

DEVELOPPING A LAND INFORMATION SYSTEM FOR THE UNIFICATION OF THE ARCHAEOLOGICAL SITES OF ATHENS

**Efi Dimopoulou,
Vasso Nikolaidou,
Panagiotis Zendelis**

Laboratory of Photogrammetry, Faculty of Surveying Engineering, National
Technical University of Athens

ABSTRACT

This paper presents the development of a Land Information System comprising reliable and exhaustive information on all sites and monuments of the Kerameikos neighborhood, which is one of the six archaeological areas included in the Program for the Unification of Archaeological Sites in the Centre of Athens. The system is utilizing ArcInfo, ArcView and Avenue to register, manipulate and display the available historical and cultural information in an effective way, along with location and spatial interconnections with the greater archaeological area. Further documentation and auxiliary photos, as well as multimedia material are organized into the system, customized to the specific application. The application results in an efficient tool to make the information on archaeological sites and monuments easily accessible, providing additional links to each other. Therefore the system might be used by tourists or by Cultural Organizations and relevant Offices, mainly supporting query operations and exhibiting both citizen and visitor the historic and cultural value and continuity of the city.

INTRODUCTION

Athens, through its long history, has inherited important archaeological sites and monuments of all periods, lying within an area of 7 Km² (Figure 1). These sites and monuments are generally unconnected to each other, having no special interrelation with the monumental environment. In 1985, a program for the Unification of the Archaeological Sites of Athens was launched, which was put into effect in 1993 by a special Office, formed under the Greek Ministry of Culture [HMC 1998]. The aim of the program is to create a natural continuity of the various archaeological sites and monuments of Athens within an improved functional, educational, aesthetic and recreative environment, emphasizing the historical character of the city [Presidential Decree 1993]. The program applies modern ideas about the protection of cultural heritage, with the reconstruction, conservation and display of monuments, reorganization of the archaeological sites, and so forth. Within this context, our study is focussing on the development of a user friendly system, combining and displaying all available monuments' information (e.g. origin, period of construction, previous and current use, auxiliary infrastructure data and multimedia material) for the specific area of Kerameikos, by using GIS technology. All kind of query operations is supported through the use of a Touch Screen, providing easily access to the information.

