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Italy's National Informative Catalogue System (SIGEC): tools and strategies for acquiring and managing knowledge on archaeological heritage

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Introduction

The Central Institute for Cataloguing and Documentation (ICCD), the office that deals with all activities regarding cataloguing Italian cultural heritage, is responsible for the *National Informative Catalogue System (SIGEC)*. This was created for controlling the processes involved in the acquiring, managing and spreading of cognitive data on heritage through the use of computer tools. The system is divided into four modules: three of these totally control the descriptive, multimedia and geographic information, while the fourth is aimed at processing the data for its use on Internet, while guaranteeing respect of rights of intellectual ownership, privacy and all necessary requirements for the safety of heritage.

A particularly interesting and important aspect of the *SIGEC* is the chance it gives to relate information on heritage to the territory. It's then possible to identify logical, historical and space relationships that exist between the environmental and anthropical elements and other culturally interesting aspects present in the same geographical area. It does therefore offer a better and more conscious knowledge of the heritage itself and facilitates establishing its context in time and space. While these considerations are valid for all types of cultural heritage, they are particularly so for archaeological heritage that, inasmuch as it is a tangible testimony of the past civilizations, acquires its own special value and meaning when inserted in the historical and territorial context from which it originated and in which it existed.

Tools for cataloguing and documenting archaeological heritage

Archaeological heritage is made up of a complex and very mixed group of elements: movable, immovable and territorial heritage, heterogeneous as regards type, chronology and ownership, that constantly increases thanks to excavation campaigns and chance finds all over the whole national territory.

Organic and systematic cataloguing and documentation, with the support of computer technology, provide a fundamental contribution to managing, protecting and developing this rich and varied world. To this end, the ICCD has prepared a collection of tools ('cataloguing standards')

and precise operational processes which, when applied in the *National Informative Catalogue System*, ensure quality and uniformity of information.

The cataloguing standards currently available can be arranged, for reasons of practicality and clarity, into four main typologies: *catalogue files*, *Authority files*, *terminological tools*, *standards for the description and production of accessory documentation*. Respect for common regulations permits sharing information among those who operate in the area of cultural heritage, for the most diverse reasons (protection, conservation, didactics, territorial management, statistics, research, etc.).

It should be noted that these tools are aimed not only at the precise and scientifically correct description of the heritage but also at highlighting the relations that exist between the heritage itself and the territory, with the by now consolidated and shared intention of an integrated cataloguing aimed at acquisition and diffusion of knowledge on the '*cultural heritage system*' as an organic whole.

As regards the *catalogue files*, the following models are currently available: *SI file* – *Archaeological Site*, aimed at describing and documenting 'a portion of territory that preserves evidence of human activity belonging to a more or less distant past and that can be investigated with typical methods of archaeological research', with no qualitative and quantitative judgement regarding the importance of the evidence. *SAS file* – *Stratigraphical Probe*, which is used for documenting the stratigraphical sequences found within the excavation context. *MA/CA file* – *Archaeological Monument / Archaeological Complex*, catalogue archaeological monumental heritage either single monuments (a mausoleum, an amphitheatre, a house, a tower, a church, but also a bridge, a section of road, an aqueduct, etc.) or monumental complexes formed by a group of constructions or a number of buildings (a fortified town, a shrine, a thermal complex, etc.), independently from their state of preservation. *RA file* – *Archaeological Item* catalogues individual objects of an archaeological nature; it acts as the most consolidated and used standard in the archaeological sector, due to the high number of movable items that form a large part of cultural heritage. *NU file* – *Numismatics*, analyzes items belonging to a chronological span that goes from prehistory to modern times and includes not only coins but also paramonetary finds, i.e. all those items with a monetary aspect prevailing over their material or juridical evaluation. The same tool can be used for cataloguing minting dies, punches exclusively related to coins, weights for checking monetary items, ancient seals and medallions. *TMA file* – *Archaeological Materials Report*, for cataloguing collections of material without significant characteristics, for which it is impossible to create an RA file, or for a quick reference for large quantities of finds such as material from archaeological excavations, surveys, preserved in museums, stores, private collections, etc.. *AT file*

– *Anthropological Finds*, for cataloguing biological testimonies in close connection with archaeological and palaeontological, historical and cultural contexts, that regard the evolution, life and history of studies on the human race and its predecessors.

The logical arrangement of all these standards aims to gather evidence into an organic framework expanding from the general (the site, “territorial container”) to the detail (the archaeological complex, the individual monuments of which it is composed, the items found) and – viceversa – to reconstruct the sequence that runs from the item to the monumental context and then to the territory to which it belongs, following the relationships between the various items (and therefore between the various descriptive files) in a way that is not closed but adjustable depending on the different situations. This ‘*system of relations*’ allows the linking, for example, of movable and immovable archaeological heritage of various types to the archaeological site in which they were found; or puts in context the stratigraphical investigations in the area where they were carried out (portion of territory or monumental site); or again establishes functional or typological type relationships between the items, to recompose burial contexts, groups of objects belonging to cargoes from shipwrecks, collections, etc.

With regard to the application and the flexibility of the cataloguing files, it is worth noting that the archaeological ones – just like all the other files issued by the ICCD – require both a minimum level of information on the item (the so-called ‘inventory level’), and also the eventual acquisition of more in-depth knowledge, in order to respond to the various requirements dictated by cataloguing campaigns and the availability of funding.

