Proceedings of the 42nd Annual Conference on Computer Applications and Quantitative Methods in Archaeology
CAA 2014 - 21st Century Archaeology/F. Giligny, F. Djindjian, L. Costa, P. Moscati, S. Robert (eds.)

Archaeology and Computer Applications: The Automatic Cataloging of Italian Archaeological Heritage

Alessandra CARAVALE

Istituto di Studi sul Mediterraneo Antico (ISMA) - Consiglio Nazionale delle Ricerche (CNR), Italy
alessandra.caravale@isma.cnr.it

Abstract

This paper is centered on the birth and early development of the automatic cataloging of archaeological heritage, with particular reference at the Seventies and Eighties that marked two very important decades in this sector. In fact, in these years in Italy as well as in other European countries, a lively debate aroused on this theme and set the basis for the development of the instruments and for the procedures and the techniques to be adopted. In this paper we will refer in particular to the Italian situation, where the introduction of computers in documentation procedures mostly pivot around two pioneering scholars: Oreste Ferrari and Paola Barocchi. Some reference will be made also to the situation in France and Britain. Some recent examples of ISMA on-line projects, such as the database Sethlans. Bronzi del Museo Faina, will also be examined

Keywords: automatic cataloging, heritage, archaeology

The cataloging of an archaeological item means to study and know it appropriately, by determining its rightful place in space and time for the purpose of its proper conservation and enhancement. The cataloging of an archaeological item also means to give further information and details about its relationship with other items or disciplines. The use of computer science for cataloging has enabled us not only to have a rapid and effective means of research, but also to check and analyze data that would otherwise be difficult to achieve when using traditional paper cards (Barocchi & Fileti Mazza, 2000; Moscati, 2002; Corti, 2003; Gamba, 2007; Caravale, 2009). The first computer experimentations of cataloging cultural heritage date back to the Sixties in most countries of the world. These kind of experimentations developed along with other more important projects of inventorying national heritage which were organized by public institutions in charge of documentation and preservation. The introduction of computer technology brought about problems linked to automatic techniques of data processing and language standardization. In other words, how to describe similar objects homogeneusly, so as to be able to perform search in databases created to catalogue archaeological items or monuments and how to retrieve that information correctly.

The first solutions to ensure uniformity of description and standardize the language were oriented to the creation of analytical 'codes' designed to describe various antique objects. In France, Jean-Claude Gardin devoted his pioneering work to this purpose (Moscati, 2002; 2013). Controlled vocabularies or thesauri, containing lists of terms or 'keywords', were then created. Later on, the general trend was to define different files for the various categories of goods, as well as the so-called 'standard catalogue'. All these tools were intended to support and control the rules and methodological guidelines to be followed in order to acquire knowledge on the goods and produce documentation relating to them, according to homogeneous and shared criteria (D'Andrea, 2006).

1. The Seventies and the Eighties

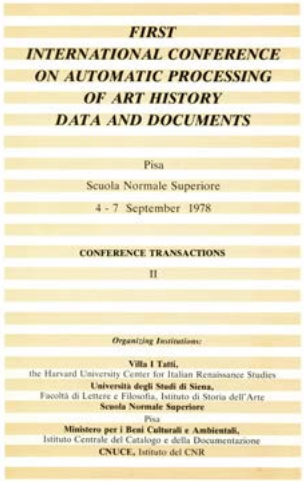
The Seventies and the Eighties marked two very important decades in the development of automated cataloging. In these years in Italy as well as in other European countries, such as France and Britain, a lively debate aroused on this theme and set the basis for the development of the instruments and for the procedures and the techniques to be adopted. In this paper we will refer in particular to the Italian situation, where the introduction of computers in documentation procedures mostly pivot around two pioneering scholars: Oreste Ferrari and Paola Barocchi. Some reference will be made also to the situation in France and Britain (Caravale, 2009).

