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Unveiling the Potential of "Minor" Archaeological Documentation: Digital Tools and Methodological Advances

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Abstract

The development of digital archaeology has provided new perspectives on the management, archiving, and sharing of archaeological data. This paper explores the use of digital management tools for archaeological data related to category of finds that have historically been overlooked in traditional archaeological research yet have considerable informative potential. The case study presented focuses on zooarchaeological data, which includes information derived from the study of faunal remains found in excavation contexts.

The digital management of this dataset presents significant methodological challenges, mainly due to the lack of standardization in data processing. To address these issues, a custom data management system was developed. The *REFOCUS* database (Re-evaluating Faunal and Object Collections for Unrecognized Significance) was designed to manage "minor" archaeological finds, focusing on data integrity, provenance, transparency, and reproducibility, while avoiding oversimplification. Its goal is to make legacy data accessible and usable for archaeological research.

Within the framework of the National Recovery and Resilience Plan (PNRR), and as part of the CHANGES project, the research has been further developed to encompass the design of a dedicated tool for the systematic recording of faunal data in the field, alongside the standardization of data acquisition and digitization protocols.

Keywords: Faunal Remains -- Legacy data – Memory -- Digital Heritage -- #AIUCD2024

Lo sviluppo della Digital Archaeology ha permesso di affrontare da nuove prospettive le tematiche della gestione, archiviazione e condivisione dei dati archeologici. Nel presente contributo si discute il tema dell'uso di strumenti di gestione informatica per il trattamento di dati di natura archeologica relativi ad una classe di reperti a lungo sottostimata nella ricerca archeologica tradizionale ma che, in realtà, dispone di un potenziale informativo notevole, i resti osteologici animali. La gestione digitale dei dati faunistici implica problematiche di ordine metodologico, di non immediata risoluzione, per il superamento delle quali è stato necessario sviluppare un sistema di gestione dei dati che potesse rispondere alle criticità riscontrate, prima fra tutte l'assenza di standardizzazione nel trattamento

dei dati. Il database "REFOCUS - Reevaluating Faunal and Object Collections for Unrecognized Significance" realizzato per la gestione dei reperti archeologici cd. Minori, è stato progettato, in funzione della conservazione della integrità, provenienza, trasparenza e riproducibilità dei dati, evitando ogni sorta di semplificazione. Con l'obiettivo di rendere i legacy data accessibili e utilizzabili per la ricerca archeologica.

Grazie al Piano Nazionale di Ripresa e Resilienza (PNRR), nell'ambito del progetto CHANGES." la ricerca è stata ampliata per concentrarsi anche sulla archiviazione dei dati faunistici sul campo e sulla standardizzazione delle procedure di acquisizione e digitalizzazione attraverso lo sviluppo di uno strumento appositamente progettato.

Parole chiave: *Resti Faunistici -- Legacy data – Memoria -- Patrimonio Digitale -- #AIUCD2024*

1. Introduction

The relationship between archaeology and computer science is riddled with methodological challenges, primarily due to the absence of a shared language. Issues such as the inherent uncertainty of archaeological data and the subjective interpretations of excavation materials that may evolve over time have in some instances inhibited the categorical use of digital tools to address and archaeological requirements [6:382-383]. Overreliance on digital tools has also attracted criticism within academic circles, particularly from supporters of so-called "Slow Archaeology" [5]. One of the most sensitive aspects of the interaction between these two disciplines lies in the need to preserve the complexity of the humanist approach of the archaeologist, while determining the applicability of rigorous, standardized languages to the treatment of archaeological subjects [11:21], [29:4-5].

A fundamental issue that permeates all archaeological data is the management of legacy data, comprising both paper-based archival materials and early digital records that do not align with current standards of processing and interoperability. While such data is far from obsolete, it requires systematic preparation and transformation before it can be effectively integrated into contemporary digital environments [1].

From a computer science perspective, the management of archaeological data can be problematic due to the difficulty in obtaining information that is not influenced by the interpretative process, which is intrinsic to the very nature of archaeological data [8], [31]. This challenge arises from uncertainties – such as those often encountered in chronological, spatial, or functional information – as well as from the fact that the classificatory process is shaped by variables that are both rational and intuitive. It is further influenced by interpretation and personal experience, making it inherently subjective [21:281], [15:278-280]. Nevertheless, managing archaeological data with digital tools facilitates the optimization of data acquisition and processing workflows, and encourages archaeologists to observe data quality and organization principles.

