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Digitalization of Monuments and Archaeological Sites

Mancomunidad de la Ribera Alta (MANRA)

Sergi Machí - Local Project Coordinator
Helder Moreira - Project stakeholder of MANRA

MANCOMUNITAT DE LA RIBERA ALTA

The Mancomunidad de la Ribera Alta is...

- A Public Administration - Association of 35 municipalities gathering 224.107 inhabitants over 979,5 km^2
- Aiming to promote activities and shared services between municipalities
- Located in the East of Spain, within the Province of Valencia
- Funded from municipalities contributions and other Public Administrations funds

Region of Valencia *Province of Valencia* *Ribera Alta Region*

Monuments and archaeological sites in Ribera Alta

ALFARP's Cave Paintings (UNESCO's World Heritage-1998)

Monuments and archaeological sites in Ribera Alta

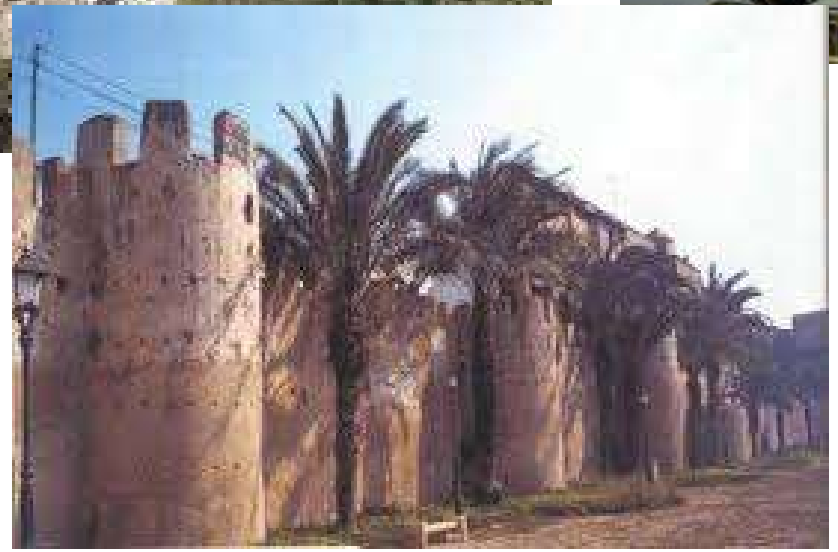
ANTELLA's Iberian settlement (5th Century BC)

Monuments and archaeological sites in Ribera Alta

ENOVA's roman settlement (1st Century)

Monuments and archaeological sites in Ribera Alta

Arabian towers and other monuments (9th– 13th Century)



Monuments and archaeological sites in Ribera Alta

Medieval Christian Period (13th– 15th Century)