In Italy an important contribution in this sector was given by the Istituto Centrale per il Catalogo e la Documentazione established in 1975 together with the Ministry of Cultural Heritage (http://iccd.beniculturali.it/index.php?it/95/istituto-centrale-per-il-catalogo-e-la-documentazione/). This Institute was managed from its establishment until 1990 by Oreste Ferrari (Fig. 1), an art historian who brought forward the first phase of national cataloging with enthusiasm and great determination (Gamba, 2007). He stated that the major purpose of cataloging was to ensure an effective protection of the heritage by means of its detailed knowledge, in order to provide a valid cognitive instrument of the national territory for a proper territorial planning. The catalogue was therefore seen as an essential knowledge base to defend and better appreciate the true

value of the Italian cultural heritage to be able to promote a sustainable development of national economy (Ferrari, 1972; 1975; 1979). Apart from promoting the catalogue on a large scale, Oreste Ferrari also sustained the computerized cataloging from its initial stages and followed the difficult transition from paper record cards to the automated ones. Since the early years of his leadership of the Institute, he strongly supported the need for a correct use of computers to achieve a more detailed cataloging of cultural items. The major problems were connected to the definition of the methods of a formalized cataloging, accounting for all the variety and complexity of information that each individual item might contain. This method was also intended to ensure the correctness and the terminological homogeneity in particular, thus allowing the Information Retrieval in very large archives (Ferrari, 1979; 1989; 1991; Papaldo & Ruggeri, 1993).

Figure 1: Oreste Ferrari (from Gamba, 2007).

Since the early Seventies, the Institute had established some models of type-written cards, which were organized as descriptive documents with information on items, also including photographic documentation. 'In many cases, the approach taken to storing catalogue information was very similar to the one used by librarians. The basic idea was to describe objects with 'cataloging cards' where information was organized in several semantically consistent sections, describing, for example author, period, excavation data, subject, historical and critical notes. The first organisation of the Italian Catalogue was based on a manual approach, where each object was described by a typewritten card. The basic ideas were very valid and all subsequent work has been greatly influenced by the intellectual efforts that led to the definition of the fundamental principles of the cataloging rules. The most important issues were: identification of a reduced set of different cards, corresponding to different types of objects (art objects, archaeological objects, drawings, architecture, gardens, historical centres, etc.); grouping of the information in several very general categories, like author, location, material, historical info, etc.; topological arrangement of the catalogue cards' (Signore, 2009, p. 112). For the purpose of adapting the paper record cards to allow computer processing of the data and in order to avoid vagueness and non homogeneity in the terminology, the Institute began to provide controlled vocabularies for some categories of items. The first one for the archeological area was related to the materials of the Final Bronze Age and the early Iron Age of 1980 (Parise Badoni, 1980). Then, the Institute started publishing new manuals providing guidance for card compilation. In particular a manual for the stratigraphic excavation was published in 1984, followed by those for the archaeological and art-historical goods and for archaeological buildings (Parise Badoni & Ruggeri Giove, 1984; 1988). In the same years, the Institute also created and distributed to the Italian Superintendences a system of guided and controlled data entry, called SAXA (SAXA, 1988). In the early Nineties it was replaced by a software called DESC (Lavecchia & Poggi, 1992). During the first XXI century ICCD concluded the General Cataloging Information System (SIGEC), a project focused on making possible the integrated management of the different information (alphanumeric, multimedia, geographic) available on the national heritage (Mancinelli, 2004); in 2009 it was released as SIGECweb (http://www.iccd.beniculturali.it/index.php?it/118/sistema-informativo-generale-del-catalogo-sigec/).


FIRST
INTERNATIONAL CONFERENCE
ON AUTOMATIC PROCESSING
OF ART HISTORY
DATA AND DOCUMENTS

Pisa
Scuola Normale Superiore
4 - 7 September 1978

CONFERENCE TRANSACTIONS
II

Organizing Institutions:

Villa I Tatti,
the Harvard University Center for Italian Renaissance Studies
Università degli Studi di Siena,
Facoltà di Lettere e Filosofia, Istituto di Storia dell'Arte
Scuola Normale Superiore
Pisa
Ministero per i Beni Culturali e Ambientali,
Istituto Centrale del Catalogo e della Documentazione
CNUCE, Istituto del CNR

Figure 2: First International Conference on Automatic Processing of Art History Data and Documents, Pisa, 4-7 September 1978: cover.