One of our primary goals is the improvement of documentation and reuse practices, a complex issue that includes both the direct reuse of data, as well as decomposition and reapplication in different contexts [3], [31]. In archaeology, reuse concerns not only the integrity, provenance, transparency, and reproducibility of data, but also its interpretation [8]. Archaeologists analyse and interpret data to draw meaningful archaeological conclusions in a process that is distinct from raw data collection [5]. This separation often complicates tracing the origin and assessing the reliability of data. These are by no means trivial issues, given the widespread dissemination of information, results, and scientific interpretations stored in public and shared databases.

2. Issues in the documentation of faunal remains: data analysis and methodological approaches

Methodological challenges in the management of archaeological data are particularly pronounced when dealing with categories of finds traditionally considered as "minor." This designation typically applies to objects that are small in size or considered to have limited artistic or chronological significance – such as so-called small finds. For similar reasons – namely, their perceived lack of aesthetic or chronological value, especially in comparison to pottery – faunal remains have often received marginal attention in the past, and frequently excluded from publications or confined to appendices. Moreover, the inherent nature of these materials poses specific difficulties in terms of documentation, standardization, and digital integration.

Faunal remains represent a valuable source of information for understanding human-animal relationships over time. Animal bones recovered from archaeological sites can provide insights into diet, hygiene, climate, site occupation seasonality, hunting and husbandry practices, as well as pastoralism. Moreover, they can significantly contribute to the study of broader issues such as trade, social organization, production, religion, and funerary rituals [7:3].

For an extended period, the study of animal bones recovered from archaeological contexts – positioned at the intersection of the humanities and the biological sciences – was regarded as ancillary to conventional archaeological inquiry. As a consequence, the interpretative potential of faunal remains was frequently underestimated, with notable repercussions for the archiving, sharing, dissemination, and preservation of associated datasets. In recent years, however, considerable methodological advancements have been achieved, accompanied by a growing recognition of the critical role that faunal analyses play in addressing complex research questions concerning the human past.

Despite significant methodological advancements and the integration of digital technologies in zooarchaeology – facilitating the reassessment of bioarchaeological data [30] – key issues surrounding the documentation and archiving of faunal remains have remained underexplored, particularly in relation to the management of legacy data.

For instance, there is a distinct lack of standardized protocols and digital tools for documenting faunal remains during excavation that are comparable with excavation documentation forms (US, USM, etc.) or anthropological forms (AT) developed by the Italian Central Institute for Cataloguing and Documentation (http://www.iccd.beniculturali.it/).

The use of digital resources for archiving faunal data from ongoing research is now well-established (e.g., https://archaeologydataservice.ac.uk/, www.tdar.org/, www.daacs.org, https://opencontext.org/, https://zooarchnet.org, www.sead.se/) [30]. However, this cannot be said for data from previous studies, often referred to as legacy data. Managing these data in zooarchaeology presents several methodological and practical issues, the foremost of which is digitization. In most cases, published data exist in paper format. This issue is closely tied to the lack of standardization stemming from the heterogeneous nature of publication practices [20:410], [29:15-17], [15:280-282]. These challenges often hinder the use of relational alphanumeric databases for processing legacy data, despite their potential to facilitate the immediate comparison of archival data from different contexts and support further data analysis. A preliminary data normalization procedure is, therefore, essential.

This section presents a case study that addresses these issues from a methodological perspective and proposes concrete solutions for their systematic digital management.

The case study focuses on zooarchaeological documentation from sites in Eastern Sicily, dating from the Neolithic to the Early Bronze Age (6200–1450 BC). This study is part of a broader research project aimed at integrating multiscalar faunal data to inform theoretical debates concerning prehistoric pastoral practices on the island.

The sample comprises 19 archaeological sites located across the eastern region, in the Etnean and Iblean territories, within the modern provinces of Catania, Syracuse, and Ragusa [25]. The study focuses on the analysis and management of faunal data with the goal of developing a custom digital tool for the specific needs of the zooarchaeological documentation under investigation (Figure 1). In Sicily, as in other regions, faunal remains have historically occupied a marginal position in prehistoric research. This limited focus contrasts with the methodological importance of zooarchaeological data in reconstructing subsistence strategies, particularly those related to pastoral economies [2]. A systematic review of legacy datasets reveals that the long-standing underestimation of the interpretive potential of faunal assemblages has led to uneven and often sparse documentation practices. Although recent studies have begun to address these gaps, they remain limited in scope relative to what might be expected, given the richness of the available material and the critical role of such data in broader archaeological narratives.