Monuments and archaeological sites in Ribera Alta

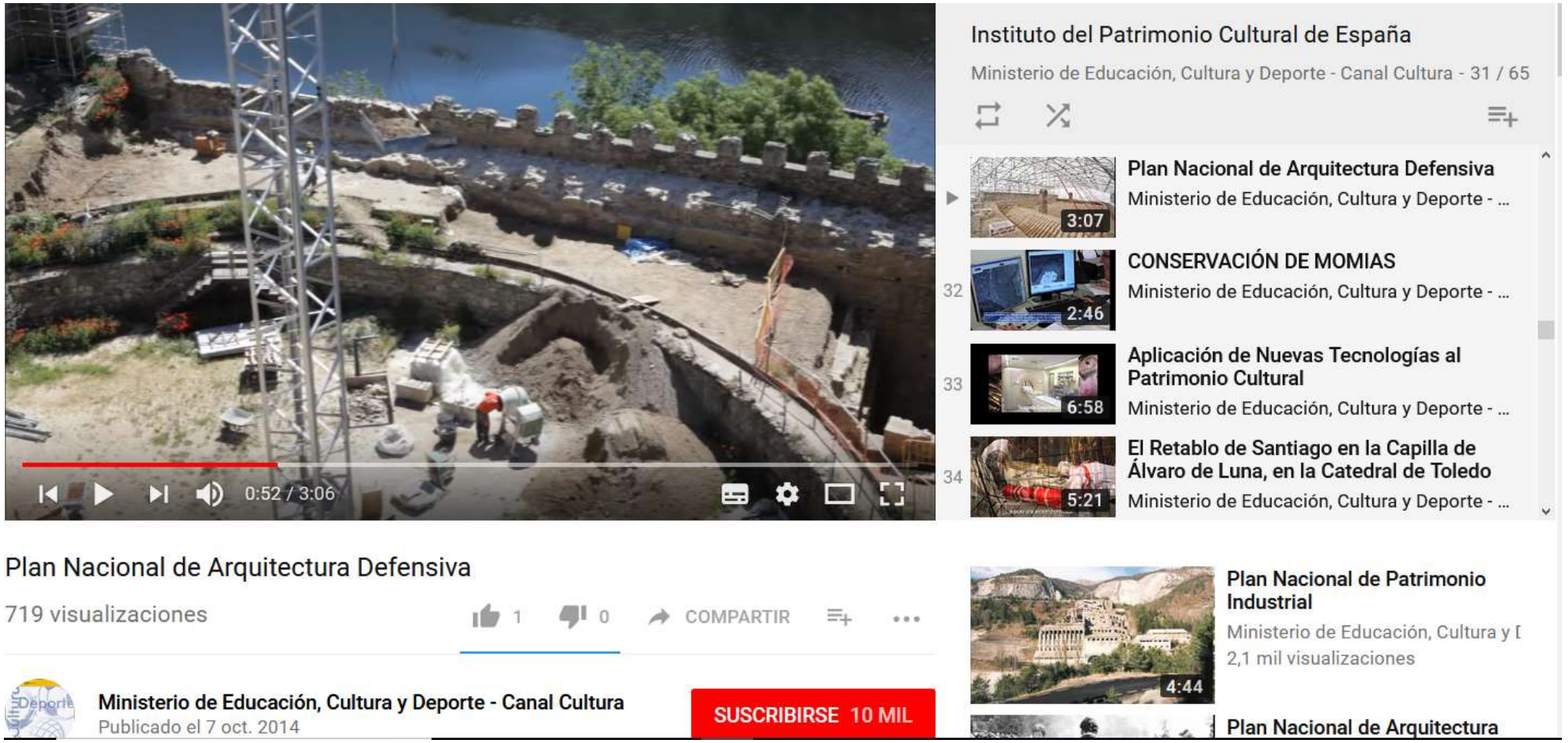
More recent monuments and archaeological sites

POLICY of the cultural heritage

- **National Plans To Investigate and safeguard historical sites**
  - Partnership between the Spanish Cultural Heritage Institute (ICPE) and the Ministry of Education and Culture.
  - Specific objective: “Archiving, processing and dissemination of technical documentation available on Spanish Historical Heritage and referred to projects, interventions and work done on that heritage; research and study on criteria, methods and techniques for conservation and restoration.”

