

CULTURAL HERITAGE AND INFORMATION SYSTEMS, AN INVESTIGATION INTO A DEDICATED HYPERTEXT

F. Agnello ^a, R. Corsale ^a, V. Franco ^a, M. Lo Brutto ^a, P. Midulla ^{b*}, P. Orlando ^a, B. Villa ^a

^a Department of Representation- University of Palermo

^b City and Land Department - University of Palermo

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ABSTRACT:

This paper describes an experiment concerning a 'historical heritage-conscious' data recording system.

The experiment was part of a wider research, which was conducted into the archaeological site of Piazza Armerina, Sicily, and comprised the surveying, recording and classification of various kinds of information.

Notably, the main aims of the research into the data recording system were:

- a) devising an information system capable of easily recording and organising survey data such as text, drawings, images and animations, for the use of researchers and technicians;
- b) promoting a multidisciplinary dialogue among different disciplines, thus obtaining some integration among different kinds of documents and projects;
- c) verifying the effectiveness of a hyper-textual system as regards procedures for storing survey data;
- d) supporting researchers and technicians when investigating an archaeological site.

1. INTRODUCTION

An information system for archaeological sites can be organized according to two main criteria of investigation. The first criterion would be territorial in which the object of study is the individualization of archaeological sites; the second would be dedicated to the study of individual archaeological sites. In this case, both the territorial environment and the construction would be taken into consideration. Generally, this would consist of settlement remains or of a group of buildings in which it would be necessary to have knowledge of in order to apply the correct procedures both for urban surveys and for architectural ones. Furthermore, when studying the geometrical aspect of a construction, one would have to conduct further investigations. For example, investigations can relate to the historical evolution, thus taking into consideration temporal events and construction layering as well as studying construction techniques, materials, formal aspects, geological aspects, and finally the geomorphology of the ground on which the construction was built.

All this information can be organised by using different kinds of textual and graphic documents: drawings, photographs, pictures, text, diagrams, charts. Each document can be separately considered and examined. However, a comparison among them could provide a more focused insight.

Firstly, the comparison could simply regard documents of the same kind, which differ from each other in the time of their production, thus allowing one to study the chronological progression and the transformations of site and buildings.

Secondly, in a more complex way, comparisons could also be drawn among documents of different kind. This should allow one to investigate more closely the physical phenomena and their causes. Thirdly, it is furthermore possible to associate all the surveyed data on site to the information about historical building techniques and materials.

Therefore, a system organised into closely connected sections should be used when doing research into a particular site, especially when assessing the feasibility of intervention on

cultural heritage. It would be desirable that every aspect of the site was described with data that can be retrieved and processed both independently or related to each other, depending on the characteristics of the research.

Today the necessity of comparing and validating all sorts of information has increased thanks to the availability of different kinds of documents and as a result of the speed of the computer sciences, which contribute to increasing the quantity of the available data and information. However, information, in order to be useful and effective, should be easily accessible.

If a traditional system of data filing were used, it would be difficult to reassemble the general scheme and study individual data or the relation among data. To this extent, computer techniques, and particularly the Geographic Information Systems (GIS), can greatly contribute, to the creation of 'intelligent' filing systems, by allowing the formation of "databases of documents" and "databases of databases". This kind of recording system can improve the management of numerous and complex groups of data, by following pre-set criteria of investigation, and facilitate the retrieval of information through the particular interrogations of the users.

Collecting the information can be performed on a single database. However the search can include a group of databases, in which case, each single database can be related to each other. Moreover the system allows processing the same type of information that is stored in each database.

Taking this into consideration and bearing in mind the need for flexibility and ease in recalling data, there has been an attempt to find a type of hypertext filing system, which can provide a valid solution. This is somewhat simpler than a GIS but it is nevertheless suited to achieve the above described objectives.

A hypertext, in fact, seems to perform well when personalized from time to time and aimed at specific objectives, thanks to the possibility of formulating paths and contemplating choices. It can satisfy not only the necessity of an intelligent filing system, but also that of organizing the data and files in view of successive uses on the part of the researcher. Naturally, at the starting point there are some limitations inherent to a hypertext.