A survey of the archaeological documentation concerning the period and geographical area under investigation reveals notable quantitative and qualitative inconsistencies [25:56]. These discrepancies stem from the fact that the studies were conducted by different researchers, each adhering to varying standards for reporting results. In some cases, the level of detail in the documentation met the analytical requirements established by the project's research framework. In others, however, the available data permitted only a more limited exploration, addressing specific aspects of the research. Nevertheless, all available data have been stored and integrated into the database, making them as accessible as possible.

The most significant discrepancies concern specific parameters. For instance, data on age-at-death are not consistently provided, and quantitative information sufficient for constructing mortality profiles is present in only approximately 70% of the cases. Moreover, in several instances, no information is given regarding the Minimum Number of Individuals (MNI). Lastly, in nearly all the consulted documentation, species representation percentages are calculated solely on the basis of the Number of Remains (NR).

The corpus of documentation, both published and unpublished, includes preliminary reports, appendices with alphanumeric tables in some cases, brief summaries, and, more rarely, extended analyses containing quantitative information, sometimes in considerable detail. Unfortunately, only two cases contain raw data archived in spreadsheet format. These datasets have been supplemented with raw data from three sites – Calicantone (Modica-RG) [27], Calaforno (Giarratana-RG) [28], and Molona (Caltagirone-CT) [17] – which derive from recent research conducted by the author [26] (Figure 1). All of these data were considered in various ways depending on their nature, completeness, and relevance to the research objectives.

The most recent faunal records exhibit a higher degree of detail and include aspects such as taphonomy, which are frequently omitted from summary reports. A thorough examination of the natural and anthropogenic modifications affecting osteological remains is essential for reconstructing the depositional histories of archaeological contexts. Such analysis, in turn, enables a more accurate interpretation of faunal assemblages and contributes meaningfully to the broader reconstruction of the archaeological record.

In the framework of a synthesis study addressing an issue such as emergence of pastoralism, the lack of standardization constitutes the main challenge to be addressed, as it is crucial to have

qualitatively and, more importantly, quantitatively comparable data on which statistical analyses can be based. Digitization and data normalization become therefore necessary for data usability and for the progression of the dedicated information management system [20].

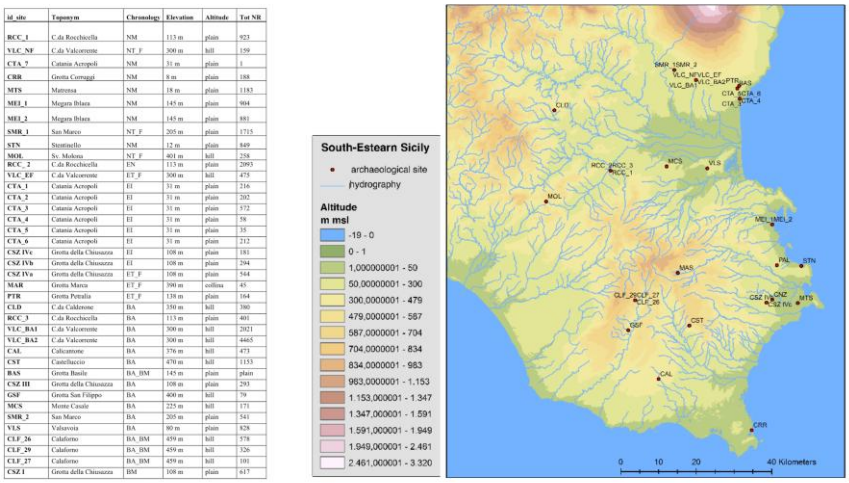

Figure 1 Distribution map of the sites involved in the research (created by Erica Platania and Rodolfo Brancato)

3. The implementation of REFOCUS (re-evaluating faunal and object collections for unrecognized significance)

The REFOCUS (Re-evaluating Faunal and Object Collections for Unrecognized Significance) relational database system dedicated to the management and processing of "minor" archaeological finds (developed within the 'Storage. Dai dati al Web' project), was based on the prototype system GEAR, specifically developed for small finds [8].