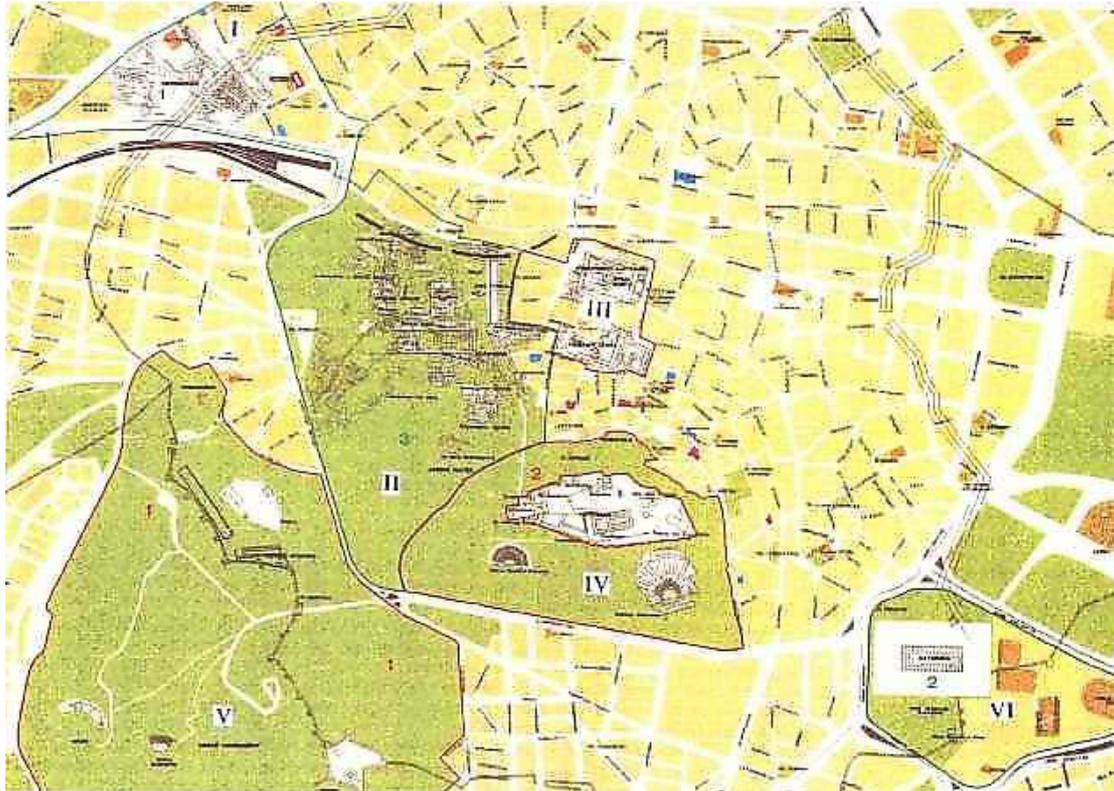


Figure 1. The 6 areas included in the “Unification Program of the Archaeological Sites of Athens”. *Source: Hellenic Ministry of Culture.*

DESIGN OF THE STUDY

Study area

The Archaeological Site of Kerameikos (marked with the Latin character I on the above figure 1) is located in the N-W side of the historical Centre of Athens, covering a total surface of 45.000 m². The area is divided into two sections, the “inner” and “outer” Kerameikos by the walls of Athens, constructed in the 5th century BC by Themistocles. Many important monuments of every period (ancient, Byzantine, post-Byzantine and later) are comprised in the area. Nowadays, Kerameikos is among the less developed sections of Western Athens, requiring a lot of work for its amelioration, such as traffic regulations, reorganization procedures, conversion of existing land uses, interconnection of different sites by paths, open areas, etc. Systematically recording information on the archaeological sites and monuments of the area and efficiently organizing them into a multimedia system is on the direction of supporting the Unification Program and improving the informative infrastructure of the area. In a later phase, the system may be expanded to the other areas of the Program as well.

Methodology

The development of the system goes through several distinct stages. The first is data collection and conversion, the second is editing and the final stage is system development as well as browse and query functions through a user interface. Emphasis is placed on the method of organization determined to maximize browse and query efficiency and friendliness, by dialogue buttons, menus and tools using Avenue scripts under ArcView.

Data Collection and Conversion

Both analogue and digital data are gathered for the study area, including:

- A digital base map for the Unification Area, provided by the relevant Office.
- Aerial photos of scale 1: 6,500 compiled in 1995 enlarged x 2 (1: 3,250) and of scale 1: 10,000 compiled in 1989, provided by the Ministry of Environment, Planning and Public Works.
- Historical data, photographs, reproductions and surveying details of the monuments.
- Bibliographical sources mainly from the German Archaeological Institute, responsible for the excavation work of the area.
- Digital images taken with the digital KodakDC50 camera of the Laboratory of Photogrammetry of the NTUA.
- A Video serving as a guide showing around the area with a video camera of the above Laboratory.
- Additional descriptive information was also provided by archaeologist involved in the Unification Program.

ArcInfo is used in converting data from .dxf format to produce a coverage of all layers of information included in the digital base map. Separating the layers of information into different line or polygon *coverages* and building topology is performed in the Arcedit subsystem environment. The coverages are then imported into ArcView environment, constituting the initial infrastructure data for developing the application. The archaeological sites and monuments of the study area are imported as line or polygon *entities* into the system, for further manipulation and analysis.

Image and Photograph editing is performed in Photoshop 5.0 along with associated texts imported from Word 7.0, providing the system with pictorial/textual information about the site.

System Structure and Analysis

The system's structure is performed into the ArcView environment, which provides easy and efficient data management and analysis. The specific application includes the integration of the above mentioned coverages into ArcView as *themes* and the implementation of the database. Archaeological sites and monuments' entities imported as themes, are linked to the spatial infrastructure data and organized according to the following thematic data types:

- Gathering Areas
- Sacred Areas
- Houses
- Tombs
- Sculptures

- Engravings
- Pots
- Gates
- Walls
- Roads and
- Natural Environment (rivers, lakes, etc)

Additional entity types, such as:

- Theaters
- Stadiums
- Scripts
- Frescoes
- Gymnasiums etc,

not found in Kerameikos, are also added to the system, predicting its extension to other areas. In case of overlapping monument types (e.g. a Theater may also be a Gathering Area), the entity is imported to both categories. The associated attribute tables are then populated with the descriptive information concerning each entity and multimedia material is also added.