In the Seventies, the Scuola Normale Superiore in Pisa was also interested in the creation of glossaries and thesauri for the art-historical sector, in collaboration with the Accademia della Crusca and the John Paul Getty Trust in Los Angeles (Parra, 1993; Vesentini, 2009). The research was also centered on cataloging, data management and automated processing of sources and documents. Another art historian, Paola Barocchi, professor at the Scuola Normale Superiore, led this work and also managed the Computer laboratory and its 'Bollettino d'Informazioni del Centro di Ricerche Informatiche per i Beni Culturali'. In the Eighties the journal published articles on the various projects of archiving and cataloging produced

in that period both in the field of archeology and in the art-historical sector. In 1978 the First International Conference on Automatic Processing of Art History Data and Documents was held in Pisa, with a section devoted to archaeology (Fig. 2) (Barocchi & Bisogni, 1978). Here some international programs were presented, some of them just experimental, which gave rise to a large discussion on computerized cataloging, favored by the widespread use of personal computers. In 1984 another meeting followed in Pisa, still focusing on the relationship between computing and cultural heritage (Corti, 1984).

In the late Eighties, the Italian government allocated approximately six hundred billion old liras to finance archaeological computing projects (Rapporto sui progetti, 1989). They aimed at enhancing cultural heritage through the use of advanced technologies as well as the employment of young people in this sector. These projects involved large IT companies, such as IBM Italia, that for the first time collaborated in the field of cultural heritage. Unfortunately, the evaluation of these initiatives was not positive since they came into conflict with the others brought forward simultaneously by the Ministry. First of all, problems concerned the types of projects undertaken, that often went on regardless of the state of progress of the cataloging in the various departments and they were deprived of a broad and general vision required for a correct management of cultural heritage. Furthermore, they were limited to just a few territories and certain types of items. As a consequence they disregarded the correlation and historical contextualization between the various items that distinguished the catalogue from the inventory. Nonetheless, this experience was useful to highlight some common issues related to computerized cataloging, which were later dealt with, like the one connected to the use of mutually compatible and consistent systems.

2. France and Great Britain

In Europe other countries had contributed in this sector before Italy. For example, in England, the roots of the English Heritage Archive date back to 1908 with the foundation of the Royal Commission on the Historical Monuments of England (RCHME). Its approach was topographical. The Commission was set up to compile and publish an inventory of the ancient and historical monuments, by county and by parish, constructed from ancient age until the Eighteenth century. The activities of the Royal Commission continued during the Twentieth century and included the National Buildings Record (NBR) and National Archaeological Record (NAR). In 1999 the Royal Commission merged with English Heritage to form a new body for the historic environment. Within a context transformed by the rise of digital media and the Internet, English Heritage (http://www.english-heritage.org.uk/) still carries on its historic role of creating a record of the historic environment; making that records available to all those interested in the history around them; and preserving the record for future generations (Aberg & Leech, 1992). Now the record of England's archaeological and architectural sites contains over 400,000 records. The data set provides basic information about each site together with sources, archive and activity details as appropriate. The data set is compiled to clearly defined standards and is compatible with MIDAS (the Manual and Data Standard for Monument Inventories) and uses nationally recognized terminology standards.

More recently, in the archaeological field, the Archaeology Data Service (ADS, http://archaeologydataservice.ac.uk/), that was established in September 1996, has strongly contributed to the creation and maintenance of digital archives. The ADS is led by the University of York. Its mission is to support 'research, learning and teaching with high quality and dependable digital resources', by maintaining 'digital data in the long term, and by promoting and disseminating a broad range of data in archaeology'. This service also 'promotes good practice in the use of digital data in archaeology, provides technical advice to the research community, and supports the deployment of digital technologies'. The Archaeology Data Service web-site offers some useful databases, like for instance the one on Roman amphorae.

The problems related to language standardization and data structuring were also dealt with in France, where the research by Jean-Claude Gardin and Rene Ginouvès gave a strong impetus to the development of the automated analysis of documentary character.

L'Inventaire général des monuments et richesses artistiques de la France (http://www.inventaire.culture.gouv.fr/) was set up in 1964. Its establishment was promoted by the minister of culture Andre Malraux and by André Chastel, with the objective of reviewing, studying and getting to know all the historical, artistic and archaeological works of art that are part of the national heritage. It responded to the need of better knowing the national heritage of the country through a systematic analysis of all the elements that witnessed the art history of a territory, from the smallest to largest ones. This work was carried out on a topographic bases and by regional commissions, but following principles developed at a national level (de Massary & Coste, 2007; Meyer, 2008). The need for the standardization of information emerged because of the huge number of monuments being recorded, and it proved to be the only instrument allowing correct statistical analysis and homogeneity of documentation. The first results of the normalized treatment of data were presented in the early Seventies, earlier than in Italy. Various controlled vocabularies for databases were prepared before the end of the decade, together with software specifics. In that period some of the data collected was already published. Gardin collaborated in the implementation of controlled vocabularies with his Center d'Analyse Documentaire pour l'Archeologie (CADA) (Moscati, 2013, p. 17-19). Since 1995 the French Inventory has been available on the Ministry's web-site.

