

## RAWMATERIALS PROJECT ARCHAEOLOGICAL WEBGIS WITH GOOGLMAPS API

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### ABSTRACT:

The aim of this paper is to present the results of the Raw Materials Project, which links material and field data in a DBMS and a WebGIS made by free tools that can produce common format outputs (rtf, txt, xml, dbf, etc.), through some scripts, appositely built by the writer. All these data are now published on the web along with geographical and environmental information (coordinates, geomorphology, archaeobotany, etc.) on all the archaeological sites. Also the archaeological finds (obsidian, bone and stone polished tools) are now in this webgis, created using Google Maps API. The user can filter the data and see the results on a map, or save them in the same free formats of the database by an easy and user-friendly web interface..

## 1. RAW MATERIAL PROJECT

### 1.1 Background and objective of the Project

The aim of the project is to trace sources, processing methods, and operative chains of three main types of neolithic artefacts - obsidian tools, bone tools and polished stone; microscope observations, chemical analyses, 14C, RAMAN and LIBS spectroscopy were employed in the characterisation of artefacts. The final goal is the publication of the results on the web, together with geographical information to be (freely) used by the scientific community.

The project was promoted by Carlo Tozzi (full professor in the University of Pisa; tozzi@arch.unipi.it) in 2003, and funded by IIPP (Istituto Italiano di Preistoria e Protostoria-Italian Institute for Prehistory and Protohistory; iipp@iipp.it).

The literature on the subject was first reviewed, in order to extract all the available information on selected materials and sites. The second step was to find out or check the exact location of the sites on the ground, mapping them together with literature and new digital photos of the finds.

### 1.2 Data and Database Management System

All the data were recorded and organised in a database strictly integrated within a geographic information system. All the available data from different sites all over Italy were collected and stored following the same criteria and using a standardised thesaurus.

The merging of all the collected information allows complex queries and spatial analysis of the data, and to underline interesting areas where deeper investigations can be carried out; new and previously unexplored relationships among different raw-material sources and sites can be focussed.

Four main requirements were considered of fundamental importance by all the involved research groups, and the GIS structure was designed paying particular attention to them:

a. localisation of all the sites in a common reference system;

b. full accessibility of the data source;

c. dating of each record (sites, finds, cultures, ...);

d. data export in open formats (rtf, csv, xml, txt, and kml, the xml code of googlemaps).

The database design was highly influenced by the nature of the data to be recorded. Therefore, only general rules (e.g. metadata definition, common glossary and a full and understandable documentation) were stated at the beginning.

In general, the complexity of some databases, especially those involving the integration of archaeological and environmental databases is often painfully slow, or has eventually been limited to the visual analysis of simple distributions of sites across landscapes.

In this database these problems are overridden because only 4 items were used to link all information:

- 1) unique ID (generated by the name of the site, the nearest toponym and the administrative province ID; i.e. Grotta delle Settecannelle-Ischia di Castro(VT));
- 2) geospatial reference (LatLong);
- 3) dating (14C or cultural aspect);
- 4) literature.

### 1.3 Maps and Web

Considering that all archaeological data have spatial dimensions, and that context is the primary way to interpret archaeological data, the first step was to build a GIS allowing the cartographic presentation and analysis of the data.

All data, organised in relational tables, are grouped in pre-edited queries for the web, in order to reduce the amount of server-client traffic, and to enhance the performance of the whole website.

Data can be subsequently filtered by customised criteria, picking predefined values from drop-down menus, or by directly editing the SQL string (always visible and printable together with selected information). The location query, for example, is a simple and direct way to access the database, clicking on the position of the object of interest on a map.

All these information, with different level of data resolution, are now available on the web and can be visualised by free GoogleMaps API.

As specified on the webpage of the documentation, "The Google Maps JavaScript API lets you embed Google Maps in your own web pages. To use the API, you need to sign up for an API key, and then follow the instructions"

The possibility to create thematic maps of the collected data is one of the most popular and helpful ways to share information. Within this system, each query is visible on the map, and in the same page the user can see the distance (in kilometres) of the site from the raw material as the crow flies, or by using actual available roads -by using the `.GPolyline()` and `.distanceFrom()` commands. E.g., the user can select the sites where obsidian tools from Lipari were found, and see that all the sites lie in a particular part of Italy.

The geomorphological characteristics of the sites (e.g. distances from active or abandoned rivers, or natural land resources) can be best represented on orthophotos and/or historical maps, that are usually more understandable for specialists of GIS for Cultural Heritage management as well as for common users (Agosto, Cosenza, Rinaudo 2003); the use of satellite images from google maps integrated with our dbms shows all his advantages including exporting in `.kml` and visualisation in 3d view with Google Earth.

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I wish to thank professor Carlo Tozzi, who gave me the opportunity to work in this stimulating project, always in search of a free and (often) better alternative; I am indebted also with all the research groups involved in the project for their friendly collaboration, particularly Marta Colombo for her uninterested help in solving archaeological problems from a theoretical and methodological point of view.

Website of the project <http://materieprime.humnet.unipi.it>.

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