For each of the above monument types, a View is created and the relevant theme is imported from the database. Using Avenue scripts under ArcView an interface is developed to support user friendliness of the system.

RESULTS

The application results in digital dynamic maps, associated to descriptive and multimedia information about the archaeological sites and monuments of Kerameikos area. Zooming in the map, a more detailed display of the area is obtained, facilitating the investigation process. Through the use of a menu, the desired entity type is displayed, further divided into sub-types, according to specific characteristics. A set of buttons and tools is used for accessing different parts of the system and obtaining the pictorial and textual information about the geographically referenced monuments and sites.

Use of the system

The system's structure conducts the user's navigation through alternative searching paths, created by the application. The start-up screen of the system displays a map of the whole area included in the Unification Program (Figure 2). Clicking on the area of interest, a second dialog window is presented to the user, containing all the entity types of the area, each represented by a characteristic picture (Figure 3). A button linked to an aerial photo of the area is also available for displaying.

Choosing for example the entity “Gathering Areas”, a map of Kerameikos with all the gathering areas is displayed. A further division of this entity, according to names or construction periods is also possible (Figure 4). After clicking on the  identity button, the descriptive information concerning this site is presented. The multimedia button  is used for getting associated multimedia material. This choice is displayed in a menu box, through which the user can obtain photographs of the monument in different time periods or of its model reproduction (Figures 5, 6, 7 & 8).

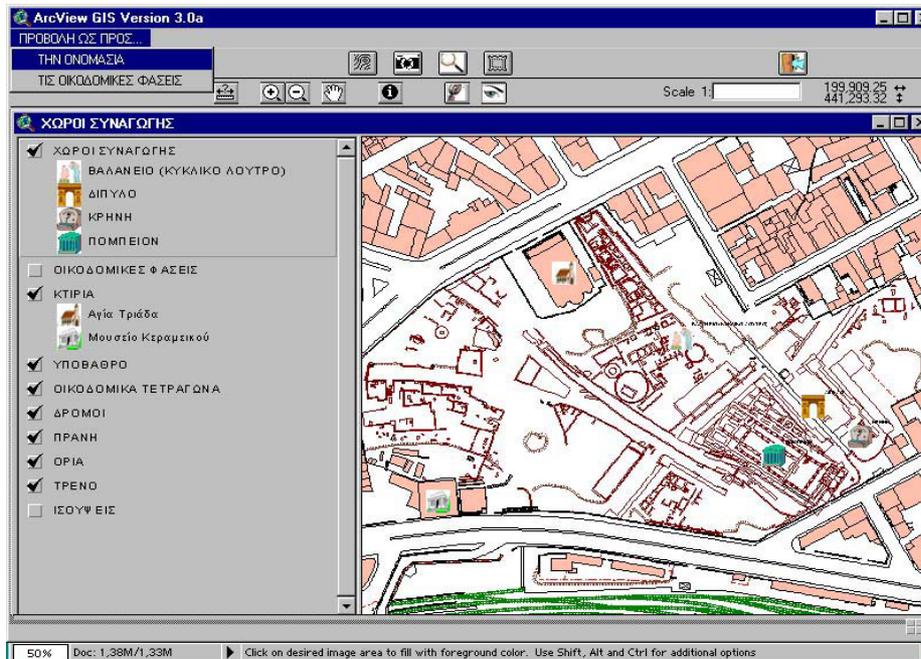


Figure 4: Zoom in the archaeological entity of “Gathering Areas”. Display the associated legend.