As regards the *Authority files*, that is to say the section of the archives that controls the management and standardization of information relating to elements connected to cultural heritage, two specific authority files have been prepared for archaeological heritage, for collecting and uniforming data on excavation campaigns (*DSG file – Excavation*) and on surveys (*RCG card – Survey*) carried out on the national territory. These are different models from those setup for the Authors of the items and for the reference bibliography.

Within the framework of standards used in cataloguing cultural heritage, *terminological tools* occupy a seminal rôle. During the critical phase of recording knowledge about cultural heritage, these tools constitute a fundamental aid for the acquisition of data following standard criteria and for the creation of that ‘common and shared language’ so essential for a correct use and spread of information. For movable archaeological items, the entire terminology for defining and classifying objects has been revised in order to create a functional thesaurus for filling the *RA* entries file. Other terminological lists are being prepared for numismatics, mints and monetary types. As regards monuments and territorial heritage reference vocabularies have recently been

published for defining archaeological sites, provided with explanations of the individual entries and practical indications on the criteria for choosing terms regarding the different contexts to be described.

As regards *accessory documentation*, with the support of the National Body for new technologies, Energy and Environment (ENEA) and the National Research Council (CNR), ICCD has prepared reference rules for different types of documents (images, graphical documents, textual documents, audios, videos) also in a digital form, by now the most common in campaigns of digitized cataloguing.

Computerized cataloguing and GIS tools

Computer technology, and especially Geographical Information Systems (GIS), carry out an important support rôle in the management and spread of the vast complex of information generated by the process of knowledge and documentation of cultural heritage.

The peculiarity of a computer system is its capacity to interrelate information and provide complete frameworks of summaries of knowledge: in this context geo-referencing cultural heritage on the territory assumes an important rôle, whether it regards immovable or movable heritage. The latter can in fact be spatially placed through the relationship they have with a “container”, that is to say with the structure that preserves them (museums, monuments, sites, places of worship, etc.). A particularly interesting aspect therefore is the way in which SIGEC organizes geographical information on cultural heritage, and especially archaeological heritage. SIGEC has a cartographical module that offers simple and intuitive functions to map cultural heritage. Starting from the geo-referenced information in the catalogue file, a geographical position can be given more or less in detail to each item, thus linking to the territory all the descriptive data and attachments of various kinds (photographs, drawings, documents, etc....) archived in the catalogue file.

Computerized geographical information has led to the evolution of the traditional catalogue models, introducing in the latest generation of standards (next to the classic alpha-numeric references to relate the object to the territory - region, province, municipality, etc...) a geographical description expressed as a couple of coordinates. Depending on the type of object and the quality of the available cartographic bases, this information shows the position of the item on the territory with a point, a line or a polygon.

The result thus obtained is a great support to investigation on cultural heritage, and especially to the analysis of “what is catalogued”: layers of summaries of information provide thematic maps that immediately illustrate the distribution and quantity, allowing also further detailed research.

Analyses linked to the reconstruction of archaeological contexts or the description of areas showing the spread area of certain products have proved particularly effective. While in almost all cases of architectural elements the geo-reference regards their physical location (except in rare cases of anastylosis), the spatial position of archaeological finds can be linked to the find spot or to the place where they were produced.

The constant evolution of computer technology has optimized the cataloguing management process. A re-engineering of the SIGEC has recently begun aiming to the migration of the structure from a client/server architecture to a WEB one.

The aim of this evolution is essentially that of making the functions of the system more effective and respondent to the requirements of the institutions that operate on the territory for the management and protection of the heritage, guaranteeing the availability of the necessary technological infrastructures apart from the acquisition of specific hardware and software equipment in their offices.

SIGEC can be used through a WEB interface by all local offices coordinated by regional centers: each center is then connected and interacts with the ICCD, that has a rôle of coordinator as well as that of controlling and defining the cataloguing rules and standards, ensuring information sharing and protection.

Within the SIGEC WEB the section for geo-referencing has also been redesigned, passing from a commercial GIS desktop solution to an *open-source* WEBGIS. The section is available on-line without the need to install locally any software or plug-in. The fundamental aspect of this evolution is that a catalogue of maps can be prepared using web map services (WMS) provided by territorial offices and public institutions, such as for example the Ministry of the Environment, or by map services such as Google Maps. This means having a large number of raster and vector cartographic layers available without possessing them materially on one's own machine. It will therefore be possible to geo-reference cultural heritage starting from textual information on the coordinates of the points that represent the object in the catalogue file, in the chosen spatial reference system. In this way, starting from the data contained in the catalogue file, it will always be possible to show the spatial position of the item on the territory no matter what basic map has been used.

Very interesting is the possibility of visualizing summary information layers referring to the distribution of cultural heritage on the territory: within the SIGECWEB, queries can be made in the catalogue files in order to obtain thematic maps that show the required research criteria. For example, it will be possible to visualize on a map all the immovable cultural heritage of a particular type, belonging to a particular historical period or with specific characteristics described in the

catalogue file. As regards movable objects, the system can visualize on the cartography their “containers”, that is to say the structures (monuments, churches, archaeological sites, etc....) where the objects are preserved, unless there are protection or privacy limitations. It will also be possible research spatially on the maps and show all the items that are in a particular spatial relationship with other items or with elements of the territory. Special tools in the WEBGIS interface allow detailed consultation of the individual items on the map.

The development of Internet has meant that large quantities of data in all fields of human knowledge are now available and promote sharing of ideas, studies and information and at the same time allow even non-experts to approach and discover previously unexplorable areas of knowledge. In this context, the moving of SIGEC to WEB technology offers new models of development and communication and allows spreading and sharing of documentary investigation results and therefore of information on national and international catalogued cultural heritage.