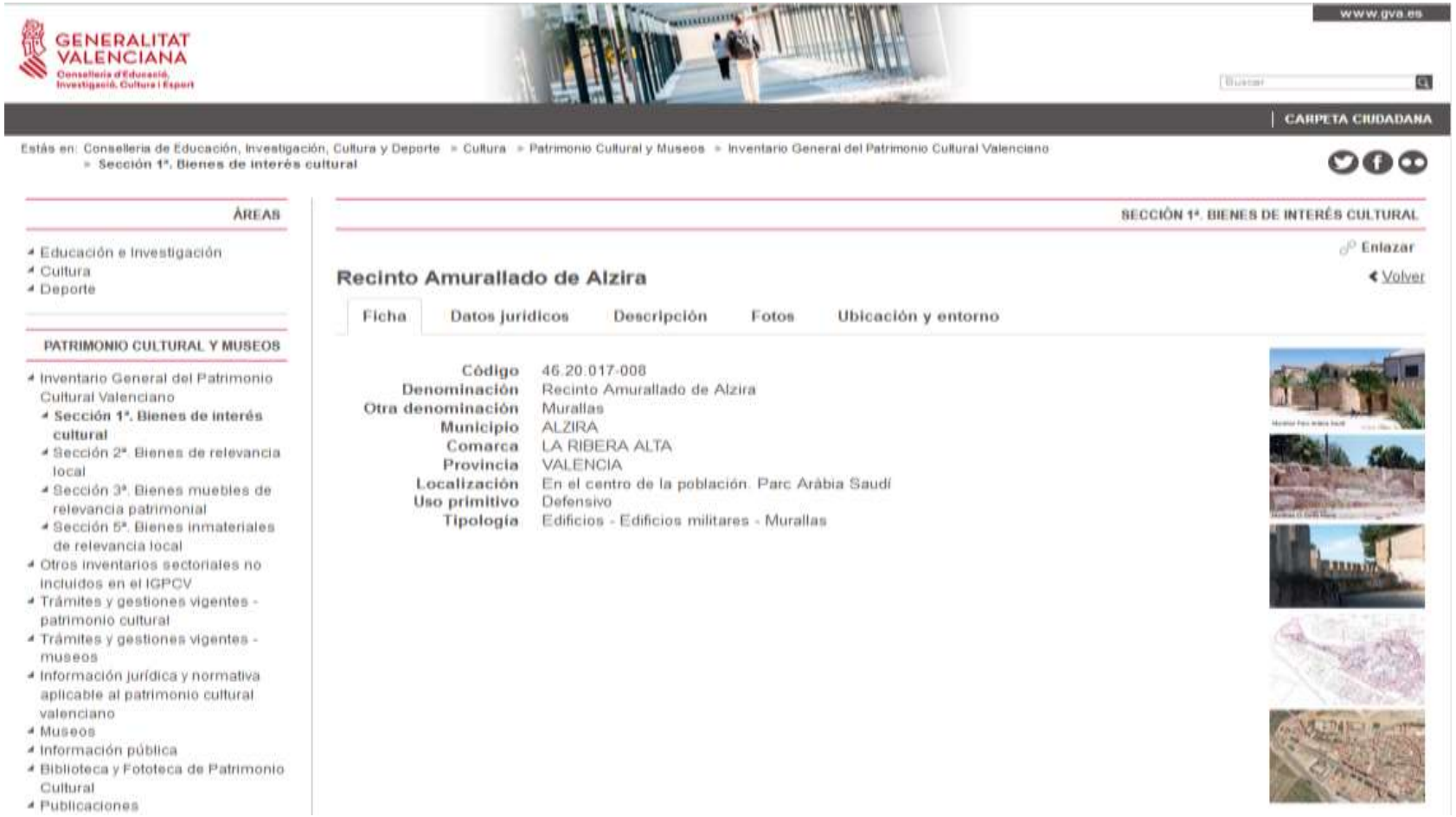
- **Valencian Cultural Heritage Law**
  - Since 2007 (from a 1998 law modification)
  - Programming and undertaking actions to restore and protect heritage
  - Promoting its enhancement

National Plans To Investigate and Safeguard Historical Sites



MANAGEMENT of the cultural heritage

- Valencia General Directorate of Cultural Heritage offers an online list of historical sites



http://www.ceice.gva.es/va/web/patrimonio-cultural-y-museos/

DIGITALIZATION of the intangible cultural heritage

No pictures

- Additional work is needed.

Spanish studies – documents

- *Digitalization of Cultural Heritage.* BAÑUELOS CAPISTRÁN, Jacob Israel.

- Razón y palabra. http://www.razonypalabra.org.mx/anteriores/n44/jbanuelos.html

- *Tourism management of cultural heritage,* VELASCO GONZÁLEZ, María (2009)

- Universidad de Murcia. https://revistas.um.es/turismo/article/view/70121

In Conclusion

- In Ribera Alta Region there is an important variety of monuments and archaeological heritage.
- At national and regional level there are some policy instruments (PI) to promote and safeguard this heritage. Digitalization is reaching an important presence as a tool in this aim.
- At local level there aren't any relevant initiatives concerning digitalization of archaeological heritage.
- More efforts are needed to safeguard our heritage and to promote digitalization tools as a way to disseminate and safeguard it.