The choice to expand an existing database with zooarchaeological data, through the development of a more comprehensive system, arises from the recognition that many of the challenges encountered during the analysis of faunal data were analogous to those addressed in the development of the GEAR system: 1) the underestimated informative potential of the finds; 2) problematic management of so-called legacy data; 3) lack of terminological standardization; 4) the need to preserve all sources, avoiding the loss of information; 5) the need to create a method for evaluating the reliability of the data; 6) the standardization of heterogeneous documentation available; 7) the possibility to allow for subsequent updates, and be able to respond to specific queries in line with the primary objectives of the research.

REFOCUS is capable of managing archaeological and zooarchaeological information with a high degree of control, while duly considering the heterogeneity of published data, the potential for integrating these with more recent and more detailed research data and allowing for the creation of specific queries at multiple scales (Figure 2)

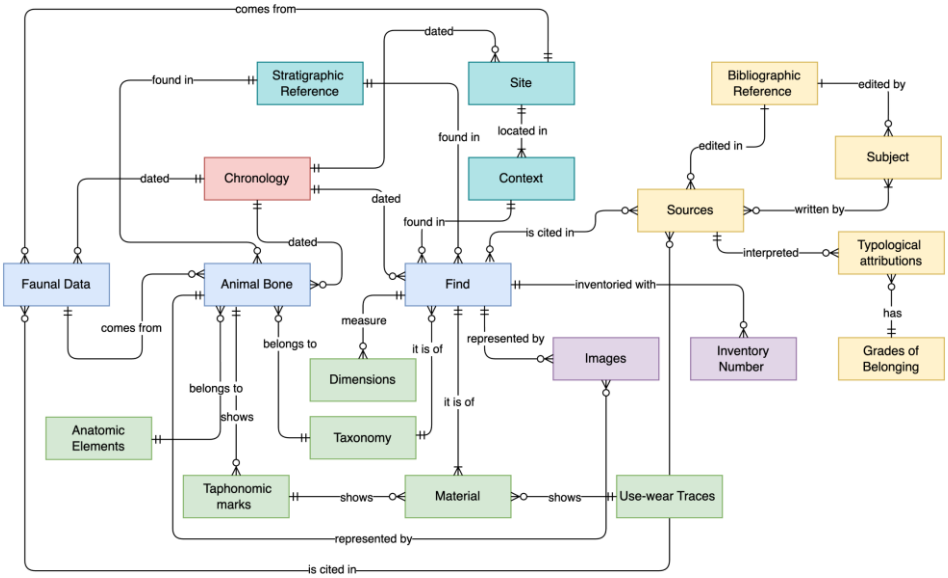

Figure 2 E-R diagram of the REFOCUS system with the core entities "Finds", "Animal bone" and "Faunal Data" (in light blue), entities related to location and context (in aquamarine), characteristics (in green), chronology (in red), inventory and graphic sources (in violet) and documentation (in yellow) (created by Marianna Figuera and Erica Platania)

In this context, only the archives related to the management of faunal materials are detailed (Figure 3), and methodological reflection was necessary to overcome the critical issues described above, which also represented the most challenging aspects of the design phase

The "Site" table is designed in accordance with the type of information available in the published documentation and gathers data related to the general description ('Site_ID'; 'Description'; 'Chronology_ID') 'Site_Type_ID' to define the type of site; ('Abbreviation"), to the location ('Province'; 'Locality'; 'Latitude'; 'Longitude'), and to geomorphology ('Environment'; 'Altitude'; 'Hydrology').

The "Finds" table is designed and structured around the individual artifact, with its attributes organized into two groups of information: general description ('Find_ID'; 'Taxonomy_ID'; 'Description'; 'Chronology_ID'; 'Discovery_Date'; 'Details') and contextual references ('Stratigraphic_Reference_ID'; 'Context_ID').

In different archives, the information concerning the contexts and stratigraphic references is processed, as well as data related to chronology and cultural phases ('Chronology_ID'; 'Period_Phase'; 'Abbreviation'; 'Absolute_Dating'; 'Dating_From' and 'Dating_To', fields for managing relative dating; 'Radiometric_Dating'). The latter are related, without mandatory constraints, to "Site", "Find", "Animal_Bones" and "Faunal_Data".