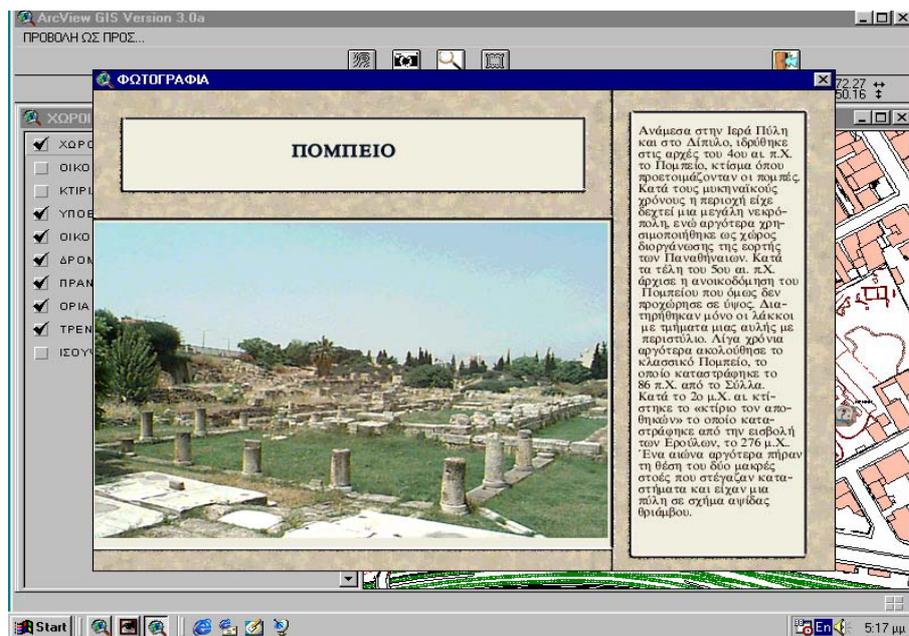


Figure 5: Photograph of Pompeion monument in its present situation, along with historical descriptive data.

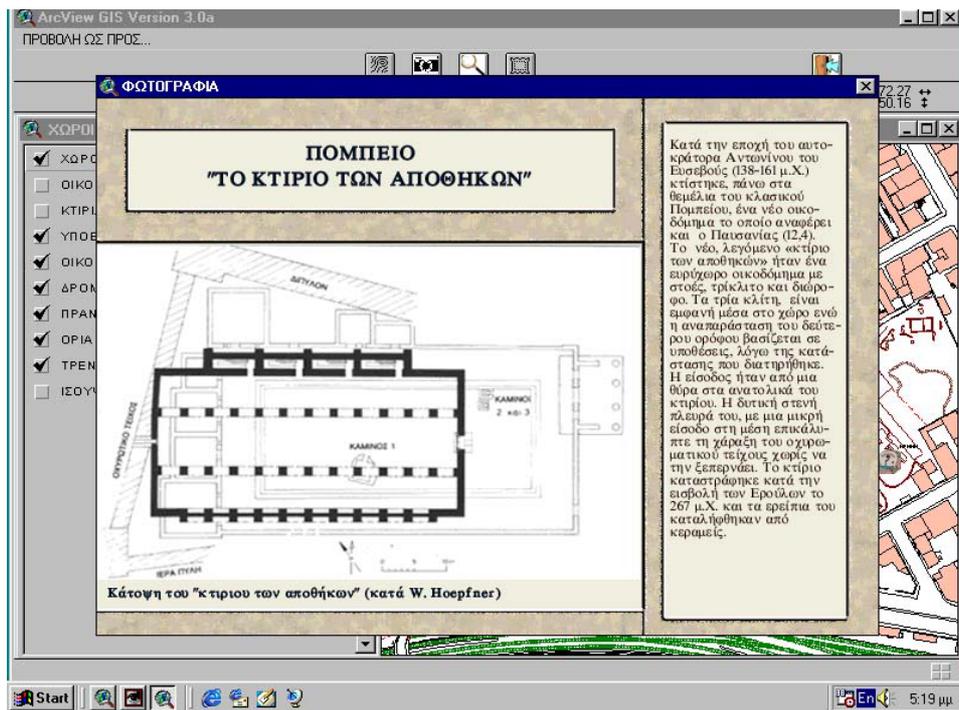


Figure 6: The same monument (Pompeion) in ground plan in the stage of 136-161 A.D.