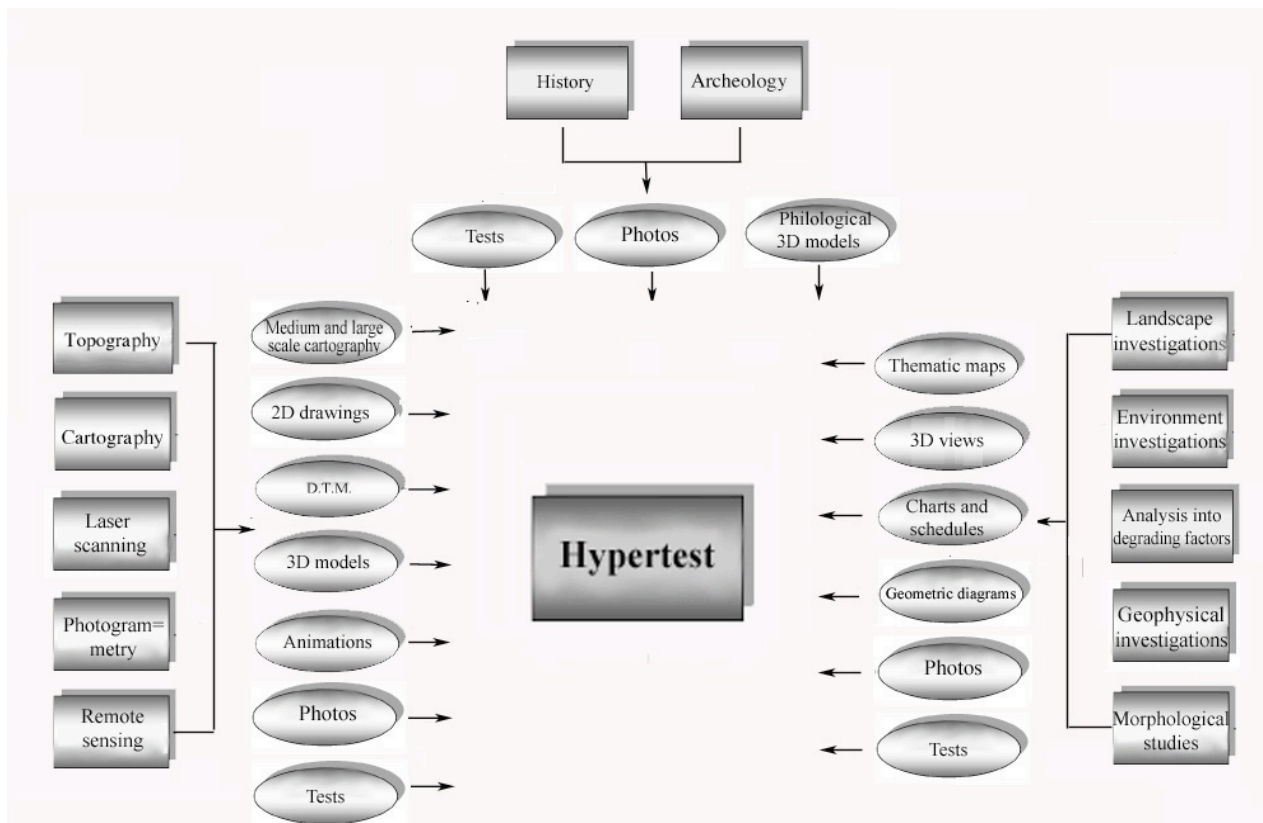


Figure 1. Contents and materials of the hypertext

For example, in a hypertext each database constitutes a unique document that can only be partially disconnected by using sensitive areas. Moreover, the images introduced in it cannot be georeferenced.

An additional aim of this study has been in finding the resolutions of such limitations or at least the formulation of alternative solutions, which could limit the disadvantages.

As mentioned above, a hypertext aiming at recording information deriving from an archaeological site is described.

A case study was carried out on the Villa of Casale in Piazza Armerina (Enna), constituted by a group of Roman remains, which date back from the first century A.C. It stands on a plot of land of about 1 hectare.

2. THE REALIZATION OF THE *VILLA DEL CASALE* HYPERTEXT

The realization of the *Villa del Casale* hypertext was articulated in various phases, which included:

1. devising the objectives;
2. capturing and elaborating data;
3. devising the organization of the pages, links, paths and the setting up of the user interface;
4. storing of the project plan;
5. importing and exporting hypertext data.

Stages 3, 4, and 5 are not sequential, however there is a close co-relation among them, in a recursive pace.