The "Animal_Bone" table includes detailed references to taxonomic, anatomical, osteometric, and taphonomic data. Following the general fields 'Animal_Bone_ID'; 'Faunal_Data_ID'; 'Stratigraphic_Reference_ID'; 'Context_ID'; 'Chronology_ID'; 'Identified_specimens'; the structure includes: 'Taxonomy_ID' which records classification data (species, genus, family, class); 'Anatomical_Element_ID' indicating the specific anatomical part represented by the bone fragment; and '*Completeness*', describing the preserved portion of that element. The field 'Teeth_in_Situ' specifies the presence of mandibles or maxillae with teeth still in place. Osteometric data are recorded in the fields 'Size'; 'Age'; 'Laterality'; 'Measurements'; 'Withers_Height'. The final set of fields is dedicated to taphonomic evidence, encompassing both anthropogenic and natural (biotic and abiotic) modifications. These include 'Taphonomic_Marks_ID'; 'Marks_Type_ID'; 'Description' 'Burning_Traces'; 'Color' and 'Whatering_Stage' a categorical field with five predefined values used to assess the natural processes that affected bone preservation and sample formation post-deposition.

The "Faunal_Data" manages zooarchaeological information derived from published materials associated with each individual site under analysis. It is therefore linked to both the "Site" archive and the "Animal_Bone" table, enabling access to comparable summary data that support a multiscalar analytical approach. The "Faunal_Data" archive includes a series of fields primarily intended to store quantitative data on faunal remains recovered from the referenced site: 'Faunal_Data_ID'; 'Animal_Bones_ID'; 'Site_ID'; 'Chronology_ID'; 'Total_Number_of_Elements'; 'Reliability_Level_ID' the latter to indicate the reliability of the data; 'Total_Identified'; 'Total_Unidentified'; 'Total_NR_Domestic_Taxa'; 'Total_NR_Wild_Taxa'. Two fields connected to 'Taxonomy' are dedicated to the Number of fragments 'NR' and the Minimum Number of Individuals 'MNI' for identified species.

A group of archives dedicated to documentation also includes nine tables where information related to sources can be managed using the fuzzy approach, as was the case in the prototype system GEAR [8] which allows for the preservation of data uncertainty and variability and supports the reliability of archaeological attributions [10]. The fuzzy logic approach is a mathematical method capable of blurring the rigid true/false dichotomy of standard computing rules and moving beyond the traditional interpretation of information where a value is viewed as either positive or negative.

The fuzzy method is based on a range of values between the Boolean 0 and 1: where 0 corresponds to false and 1 to true, all decimal values between these two represent intermediate stages of truth [13:103]. Therefore, each piece of information can be accompanied by a pertinence value or degree of truth, thus preserving subjectivity and encoding the degree of uncertainty often inherent in archaeological data [21].

Fuzzy values can be used to manage two main types of information: so-called "labels", or predefined concepts such as "male" and "female" or "type", and numerical values such as age or date. The potential of the fuzzy method has been tested for managing "labels", which are predefined categories for which the "probability of belonging" can be calculated [13]. For each find, the possibilities of belonging to each category in the list of possible "types" are assessed, and a decimal coefficient is assigned based on the degree of probability, according to the scale of values chosen previously [12].

The fuzzy method applied to source management allows for the generation of a relevance index for the sources, thus evaluating the reliability of the typological and functional interpretations attributed to the finds, which is particularly useful in the case of small finds, as well as the reliability of the data related to the archaeological interpretation of the context and that specific to the zooarchaeological record. In the first case, for example, the find ID_1112 has been given

three different typological attributions over time: 'Razor' in 1907 [23], 'Dagger' in 1951 [24: 99-103], and 'Dagger' or 'Spear' in 1999 [16: 262]. The fuzzy method allows for tracking each of these attributions, assigning a "probability of belonging" value to each typology, and, considering all the reliability criteria citation of the find description within any given document [8: 98-103] (Figure 4)

The fuzzy method has been applied to zooarchaeological data to address two critical issues.

The applied to source management allows for the generation of a relevance index for the sources, as well as the reliability of the data related to the archaeological interpretation of the context and that specific to the zooarchaeological record. Resolving the methodological issues inherent in this case study led to addressing the concepts of source relevance, source type, and the reliability of typological attribution, thus proposing a potential approach for the conscious reuse of data [9]. Several criteria had to be considered: the age of the source, the scientific credibility of the claims (derived from the scientific data and detailed analyses presented in support), the depth of the source (supported by studies, compilatory, preliminary, reasoned notation, immediate notation, etc.), the degree of certainty expressed by the author within the same attribution, and the consistency with previous interpretations [10], [8:98-106].