Archaeology – Traditional view

"Excavation is destruction"[1] - that emphatic exhortation for careful archaeological recording- is perhaps the most repeated adage among archaeologists from student to professor, novice to professional. If not a destructive activity, excavation is glossed also as an "unrepeatable experiment" [2], stressing the objective and scientific nature some hope it to embody.

Christopher H. Roosevel

Archaeology – Traditional view

An example of this paradigma can be view in the “cut” above.

To reach the blue stratum, one must first remove the Orange startum above.

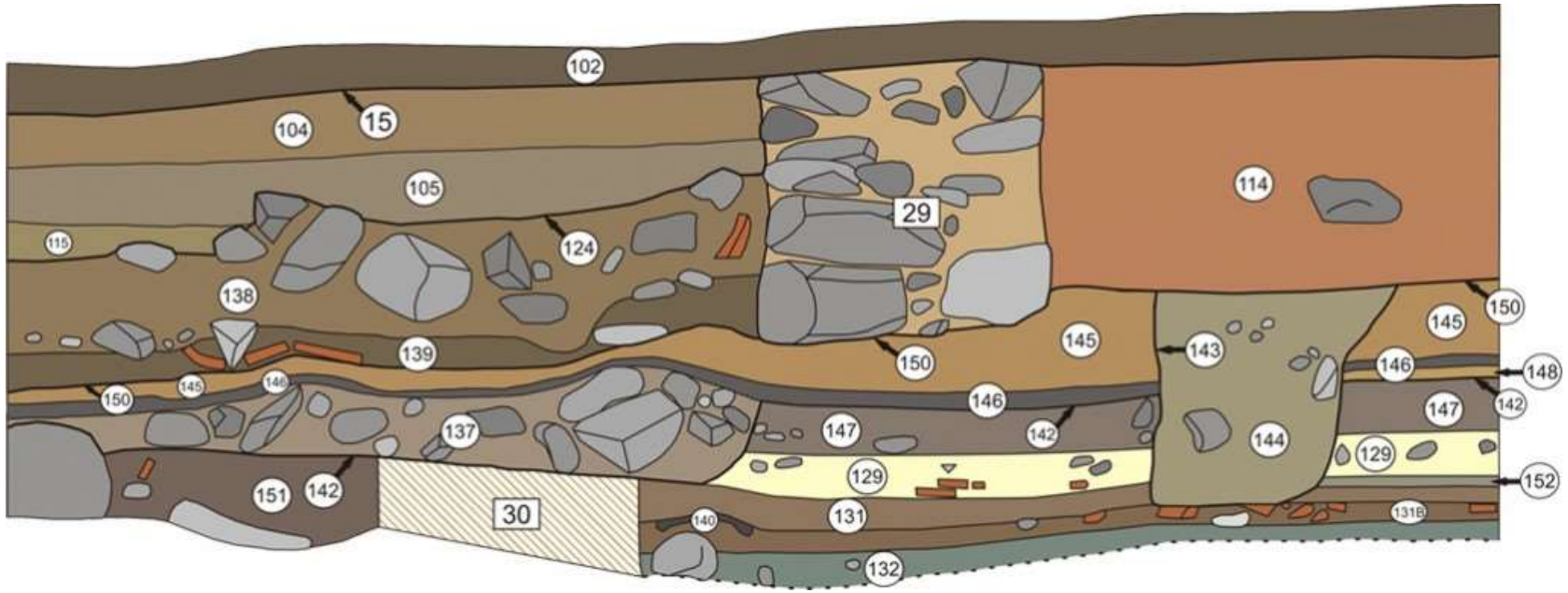
(*) http://www.guarrazar.com/el-yacimiento/los-hallazgos/