2.1. Devising the Objectives

The hypertext was formulated according to a series of objectives which relate to both the organization of the data and the user interface. In particular, the following was attempted:

-to offer during any moment of the consultation of the hypertext a vision of the path taken and of the possible alternatives in the continuation of the consultation;

-to offer the possibility of organizing the consultation according to diverse key links (using texts, icons, images, search engines);
 -make the consultation as flexible as possible, attempting to resolve the limitations of this type of processing, for example including zoom functions, file links in AutoCAD format, etc.;

-to surpass the mere filing of collected material in order to offer the technicians and researchers the possibility of using a hypertext as a base from which to begin successive processing of the contents.

2.2. Capturing and Elaborating Data

Important data which was introduced and organized in the hypertext was relative to multi-disciplinary contributions regarding vast fields of study such as: cartography, topography, photogrammetry, geology, chemistry, history, archaeology, information technology, etc.

The relative data was articulated in content and in the language in which the contents were expressed. It includes maps of medium and large scale, drawings, three-dimensional photo-realistic and philological models, animation, texts, thematic maps, photos, geometric schemes, diagrams and tables (figure1).

The data was collected both by document and bibliography research and by the gathering of data done between 2001 and 2003. The gathering of data was done in order to obtain data not only the geometry of the villa but also its intrinsic features (i.e. materials, the state of degradation, and the structure condition), and extrinsic ones (i.e. the landscape).

Relative to the geometric relief, integrated methods were applied i.e. topographic techniques and photogrammetrics as well as innovative methods such as laser scanning. In this way a two and three-dimensional description of the villa was obtained. Particular care was taken with the relief of the mosaics in which rectified photos and orthophotos were realized. Their representation was accompanied along with the detailed study of the altimetry of several of the most significant areas obtained



Figure 2. Example of a page from the section “Metadata”

by the use of a laser scanner and by precision geometric levelling. The different operations performed and the relative processing are documented by metadata given in the summary and introduced in a specific section. The various metadata are connected to the relative elaborations using hyperlinks (figure2).

2.3 Devising of the Page Organization, of the Hyperlinks, Paths, and the Setting Up of the User Interface

The mentioned hypertext was created by using *Macromedia Director 8.5*, and based on a logical and hierarchical structure which was organised into hierarchical links. It has a simple tree structure where thematic information and crossed links were introduced. For example, the Villa layout can be hyper textually linked to the terrain sections, to the geophysics investigations, to form investigations, to metadata concerning the survey process. As a result, data consultation is quite flexible. The variety of the hypertext contents deemed necessary the occasional formulation of personalized pages based on the contents themselves hence on the typology of the organization and visualization of the data. This was done based on a modular page subdivided in areas for the text, graphics and photographs. Occasionally, when necessary, two areas were incorporated to make space for a larger visualization or to substitute one kind of content (a text) for another (images). The standardization of the page grid, apart from assuring a more orderly appearance of the contents, it made consultation easier as it permitted the user to research information according the interface map which became a mind-map as well.

Particular regard was given to consultation paths, which allow the supervision of the hypertext structure by using both alphanumeric and iconic tables of contents. It is therefore possible to consult the hypertext choosing: sensitive areas, 2D, 3D and animated surveyed documents; key words; words in the text indexes; icons in the icon indexes. It also possible to use a search engine. Therefore, what was attempted to be carried out was, using the hypertext structure, a mental path of acquiring knowledge, which is not usually linear but rather recursive and random.

The examples on the pages relative to the various contents are shown in the figures 3-6.

Particular attention was paid to the use of 3-D processing.

Usually, in hypertexts, the 3-dimensional processing models are used to represent an object of study efficacious visual impact and results disconnected to the rest of the processing. In the work described, the processing is combined with the consultation of a 2D processing which provides visualization in an efficient manner, even in upright. Furthermore, they not only have the job of visualizing in the most efficacious manner but also constitute an excellent way to search the hypertext. They possess sensitive areas which is the reason why, by using 3D models, it would be possible to visualize thematic, retrieve files and other 2D and processing.

2.4. Storing of the Project Plan

In comparison to other types of processing, in a hypertext reference is not made to single tried and tested methods used by



Figure 3-4. Examples of pages from the section “Surveys”