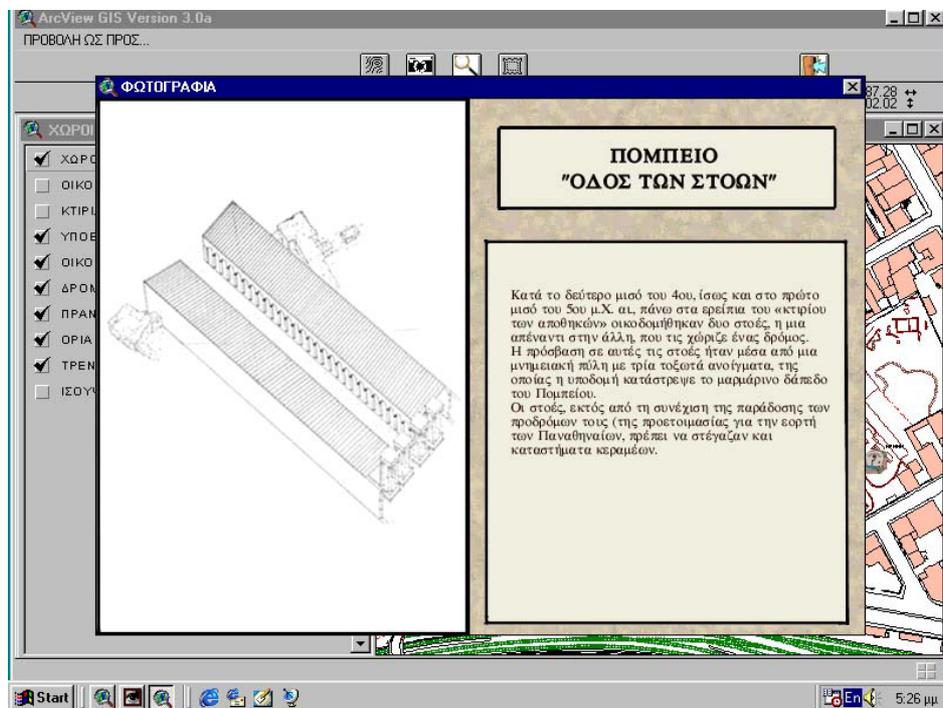


Figure 7: Photograph of a model of the same monument in the stage of the 4th and 5th century A.D.

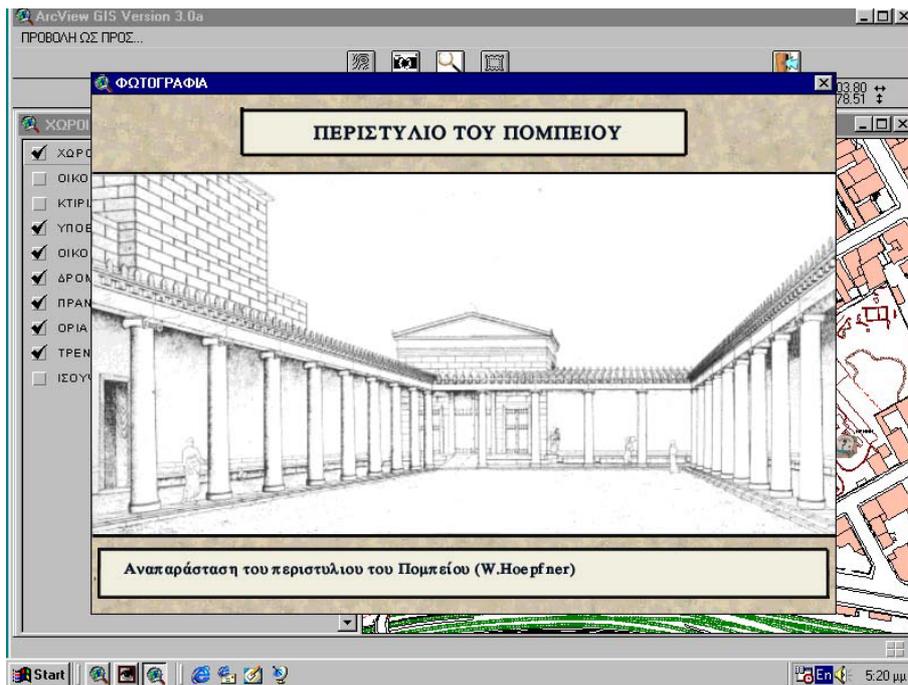


Figure 8: Another reproduction of Pompeion by W. Hoepfner (The Peristyle courtyard).