3. New ISMA projects

Over time, the development of information technologies has had a significant influence on the methodologies of cataloging cultural heritage, causing the evolution from databases to multimedia systems and then enlarging the objective of these instruments from cataloging to disclosure. In particular since the second half of the Nineties, the Internet network has become an important environment for consulting and sharing knowledge, to facilitate the work and the integration of bodies in the documentation and the protection of cultural heritage, but also to be used by a wider audience. In this direction, focusing on computerized cataloging and open access is also guiding my own research at the Istituto di Studi sul Mediterraneo Antico (ISMA) of the Italian National Research Council (CNR), which is focused on an on-line project of automated cataloging. This project concerns the bronze collection of Museo Claudio Faina in Orvieto (Figs. 3-4).

Figure 3: Faina collection: a votive bronze (© Museo).
Figure 4: Faina collection: a bronze situla (© Museo).

The Faina collection was started in 1864 by to two important members of the family: the counts Mauro and Eugenio. It is believed that the initial collection was made up of 34 vases donated to the count Mauro by princess Maria Bonaparte Valentini, Napoleon's niece and daughter of Luciano Bonaparte, who discovered Vulci necropolis. Mauro Faina was responsible for the collection until 1868, when, after his death it was inherited by his brother Claudio and subsequently given to his nephew Eugenio. The collection was initially kept in the family residence in Perugia and then transferred to its current home in Orvieto. Eugenio started to become interested in antiquities that at that time were being found during the excavations in orvietan necropolis. Inherited by Claudio junior, the collection, at that point complete, was made open to the public in 1954.

There are around one thousand different bronze objects in the this rich collection, which date from the Bronze Age up the Roman period. The majority of these objects are votive bronzes and vases (Caravale, 2003; 2006). There are also mirrors, figured applique, candelabras, thymiateria, lamps, weapons and small tools for female care and ornament. As with other objects of the collection, there is no precise indications as to where these bronze objects originated. Some data, however, can be found in some bibliographic sources and archive documents analyzed by B. Klakowicz (1970). In the bronze collection, however, it is possible to distinguish between those collected by Mauro Faina from 1864 to 1868 from the areas of Orvieto, Chiusi, Perugia, Todi and Bolsena, and those collected by Eugenio, originated exclusively from orvietan excavations conducted between 1869 and 1881.

The bronzes Faina database makes use of the Content Management System open source Museo & Web (Natale & Saccoccio, 2010). This is a system that was created by the Technological Observatory for Heritage and Cultural Activities (OTEBAC) of Italian Ministry for Cultural Heritage and Activities and Tourism (MIBACT) in order to develop and manage high quality web-sites devoted to museums or cultural institutions. This system facilitates the creation of a database of the objects kept in museums and makes use of metadata for the retrieval and access management of digital resources. 'The importance of this CMS, characterised by modules especially planned for cultural institutions, is that it is not imposed by third parties, but is designed with the contributions of the cultural institutions which participate in the enrichment of the platform by expressing their needs. The diffusion of the kit (which also includes a series of guidelines on how to build the architecture of the web-sites of cultural institutions) contribute to increase awareness among the stakeholders of cultural institutions dealing with communication and web publishing on accessibility, usability and quality of cultural website in general' (Natale & Saccoccio, 2010, p. 47).

The Faina web-site is named 'Sethlans. Bronzi del Museo Faina' (http://bronzifaina.isma.cnr.it/) (Fig. 5). It is organized with some general pages devoted to the history of the Orvietan collection; it also includes some more detailed pages dedicated to the most important bronze items of the collection with links to other databases in the web (for example: the archaeological database of Soprintendenza per i Beni Archeologici dell'Umbria, http://www.archeopg.arti.beniculturali.it/index.php?it/157/banca-dati-beni-archeologici; or The Metropolitan Museum collection on-line, http://www.metmuseum.org/collection/the-collection-online/).