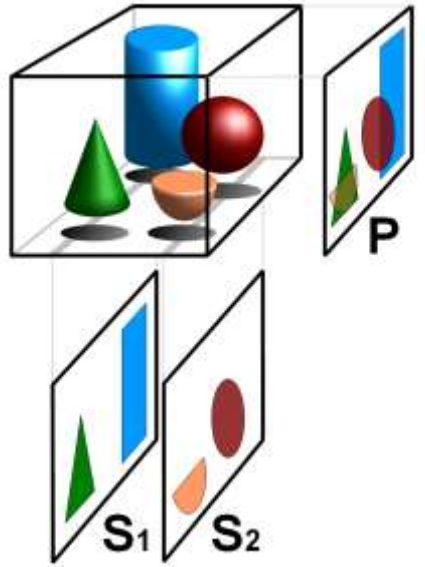
Archaeology – New approach

New view —“**excavation is digitization**”— seeing it not as a “destroyer” [3] of material but as a “creator” [4] of data, that attempts not to suggest the preservation of a pristine, objective archaeological record, but only the high-quality recording of an excavator's subject.

Representation of realities and objects via digitization is made possible by advances in technologies and thinking digitally

Archaeology – New approach





Every portion of the excavation can be view and reconstruct like puzzle of “Tomography” digital objects

(*) http://www.guarrazar.com/el-yacimiento/los-hallazgos/

Digital Archaeology – Metadata

Every “digital object” has physical characteristic's, gps coordinates, decryption, ...
This properties of object are call **Metadata**.

If each person uses a different format of Metadata, then its virtually impossible to search/publish relevant information (exp: on the internet).

Thus the framework and format of the **Metadata** is crucial for bring the Archaeology to the digital area.

Digital Archaeology – Metadata

Metadata is "data [information] that provides information about other data".

Three distinct types of metadata exist:

- **Descriptive metadata** describes a resource for purposes such as discovery and identification. It can include elements such as title, abstract, author, and keywords.

- **Structural metadata** is metadata about containers of data and indicates how compound objects are put together, for example, how pages are ordered to form chapters. It describes the types, versions, relationships and other characteristics of digital materials. [3]

- **Administrative metadata** provides information to help manage a resource, such as when and how it was created, file type and other technical information, and who can access it.[4]

(WIKIPEDIA)

Digital Archaeology – Metadata formats

CIDOC Archaeological Sites Core Data Standard

Core Data Index to Historic Buildings and Monuments of the Architectural Heritage

CIDOC CRM

MIDAS Heritage

POLIS DTD

LIDO

ADS

ISO 8601

....

Digital Archaeology – Metadata formats

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ADS Project Metadata

Element	Description
Project Title	The title (and any alternatives) for the dataset.
Description	A brief summary of the main aims and objectives of the research project (or alternative process) from which the data collection arose together with a brief summary description of the content of the dataset.
Subject	Keywords for the subject content of the dataset (qualified using e.g., the English Heritage NMR Monument Type Thesaurus or the MDA Object Type Thesaurus.
Coverage	This is both spatial and temporal coverage.
Creators	Details of the creator(s), compiler(s), funding agencies, or other bodies or people intellectually responsible for the data collection. Information should include forename, surname, affiliation, address, phone, fax, email, or URL.
Publisher	Details about any organisation which has published this data.
Contributors	Other individuals or organisations who have contributed to the resource.
Identifiers	Project or reference numbers used to identify the dataset.
Source	Any important earlier work(s) from which this resource is derived.
Dates	Dates indicating when the dataset was created, when the archaeological project was carried out, processing dates, or computerisation dates as appropriate.
Copyright	The name of the copyright holder for the dataset. If the collection was created during work by an employee, the copyright holder will normally be the employer. If the material is covered by a specific copyright (e.g., Crown copyright) please indicate this.
Relations	If the data collection was derived in whole or in part from published or unpublished sources, whether printed or machine-readable, this element should include references to the original material, details of where the sources are held and how they are identified there (e.g., by accession number). If the collection is derived from other sources include an indication of whether the data represents a complete or partial transcription/copy and the methodology used for its digitisation. Also include full references to any publications about or based upon the data collection.
Language	Indication of which language(s) the dataset is in (e.g., English, French, Spanish).
Resource Type	Whether the dataset is best described as primary data, processed data, an interpretation of data, or a final report.
Format	The format the data is saved in (e.g., WordPerfect 5.1, HTML, AutoCAD).