Fuzzy analysis has also been applied to estimating the age at death of individuals - an essential aspect for reconstructing models of animal resource exploitation - [22], and at the same time, one of the most problematic to obtain based on the existing documentation. The uncertainty in this case arises from factors related to the preservation of remains, but largely also from the methodologies that can be used for determination. Age estimation is primarily based on two methods: analysis of the state of epiphyseal fusion in long bones and observation of the eruption, replacement, and wear stage of teeth. Both methods, however, do not provide exact numbers, but rather age ranges that are sometimes quite broad, through which one can more or less reliably determine the pertinence to predefined age classes (young, adult, old, etc.). The state of the documentation often does not allow for a sufficiently certain attribution of an individual/osteological element to an age class, resulting in the omission of uncertain elements during processing to avoid erroneous attributions. The fuzzy approach makes it possible to assign a degree of belonging to one or more age classes for the same element, with the advantage of incorporating elements previously excluded due to their perceived uncertainty, thereby greatly expanding the dataset and partly addressing the data shortage and contributing to a more accurate interpretation of the zooarchaeological record [14].

The REFOCUS relational database currently manages 1,736 osteological finds from the sites of Calicantone (Modica-RG), Calaforno (Giarratana-RG), and Molona (Caltagirone-CT), as well as faunal data from 19 sites in southeastern Sicily. In order to address data accessibility requirements, the ultimate goal is the development of a web interface designed to monitor the status quo of the research and provide the scientific community with the ability to consult and verify the data.