Recently, an exhibition at the Museo Claudio Faina ('Sethlans. I bronzi etruschi e romani nella collezione Faina') (Fig. 6) was developed around our database, in which objects are implemented with a brief description of the finds and a special attention to their origin and chronology. From April to July 2014 the web-site counter has detected more than 250 hits; by analyzing the accesses' areas of origin, we observe that there is a good interest from Europe (Italy, Spain, France, Germany, Russia) and United States.

The aim today is not only the cataloging of a single item, but also its relationship with the cultural context of reference. From an IT point of view there is a tendency not so much to define uniform standards, but rather to develop the interoperability between different systems, fundamental for the growth of information in a wider dimension. The key objective is to create on-line archives of data, in order to enable the scholars of art and archaeology to exploit new technologies for their own research and for the exchange of information at an international level.

Figure 5: Sethlans. Bronzi del Museo Faina web-site: homepage.

Figure 6: 'Sethlans. I bronzi etruschi e romani nella collezione Faina': exhibition poster.

References

ABERG, F.A. & LEECH, R.H. (1992). The National Archaeological Record for England. Past, Present and Future. In: *Sites and Monuments. National Archaeological Records*. Kobenhavn: The National Museum of Denmark, pp. 157-170.

BAROCCHI, P. & BISOGNI, F. (eds.) (1978). *First International Conference on Automatic Processing of Art History Data and Documents, Pisa, 4-7 September 1978*, Pisa.

BAROCCHI, P. & FILETI MAZZA, M. (2000). Beni culturali e ambientali. Beni culturali e informatica. In: *Enciclopedia Italiana, Appendice 2000*. Volume 1. Roma: Istituto della Enciclopedia Italiana Treccani, pp. 177-181.

CARAVALE, A. (2003). *Museo Claudio Faina di Orvieto. Bronzetti votivi.* Electa: Editori Umbri Associati.

CARAVALE, A. (2006). *Museo Claudio Faina di Orvieto. Vasellame.* Electa: Editori Umbri Associati.

CARAVALE, A. (2009). La catalogazione informatica del patrimonio archeologico. In: MOSCATI, P. (ed.) (2009) *La nascita dell'informatica archeologica. Atti del Convegno Internazionale, Roma, Accademia Nazionale dei Lincei, 24 ottobre 2008. Archeologia e Calcolatori* 20, pp. 179-187.

CORTI, L. (ed.) (1984). *Second International Conference on Automatic Processing of Art History Data and Documents, Pisa, 24-27 september 1984*, Pisa, Scuola Normale Superiore.

CORTI, L. (2003). *I beni culturali e la loro catalogazione*. Milano: Bruno Mondadori.

D'ANDREA, A. (2006). *Documentazione archeologica, standard e trattamento informatico*. Budapest: Archaeolingua.

DE MASSARY, X. & COSTE, G. (2007). *Principes, méthode et conduite de l'Inventaire général du patrimoine culturel.* Paris: Ministère de la Culture et de la Communication, direction de l'architecture et du Patrimoine. Available from: http://www.culture.gouv.fr/culture/inventai/presenta/normes/livretPMC/livretPMC_2007.pdf. [Accessed: viewed 16 July 2014].

FERRARI, O. (1972). La catalogazione dei beni culturali. *Bollettino d'Arte* 57. pp. 224-229.

FERRARI, O. (1975). Esperienze e prospettive dell'automazione in rapporto all'attuale situazione del catalogo dei beni culturali. In: *L'automazione del catalogo del patrimonio storico-artistico. Roma, 14 gennaio 1975. Informatica e documentazione. Supplemento*, pp. 13-22.

FERRARI, O. (1979). Lessici come strumento della catalogazione. In: *Atti del Convegno nazionale sui lessici tecnici delle arti e dei mestieri, Cortona, 28-30 maggio 1979*. Firenze: Eurografica. p. 181-189.

FERRARI, O. (1986) Informatica, programmazione e giacimenti culturali. *Notiziario del Ministero per i Beni Culturali e Ambientali* 8-9. pp. 27-28.

FERRARI, O. (1989) Esperienza archeologica e catalogazione. *Bollettino di Archeologia* 1. p. 24-25.

FERRARI, O. (1991) La catalogazione dei beni archeologici e le tecnologie informatiche. *Archeologia e Calcolatori*. 2. pp. 13-17.