tDAR General Metadata

Element	Description
Basic Information	Basic metadata include association of a resource with a larger project, lifecycle status (e.g., draft, active, deleted), Language, Year Created, Abstract/Description and Physical Storage Location.
Bibliographic Metadata	Specific to documents, uses MODS metadata fields to describe resources.
Resource Creators	These fields are used to properly credit individuals and institutions for their contribution to the resource. "Role" refers to the individual's main role for the resource (e.g., creator, editor, etc.).
Resource Specific or Agency Identifiers	Describes agency or project identifiers used (e.g., Smithsonian Trinomial, AZ State Museum—ASM—number).
Investigation Type(s)	Lists all investigation types relevant to the resource (e.g., Research Design, Site Monitoring, Data Recovery/Excavation).
Site Description Information	Includes Site Name, Site Type (controlled vocabulary), and keywords
Material Type(s)	Artifact types covered by the resource (e.g., Ceramic, Fauna, Metal, Dating Sample).
Cultural Term(s)	Includes Culture (e.g., PaleoIndian, Archaic) and user created values.
Temporal Coverage	Includes Temporal Terms (e.g., Pueblo IV), Coverage Dates, Date Type (e.g., Calendar, Radiocarbon), Start/End Years and Description (e.g., Calibrated, Range of ± N years).
General Keyword(s)	User created values to describe aspects of the resource not covered by other metadata.
Spatial Terms	Includes Geographic Terms (e.g., Death Valley), Coordinates
Resource Provider	The institution that authorized the resource to be archived and disseminated.
Individual and Institutional Roles	Name, Current Email Address, Institution and Role of those involved with the resource.

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Digital Archaeology – Metadata formats

Generic minimum file-level metadata

Element	Description
File name	The name of the file e.g., report.doc
File format	The file format e.g., PDF/A or Open Office Document
Software used to create the files	The software used to create the file e.g., Microsoft Word 2007
Hardware used to create the files	The hardware used to create the file, this is more significant when files are created directly by survey equipment such as laser scanners or GPS devices.
Operating system used to create the files	The operating system under which the file was made e.g., Windows XP or Mac OS X 10.5.
Date of creation/last file update	When the file was made or updated.
Processing history or Lineage	This element should be used to highlight relationships between files and whether a file is a source file or derived from another.

File-level technical metadata

Element	Description
UNIQUE_ID	Auto-generated unique ID e.g.,1234567
FILE_LOCATION	The file path i.e. directory and filename e.g., /adsdata/cottam_ba/jpg/fwking_plan.jpg
CHECKSUM_TYPE	The checksum algorithm used e.g., MD5, SHA-1, etc.
CHECKSUM_VALUE	The checksum value generated by algorithm e.g., 578cbb18f73a885988426797bcab8770
PROJECT_ID	A unique project ID e.g., ADS-123
GENERATED	Date the checksum was created e.g., 16-May-2006
GENERATED_BY	Person who created the checksum e.g., Doe, J
LAST_AUDITED	The date at which the file was last checked or verified e.g., 16-May-2007

Digital Archaeology – Metadata formats

File-level process metadata

Element	Description
PROCESS_ID	Auto-generated unique ID e.g.,1234567
PROJECT_ID	A unique project ID e.g., ADS-123
SOURCE_FORMAT	The format of the original file e.g., .txt
DESTINATION_FORMAT	The destination format e.g., .shp
PROCESS_AGENT	Who did the processing e.g., Doe, J.
PROCESS_COMMENTS	Comments relating to the process undertaken e.g., "referenced to WGS84'.
PROCESS_START_DATE	Date that the process started e.g., 17-May-2007
PROCESS_COMPLETION_DATE	Date process completed e.g., 17-May-2007
PROCESS_DESCRIPTION	A description of the process e.g., "Import of XYZ data into ArcView for analytical purposes and dissemination as research outcome'.
PROCESS_GUIDELINES	Any guidelines related to the process.
PROCESS_HARDWARE_USED	Hardware used to process the file e.g., Viglen Genie Intel Pentium 4
PROCESS_SOFTWARE_USED	Software used to process the file e.g., ESRI Arcview 9.1
PROCESS_INPUT	Full file path of the source file e.g., /adsdata/pro-453/xyz/file.xyz
PROCESS_OUTPUT	Full file path of the output file e.g., /adsdata/pro-453/shp/file.shp
PROCESS_RESULT	Comments on the result of the processing e.g., "Success".
PROCESS_TYPE	Description of the process carried out e.g., "Conversion – dissemination."