The same process might be followed for the other monuments of the area. Clicking on the  button, the user can close the specific entity and move to a new one. Another example from the entity type “Tombs” is presented, along with its associated pictorial and textual information (Figures 9 & 10). Finally a display of the entity “Engravings” is presented in Figure 11, according to their period of construction.

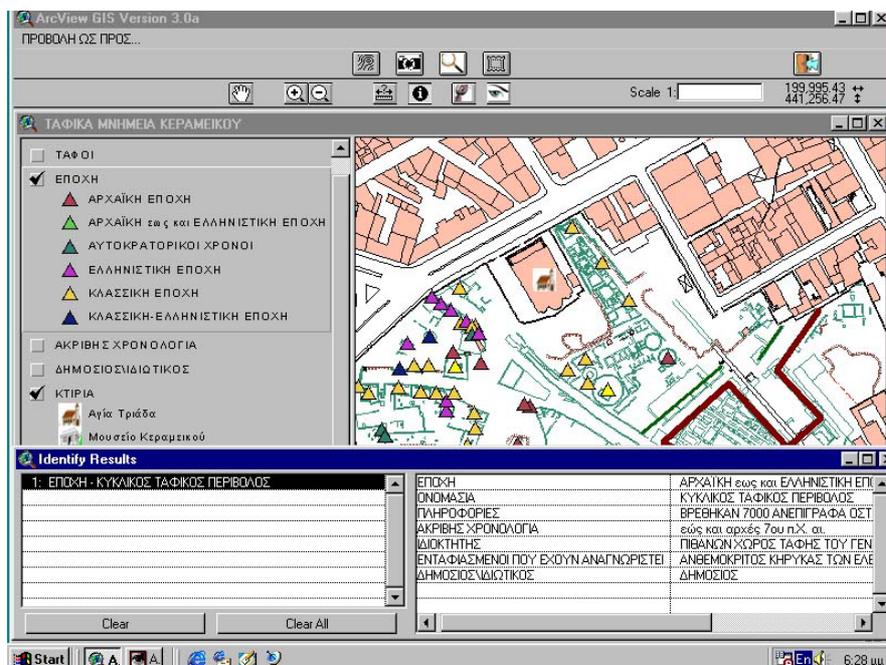


Figure 9: Entity “Tombs”: different colors represent different construction periods.

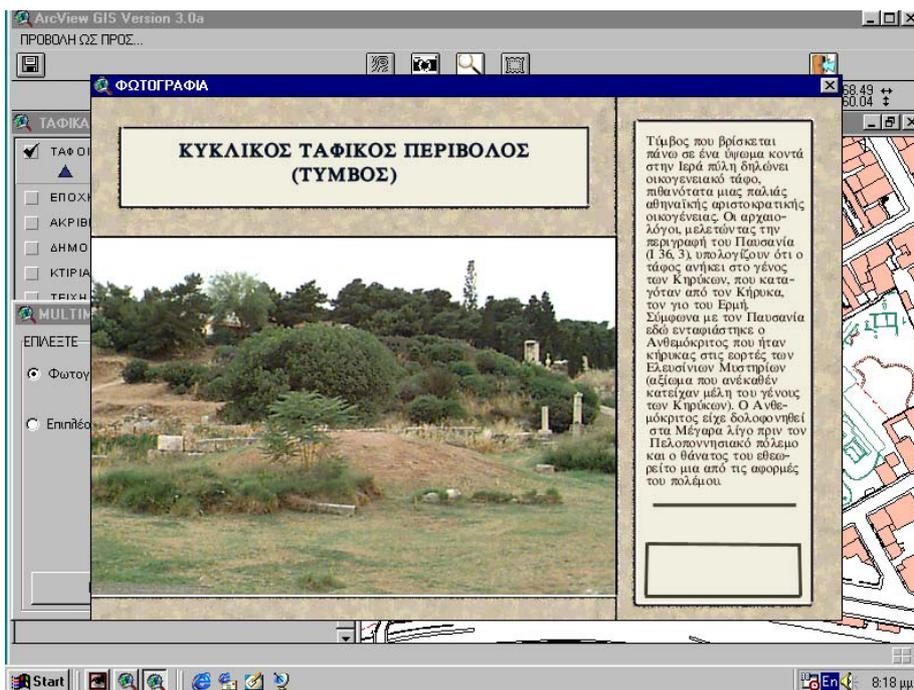


Figure 10: Pictorial and textual information of a tomb.