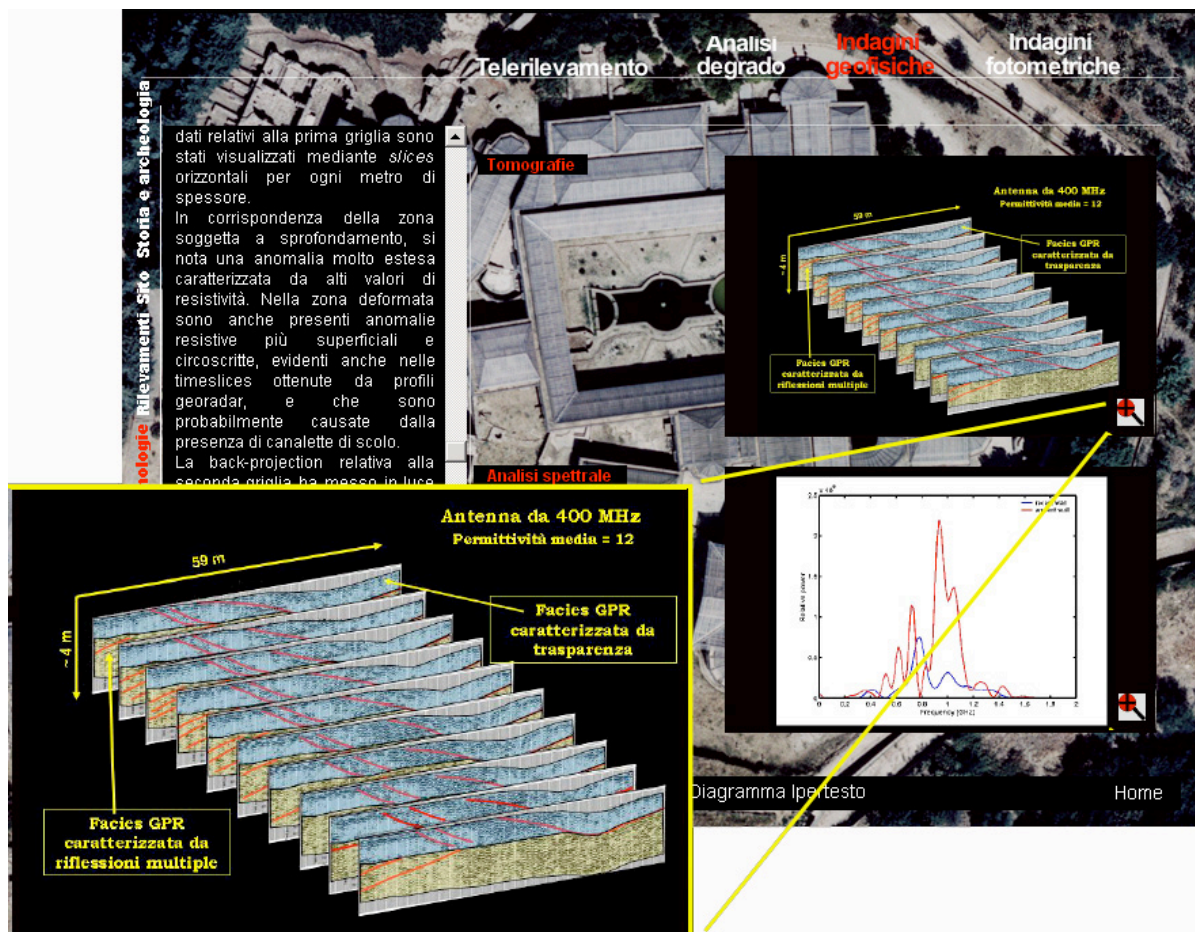


Figure 5. Example of a page from the section “Geophysical investigations”

practising professionals nor to standards mentioned in specifications. Therefore, it would be necessary to define modalities of visualization and storage procedures, this would be true especially when the programmer and operator are two different people.

In the specific case, the project briefings have included:

- a list of fundamental functions at the base of the hypertext, as for example, a link between the page, the ability to access a different page by images, texts, and films. In addition, the ability to visualize the hypertext structure and so forth;
- simulation pages organized according to topics;
- graphics and flow diagrams,
- textual descriptions;
- list of files to introduce, each individualized by identifying elements which permit, during the formation stage, different page references of the hypertext diagram.

2.5. Importing and Exporting Hypertext Data

The various processing was imported to the hypertext in the formats: *jpeg* (drawings and images), *doc* (texts), *mov* (movies), *wav* (sounds). The transformation of drawings from the original format *.dwg* or *.dxf* was necessary as the program did not allow the management of vector processing. This is one of the limits of hypertexts, a shortcoming which in this case has been overcome by offering the possibility to activate a link between the images which reproduce the drawings, the original vector processing files and the computerized design program AUTOCAD.

The hypertext was exported as a file in *.exe* format e stored on a CD. This allows the consultation even without a specific program.