Digital Archaeology – Guides to Good Practice

1. **Common Digital Objects**
   - Documents and Texts
   - Databases and Spreadsheets
   - Raster Images
   - Vector Images
   - Digital Video
   - Digital Audio

2. Data Collection
3. Data Analysis

Digital Archaeology – Guides to Good Practice

1. Common Digital Objects

2. **Data Collection**
   - Aerial Survey
   - UAV Survey
   - Geophysics
   - Marine Remote Sensing
   - Laser Scanning
   - Close Range Photogrammetry

3. Data Analysis

Digital Archaeology – Guides to Good Practice

1. Common Digital Objects
2. Data Collection
3. **Data Analysis / viwers**
    - GIS
    - CAD
    - 3D Models

Archaeology – projects

"The ARIADNE project addresses the fragmentation of archaeological datasets throughout Europe and fosters the use and re-use of data through the interoperability of digital archives. Thereby it aims to promote and support a culture of sharing and collaborative use of archaeological data across disciplinary, organizational and national boundaries." [5]

(FP7-INFRASTRUCTURES-2012-1-313193)

Archaeology – projects

Archaeology in Contemporary Europe was a project that promoted archaeology as a way of gaining new knowledge about the past. The crucial aspect of the project was to promote archaeology as contemporary practice which results might be of interest for the wider public.

The idea behind the ACE was to build up a network that could offer a comparative analysis of archaeology and the value of the past in the present-day Europe.

The project was selected and funded (2008-2012) by the Culture Programme of the European Commission.

Some Case Studies

ACE Case Studies

- Inrap: Archival Preparation of the ''ArchéoDB'' field registration system. Emmanuelle Bryas and Carine Carpentier, French National Institute for Preventive Archaeological Research.
- Preparing the Paliambela Kolindros Archaeological Project digital archive for long term preservation. Markos Katsianis, Aristotle University of Thessaloniki.

ARIADNE Case Studies

- Selection and Retention of Files in Big Data Collections: The Example of the Pergamon Excavation of the DAI Istanbul. Felix F. Schäfer, Deutsches Archäologisches Institut (DAI).
- Dendrochronological Data in Archaeology: A Guide to Good Practice Peter Brewer (Laboratory of Tree-Ring Research, University of Arizona) and Esther Jansma (Laboratory of Tree-Ring Research, University of Arizona).
- The Dendrochronology of the Early-medieval Emporium Dorestad (the Netherlands). Esther Jansma (Laboratory of Tree-Ring Research, University of Arizona) and Peter Brewer (Laboratory of Tree-Ring Research, University of Arizona).
- Thermoluminescence Dating: A Guide to Good Practice. Nikolaos A. Kazakis & Nestor C. Tsirliganis, Athena Research and Innovation Center.

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2) Barker 1982 Barker, P. 1982. Techniques of Archaeological Excavation. 2nd edn. London: Batsford
3) Frankel 1993 Frankel, D. 1993. "The Excavator: Creator or Destroyer?" Antiquity 67: 875–877..
4) Carver, M. O. H. 2006. "Thinking Allowed," *Rescue News* 100: 6–8..
5) Ariadne Booklet 9 (http://www.ariadne-infrastructure.eu/content/download/4569/26666/version/2/file/Ariadne+Booklet.pdf)

Stephen Hughes (2011). CT Scanning in Archaeology, Computed Tomography - Special Applications, Dr. Luca Saba (Ed.), InTech, DOI: 10.5772/22741. Available from: https://www.intechopen.com/books/computed-tomography-special-applications/ct-scanning-in-archaeology

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Thank you !

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Mancomunidad de la Ribera Alta

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