Digitization and archiving of Archaeological Sites: The Karabournaki case

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The archaeological aspect ("problem")

Archaeology as a discipline is usually based on the systematic collection, analysis and interpretation of data through excavation and other forms of fieldwork. Data collected in an excavation are often complex, multivariate and three dimensional, making the development of new ways to efficiently and accurately record and manipulate those data, an absolute necessity for archaeologists.

Traditionally the collection of data was based on systematic description and recording on paper (notebooks, forms etc), while the visual components of the archaeological information were captured in a variety of 2D means like photographs, architectural and topographical drawings, maps, etc. Three major problems rise out of those traditional methods:

1. Vast amounts of data recorded using these methods is the major concern of every large-scale excavation (usually lasting many years or decades), in respect not only to their storage and preservation, but also to their handling, analysis, study, and publication. Although exhaustive systems of recording, labelling and storing have been devised and employed through the years, the problem of handling, combining and retrieving data "randomly" (and at will) remains a much wanted necessity in archaeology.
2. The majority of data are visual and three-dimensional (3D). Consequently, the limitations imposed by the nature of two-dimensional (2D) formats put significant constraints to our perception of geographical space and context.
3. Finally, there is always the problem of effectively presenting spatial and 3D data to scholars and the general public, especially when interactivity and accessibility are listed among the basic intentions of the publication.

The emergence of information technologies offers today powerful solutions to these problems, with additional benefits such as less consumed time and greater analytical insight.

Facing the problem of digitising and archiving the total amount of the available excavation material of an archaeological site, using the excavation at Karabournaki as a test-bed, an Integrated System of Digital Management of an Archaeological Excavation was developed at CETI.

The use of information technologies ("solution")

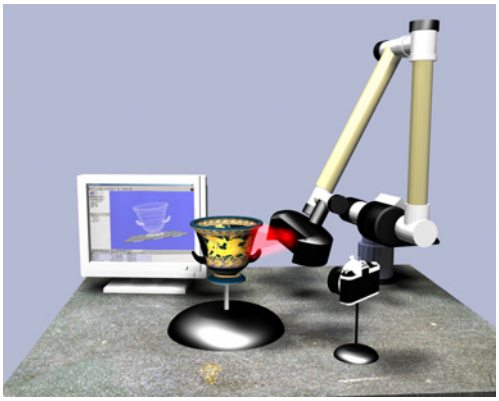
Contemporary methods in digital recording (digitisation), data management, visualization and dissemination offer today the ability to completely and efficiently record, preserve and disseminate an archaeological site and its findings.

The digitisation of an archaeological site involves many aspects. Three major categories can be identified:

Fig.1: Virtual reconstruction of a landscape

- Landscape (site) and structures digitisation: complete digitisation of the archaeological site using contemporary 2D/3D scanning methods. GIS functionality can also be considered as of added value in this field.

- Objects (findings) digitisation: complete digitisation of all objects using 2D/3D scanning techniques and virtual reconstruction. Archaeometry can be of significant importance here, providing with an additional virtual representation in the domain of surface material properties, leading to a GIS-like object database.



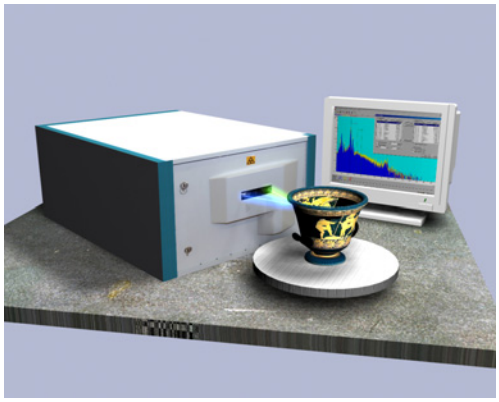


Fig.2.a,b,c. Object digitization techniques

- Documents (notebooks and forms) digitization: complete digitization of the documentary material in the form of 2D images. Traditional methods of *data management* involve the design and usage of relational models to represent and combine the data, by imposing relations on each other imitating human cognitive processes. Contemporary methods involve the exploitation of the power of the XML and MPEG-7 standards to efficiently manage and distribute the content. For the purposes of Karabournaki, we have adopted the relational data model. Data management as well as data retrieval is web based, portable and straightforward. Data input can be done in a twofold way: either explicitly, by accessing the central database, or implicitly, by using specifically designed stand-alone software forms that provide with the flexibility to collect data even during on-site works (using a laptop).

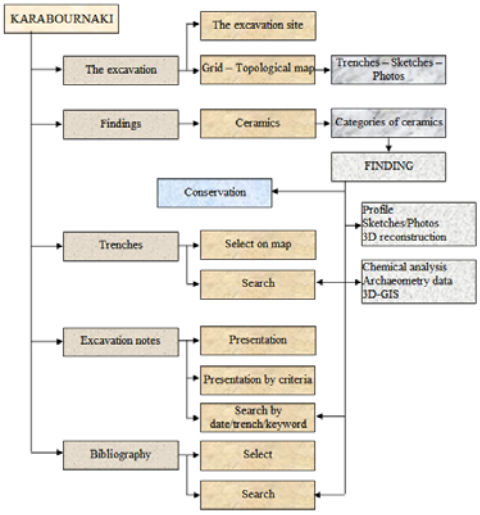


Fig.3. Database structure

In order to integrate the overall database management system into a web-enabled information *dissemination* system, one has to design an Internet front-end with extended search and *visualization* capabilities to be able to exploit the rich information content. Our scheme is based on the MySQL engine using PHP as the main programming language for constructing the dynamic web content and accessing the database.

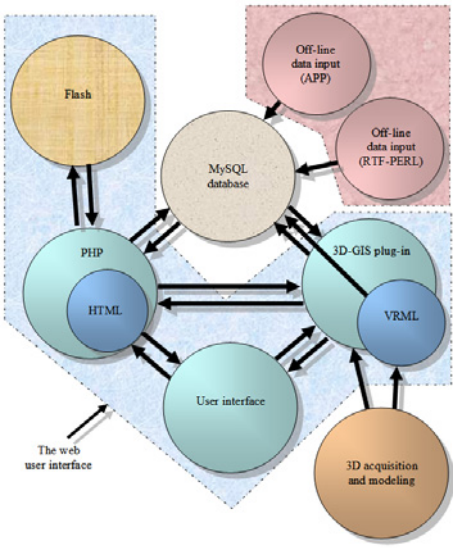


Fig.4. Overall system technologies

VRML is employed for the 3D visualization and a new web browser plug-in for GIS-like capabilities to object viewing is added. The whole system is based upon well-known and tested technologies that are successfully combined into a single and meaningful integrated interface, which is able to provide with extended search and visualization capabilities.