FERRARI, O. & PAPALDO, S. (1978) Progetto di automazione del catalogo dei beni culturali in Italia. In: BAROCCHI & BISOGNI, 1978, chapter V.

GAMBA, C. (ed.) (2007). *Oreste Ferrari. Catalogo documentazione e tutela dei beni culturali. Scritti scelti*. Roma: Iacobelli.

KLAKOWICZ, B. (1970). *La collezione dei conti Faina in Orvieto. La sua origine e le sue vicende*. Roma: L'Erma di Bretschneider.

LAVECCHIA, F. & POGGI, F. (eds.) (1992). *Schede catalogo territoriale. DESC. Programma di data entry, stampa e consultazione*. Roma: ICCD.

MANCINELLI, M.L. (2004). Sistema Informativo Generale del Catalogo: nuovi strumenti per la gestione integrata delle conoscenze sui beni archeologici. *Archeologia e Calcolatori* 15. pp. 115-128.

MEYER, J.-P. (2008). Le Service de l'Inventaire du Patrimoine culturel et sa documentation. *Revue d'Alsace.* 134. p. 389-417 Available from: http://alsace.revues.org/1430#tocto1n2/. [Accessed: 16 July 2014].

MOSCATI, P. (2002). L'informatica in archeologia. In: *Il mondo dell'archeologia*. Volume 1. Roma: Istituto della Enciclopedia Italiana Treccani, pp. 318-323.

MOSCATI, P. (2013). Jean-Claude Gardin (Parigi 1925-2013). Dalla meccanografia all'informatica archeologica. *Archeologia e Calcolatori*. 24. pp. 7-24.

NATALE, M.T. & SACCOCCIO, R. (2010) Museo & Web: un kit pratico per le istituzioni culturali che vogliono realizzare un sito web di qualità. *Archeologia e Calcolatori*. 21. pp. 27-47.

PAPALDO, S. & RUGGERI, M. (1993). La catalogazione automatizzata del patrimonio archeologico nazionale in Italia. In: *International Conference on Data and Image Processing in Classical Archaeology, Ravello, 3-4 April 1992*. *Archeologia e Calcolatori* 4. pp. 323-327.

PARISE BADONI, F. *et al*. (eds.) (1980). *Dizionario Terminologico Materiali dell'età del Bronzo finale e della prima età del Ferro*. Firenze: Centro Di.

PARISE BADONI, F. & RUGGERI GIOVE, M. (eds.) (1984). *Norme per la redazione della scheda del saggio stratigrafico*. Roma: Multigrafica.

PARISE BADONI, F. & RUGGERI GIOVE, M. (eds.) (1988) *Strutturazione dei dati delle schede di catalogo: beni archeologici immobili e territoriali*. Roma-Pisa: ICCD-CNUCE.

PARRA, M.C. (1993). Applicazioni informatiche nel campo dei beni culturali: le esperienze della Scuola Normale Superiore di Pisa. In: *International Conference on Data and Image Processing in Classical Archaeology, Ravello, 3-4 April 1992. Archeologia e Calcolatori*. 4. pp. 315-321.

Rapporto sui progetti ex art. 15 Legge 41/1986 (1989), Roma.

SAXA, (1988). *Sistema per l'acquisizione controllata delle schede dell'arte*. Roma: ICCD.

SIGNORE, O. (2009). Representing knowledge in archaeology: from cataloging cards to Semantic Web. In: MOSCATI, P. (ed.) (2009) *La nascita dell'informatica archeologica. Atti del Convegno Internazionale, Roma, Accademia Nazionale dei Lincei, 24 ottobre 2008, Archeologia e Calcolatori* 20. pp. 111-128.

SIGNORE, O. (2011). Un approccio 'sociale' e ontologico alla catalogazione. *SCIRES-IT. SCIentific RESearch and Information Technology. Ricerca Scientifica e Tecnologie dell'Informazione 1(2)*. Available from: http://www.caspur-ciberpublishing.it/index.php/scires-it/article/view/90/. [Accessed: 16 July 2014].

VESENTINI, E. (2009). Gli anni '70 e la Scuola Normale. In: MOSCATI, P. (ed.) (2009) *La nascita dell'informatica archeologica. Atti del Convegno Internazionale, Roma, Accademia Nazionale dei*