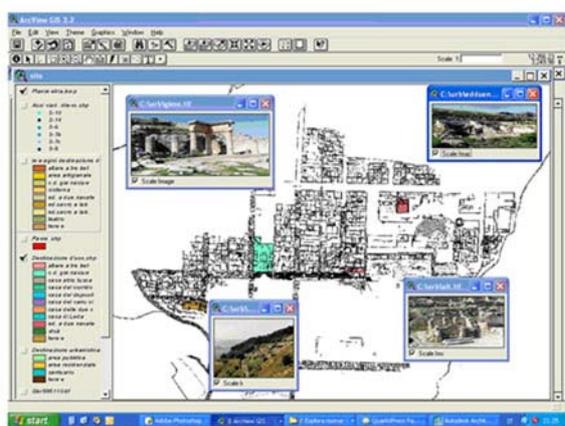


Figure 7. Plan of Solunto with most important building

The information system, in this case, is aimed to collect in a database, all the information, about materials, constructive technologies and conservation level of the monument. Alphanumeric data are supported by graphic data (pictures, drawings, maps) to describe conservation state of monument.

The end of doctoral thesis is a model of GIS application made by the author in the archaeological site of Solunto (Palermo).



Figure 6. Kind of floor in Solunto

Solunto was one of Sicily's three Punic towns, along with Motya and Palermo. It was founded by the Carthaginians in the 4th century BC, possibly beside or among the ruins of an old Phoenician town; about a century later, it became a Roman dominion. The city was built on a grid plan, the urban layout conforms with the Classical principles upheld by Hippodamus of Miletus, arranged orthogonally around a *decumanus maximus* and perpendicular side streets enclosing *insulae* (blocks). The ruins of Solunto were rediscovered in the sixteenth century and diggings continued since then.

Solunto has no complete structures; all that remains of most of the buildings here are floors, lower portions of some walls and columns. However, a few of the dwellings and public buildings are well enough preserved to provide us with a tangible idea of their construction and purpose. Portions of a few mosaics and paintings are still visible, and the *peristyle* of one of the houses suggests its big aspect. There is also a small *odeon* (theatre) and a meeting chamber.

The model made by the author is a GIS application useful in archaeological research and in restoration management. It aimed to improve a systematic maintenance to warrant the preservation of city of Solunto by human and environmental agents attacks.

The archaeological site is examined, collecting data from different sources: historical records, archaeological reports, intensive surveys, archaeological and topographical extensive researches, geographical, anthropological, ethnographical, geological, hydrological, chemical, physical sources.



Figure 8. Archaeological evidence inside the *insulae* of Solunto

All data are entered into a relational database and within the GIS alphanumeric/textual and graphical/spatial information are linked to each other, creating a system able to manage process and analyze such a complexity of archaeological record in space and time.

The GIS became instrument on the planning of punctual actions in preservation of monuments, in restoration, in use and in enhancement of them. The most important *Insulae* were studied in historical, typological, material elements. The study was supported by alphanumeric and graphic data. The main object of models was diagnostic surveying of old walls in Solunto. The wide range of information, gathered from the macro to the micro scale (that means from a regional view down to the record of a single pottery piece) is monitored by GIS, an application that allows the best kind of monitoring of the archaeological evidence.

### 1.8. Conclusions

It is important join different items like archaeological studies and Information Technologies. This joining allows a better management of cultural heritage. Not only in knowing phase. In the way to preserve the archaeological heritage GIS represent useful instrument. It allows to monitor archaeological evidences and so to define recovery and preservation action.

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