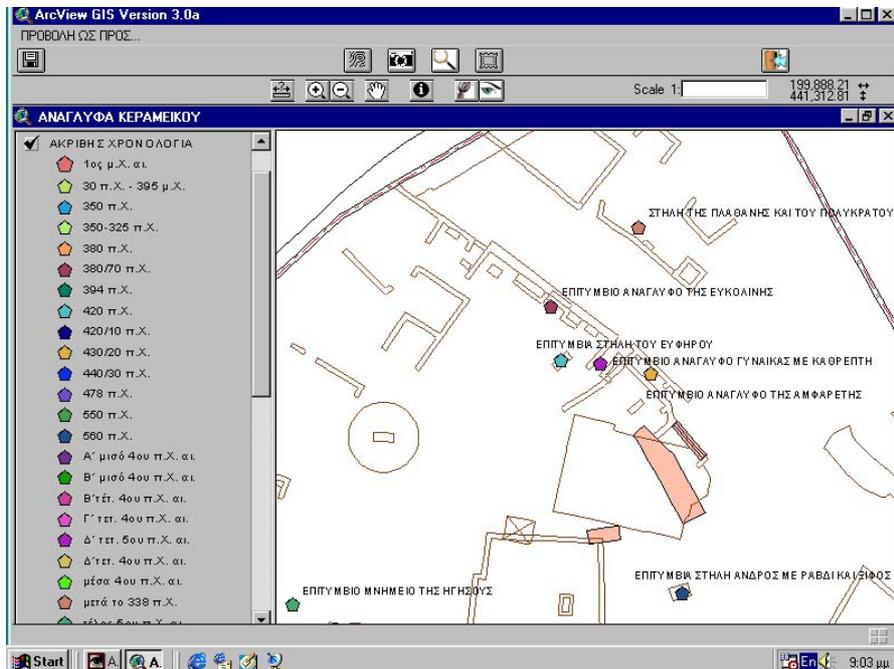


Figure 11: Display of the Kerameikos Engravings in different time periods.

CONCLUSIONS

It is well known that GIS has already become a standard tool for handling spatial archaeological data [Kvamme 1989]. GIS are now becoming more commonplace in archaeology both in Europe [Lock and Moffett, 1992; Andersen et al., 1993] and in the USA [Allen et al., 1990]. Adding multimedia material and organizing friendly entries and alternative search techniques, the system then becomes an efficient tool for different users, including archaeologists, planners, decision-makers, as well as visitors.

As shown above, our study results in an efficient archaeological information system for the study area. The extension of the system in the other areas of the Unification Program is also predicted. The system may be improved, by adding intelligence in the ability to tracking paths, following for example historical tours and bringing us closer to our cultural heritage.

REFERENCES

- Allen, K., Green, S. and Zubrow, E. (Eds.), 1990, *Interpreting Space: GIS and archaeology*, London: Taylor & Francis.
- Andersen, J., Madsen, T. and Scollar, I. (Eds.), 1993, *Computing the Past: computer applications and quantitative methods in archaeology 1992*, Århus: Århus University Press.
- Kvamme, K. L., 1989, Geographic information systems in regional archaeological research and data management, in Schiffer, M. B. (Ed.), *Archaeological Method and Theory*, pp. 139-203, Tucson: University of Arizona Press.
- Lock, G. and Moffett, J., (Eds.), 1992, *Computer applications and quantitative methods in archaeology 1991*. British Archaeological Reports International Series S577, Oxford: Tempus Reparatum.
- Presidential Decree 414/93 no.2/app. d /published: 175 A' /6 Oct. 93), Athens Greece.
- Hellenic Ministry of Culture 1995-98 "Program of Unification of the Archaeological Sites of Athens", Athens Greece