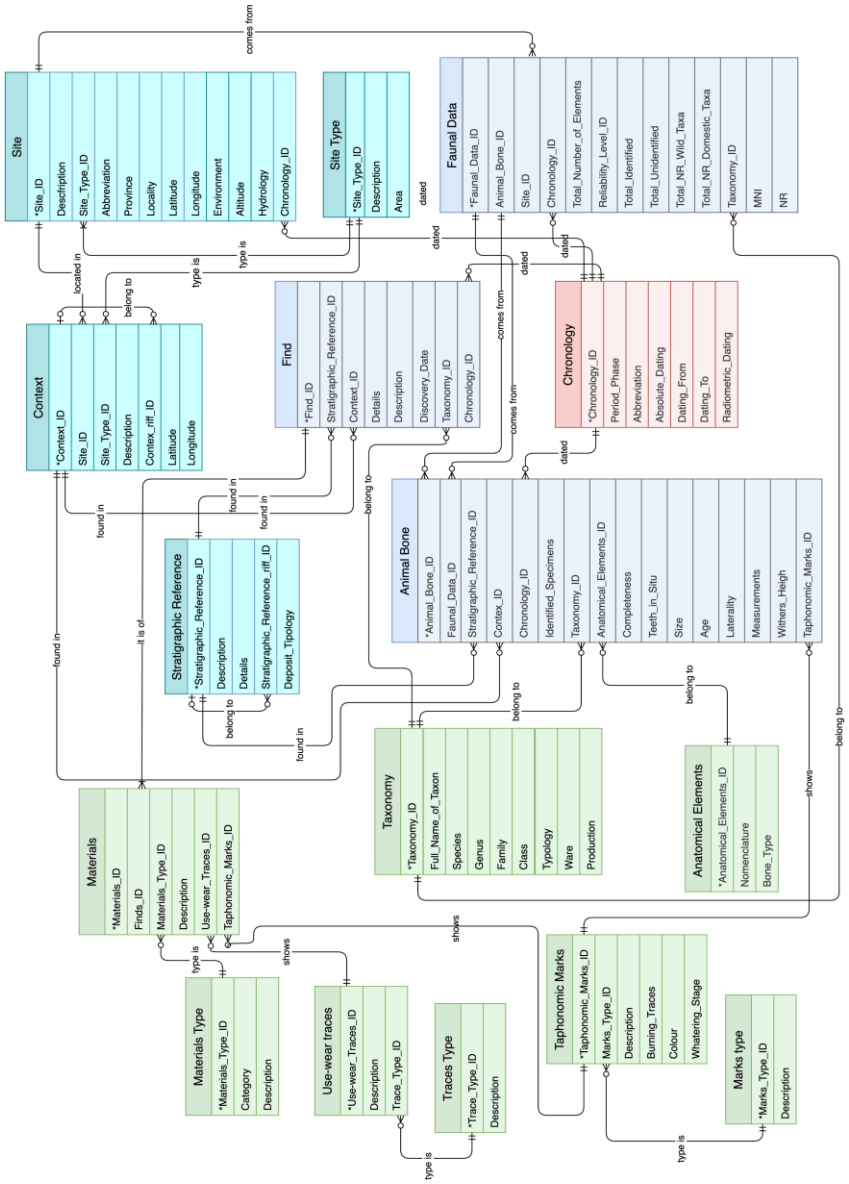

Figure 3 REFOCUS logical model: all tables (excluding tables related to documentation) involved in the management of faunal data, including PKs, FKs, and all other attributes, (created by Erica Platania and Marianna Figuera)

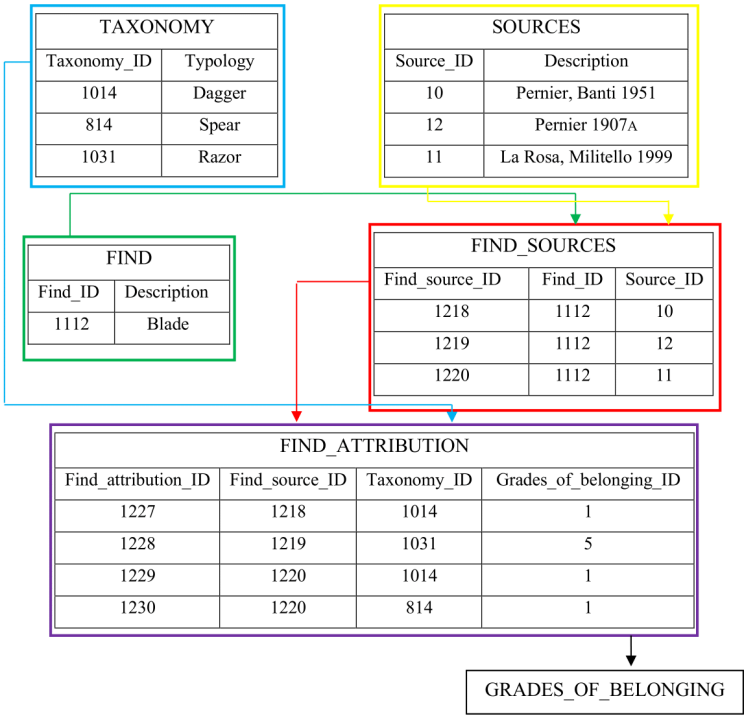

Figure 4 Database tables involved in managing source-related information using the fuzzy method (adapted from Figuera 2020, p. 101, fig. 30).

4. Further developments of the research: documenting faunal remains from excavation

Thanks to the opportunities provided by the National Recovery and Resilience Plan (PNRR), it has been possible to delve further into some of the issues addressed in order to create protocols and best practices for the documentation of Cultural Heritage within the framework of the research initiative promoted by The Extended Partnership "CHANGES: Cultural Heritage Innovation for Next-Gen Sustainable Society" – Spoke 6, History, Conservation, and Restoration of Cultural Heritage.

The project focuses on the application of integrated methodologies, strategies, and approaches for the knowledge, conservation, restoration, and communication of multilayered Cultural Heritage contexts, combining humanities, historical-archaeological, historical-artistic knowledge with a scientific approach. A key element is the focus on creating standardized and shareable investigation protocols, analysis methodologies, and documentation practices.

As part of the CHANGES project, the opportunity to extend the discussion on the digital management of zooarchaeological data to the documentation practices of faunal remains during excavation has been realised.

The issue of standardizing the methods of documenting faunal remains has been re-examined, this time focusing on the moment of initial data acquisition during archaeological excavation. This represents a critical stage for gathering information that is essential for accurate interpretation of archaeological contexts, which are difficult to reconstruct exclusively in the laboratory. Specifically, the recognition of major issues in the archival practices for this category of finds led to reflection on the need to develop an optimized tool for documenting faunal remains during excavation – aimed at facilitating proper management of the zooarchaeological record, preserving the contextual relationship of the remains, and promoting accurate digital archiving.

To address the lack of standard tools in Italy, such as the field sheets developed by the ICCD for other categories of archaeological finds (US sheets for stratigraphic units, AT sheets for anthropological remains, etc.), work has begun on creating a specific "FR sheet" for documenting faunal remains (Figure 5).

