Data matrix codes used to catalogue archaeological heritage

January 19 2011

These are examples of applying DM codes to several archaeological objects. Credit: CEPAP-UAB

The research team at the Centre for the Studies of Archaeological and Prehistoric Heritage (CEPAP) of Universitat Autònoma de Barcelona (UAB) have implemented an innovative system to register archaeological artefacts which eliminates problems in manual markings, such as errors in writing or erosion of data. The system, based on direct labelling using bi-dimensional data matrix (DM) codes, has been used by the CEPAP team during two years, in which numerous artefacts and bone remains from sites in Spain and Africa were registered.

The marking of archaeological material, or coding, is the process in which archaeologists identify each of the artefacts discovered at a site through an identifier code which is currently applied manually to each item and which contains the name of the site, the archaeological level at which it was found and an inventory number. This information is essential because it remits to a complex network of data which contextualises each artefact individually.

Manual coding is a routine process which requires much time and effort, and in which many errors exists - in some cases up to 40%. Moreover, with the pass of time the coding becomes unclear and this often may hinder subsequent studies. For this reason an important part of the work done in museums, especially with important artefacts or collection items, consists in recoding the objects.

The CEPAP team has achieved to reduce coding errors to 1% by applying a new digital cataloguing system used in several dig sites to register all types of collections.

To identify each object DM codes are applied directly to the objects. The codes adapt in proportion to the size of the identified artefact, up to a minimum of 3x3 millimetres. There are many advantages when these codes are compared to bar codes, a registry system which in past years was tested in different archaeological projects. Due to their size, in many cases bar codes cannot be applied directly to the objects and must be adhered to the bag containing the artefact. This however easily can give way to errors during the manipulation of the objects.

DM codes are printed with a program CEPAP designed for the firm IWS (Internet Web Serveis), one of the project collaborators, which makes it possible to introduce alphanumeric sequences, forming series with up to 20 digits to identify each of the objects.

Printed on polypropylene labels, the codes are adhered to the artefacts by first placing them between two layers of Paraloid B72, an acrylic resin widely used in restoration of archaeological material because of its durability and long-term protection of the label. If the label is damaged - up to 30% of the code - the information can be reprinted fully.

Each archaeological object contains an identifier code (site, archaeological unit and sequential name). The information of each code can be read using standard readers, video and photo cameras, mobile phone readers, etc. The data includes georeferenced information of the artefacts found at the sites and which are taken with a laser theodolite, as well as several quantitative or qualitative variables which are stored in electronic notebooks or PDAs. Therefore, every day when data is stored in the computer, archaeologists have access to an exhaustive and updated field inventory which includes all of the most recent findings. The program can design and modify quantitative and qualitative variables according to the precise needs of each research project.

In addition to representing a new technology application, the system offers other important advantages. The pilot project carried out in Spanish sites (Roca dels Bous and Cova Gran de Santa Linya in Lleida) and African sites (Olduvai Gorge in Tanzania and Mieso in Ethiopia) was directed by Dr Rafael Mora, director of the Centre and lecturer of Prehistory at UAB; Dr Paloma González and Dr Jorge Martínez Moreno. The new system demonstrates substantial advantages when compared to manual coding in terms of speed and reliability, as well as its easy incorporation into everyday archaeological research tasks.

That is why CEPAP researchers find it important for scientists and heritage managers in Spain to consider the possibility of adapting a unique automated registry and cataloguing system for archaeological material, relatively easy to use and fairly economical, which would allow to unify systems which are currently differentiated. At the same time it

would give way to the development of digital applications such as data consultation via internet through databases combining DM code information and visual representations (drawings, photos or 3D scans), and cyberspace access to museum pieces, which would make it easier for both researchers and society in general to have access to cultural heritages.

Provided by Universitat Autonoma de Barcelona