3. CONCLUSIONS

To sum up it can be said that this experimentation permitted to assess the capability of the described hyper-textual system, when various multidisciplinary data are to be dealt with. This system can guarantee the most effective accessibility and visualisation of information through the use of drawings, pictures, text, sounds, flowcharts, and so on. At the same time, it allows to manage and interrelate various and different kinds of data. So, it would be possible to reassemble the complete picture of the situation and find appropriate connections, which improve the knowledge of the site and allow a more detailed research. These functions can be even more effective when the hypertext maintains links with original files and their specific software.

In addition to these advantages connected to the system flexibility, it is worth mentioning the possibility of publishing the hypertext to the Internet., to allow remote consulting. This is especially true as a result of the easy approach offered by the hypertext, which not require any specific training.

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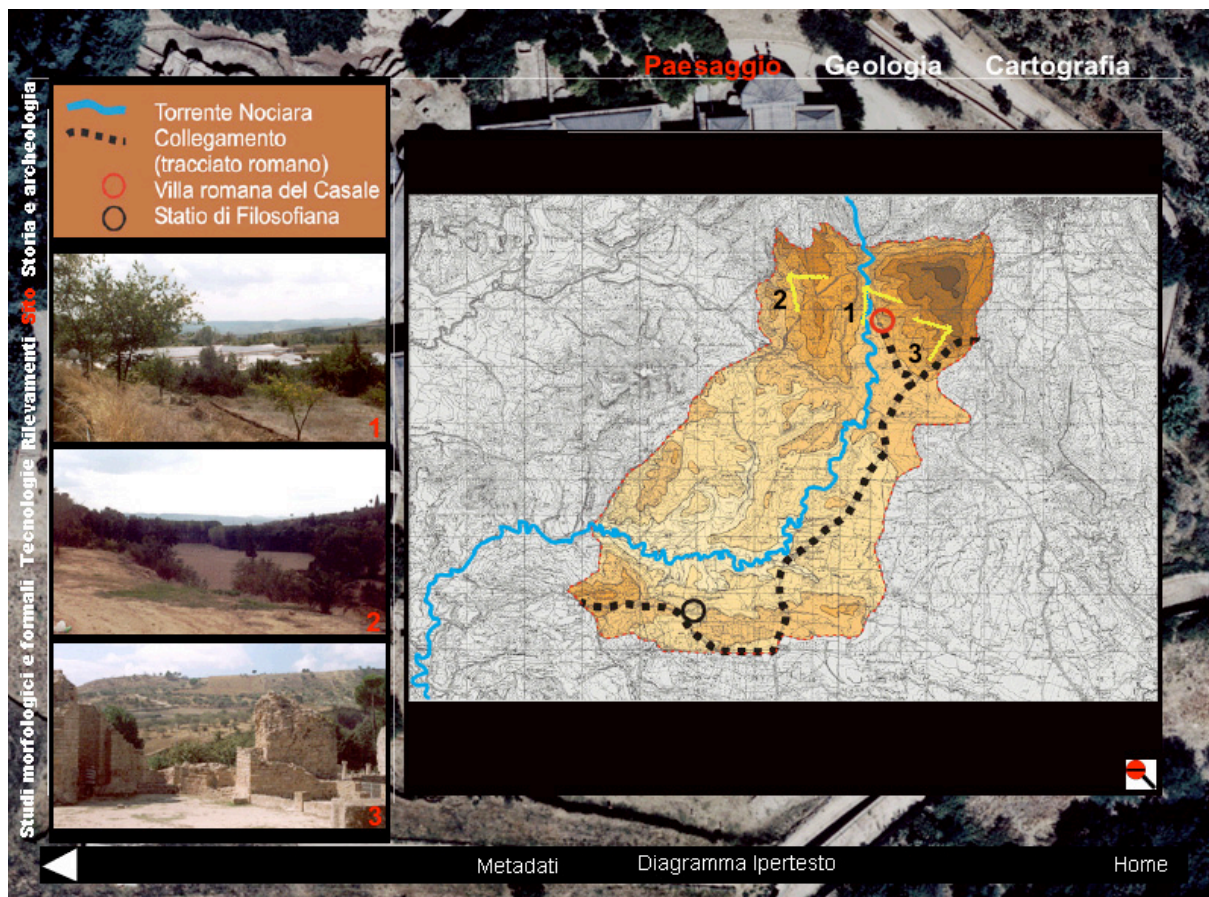


Figure 6. Example of a page from the section “Landscape investigations”

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