The completion of this field sheet is intended to document critical aspects relevant to contextual interpretation, such as depositional methods and diagenetic processes contributing to deposit formation (e.g., orientation, accumulation patterns), the associations with other find categories, the presence of specific taphonomic agents, the distribution and characterization of burning traces, among other details. This practice ensures the preservation of information that would otherwise be irretrievable after excavation. Such information is often inadequately documented or recorded in ways that do not always directly contribute to the documentation available to the zooarchaeologist in the laboratory.

The recording form was designed for use in both burial contexts featuring anatomically articulated remains and in the documentation of sporadic finds within mixed assemblages. In the former case, a single form is completed for each individual burial. In the latter, documentation is carried out on a stratigraphic unit basis, thereby recording the assemblage of faunal remains in direct relation to their specific depositional context.

It consists of seven sections each designed to encompass information of varying types and with different levels of detail (Figure 6).

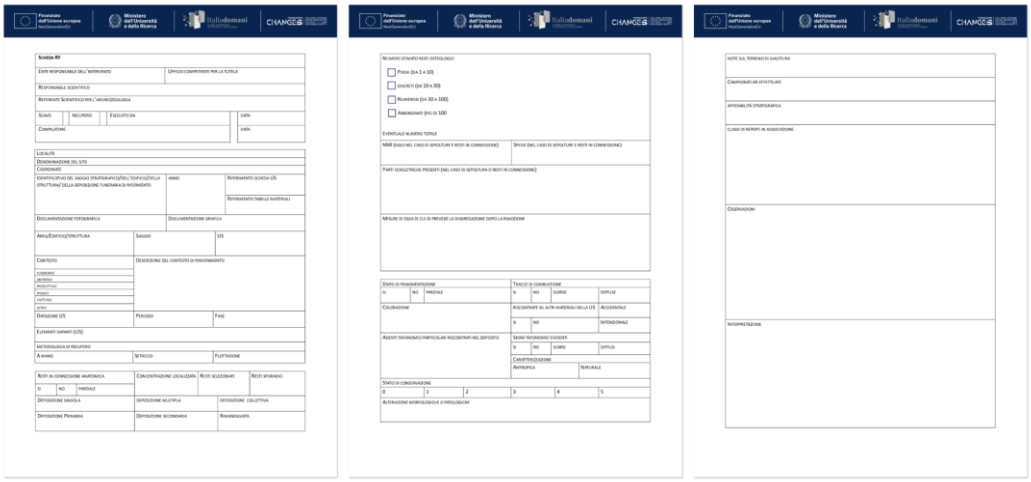

Figure 5 FR sheet for documenting faunal remains in the field (created by Erica Platania).

The first section is dedicated to the identification data of the excavation and recovery intervention (responsible entities, scientific directors, and compilers). The second section covers the location of the find and related archaeological and archaeographical documentation. The third section is entirely dedicated to defining the context and contains in addition to archaeological characterization information, available data on chronology, and recovery methods used.

The core of the form is composed of three sections designed to record zooarchaeological data in close relation to the context of the find. Section four focuses on documenting the disposition of remains and accumulation mode, which are particularly valuable for burial contexts, but also for distinguishing between sporadic remains or localized concentrations. Section 5 provides space for recording quantitative data, structured across varying levels of detail. A scale ranging from 'scarce' to 'abundant' offers a preliminary estimate of the number of fragments – subject to later refinement in the laboratory – while a dedicated field allows for recording the total number of remains, if quantifiable during excavation. Although the estimation of fragment numbers is a preliminary step that will be refined later, it is considered a useful tool for the analysis and interpretation of stratigraphic units and contexts during the excavation campaign. The fields concerning species, anatomical elements, and MNI are not mandatory and are specifically intended for burial contexts, where such data are generally more intuitive and reliable to infer. A designated space is provided to record measurements of remains that may undergo fragmentation or disintegration after being removed from their original context.

The section dedicated to taphonomic data is crucial for preserving information during excavation, as it focuses entirely on the transformations that remains undergo before, during, and after burial. It includes fields for recording the extent and coloration of burning traces, other taphonomic indicators observed either within the context or in associated bone assemblages, as well as assessments of fragmentation patterns and weathering stages. Notably, this section also allows for noting the presence of similar evidence in other materials from the same stratigraphic unit, which can significantly enhance interpretation. A final descriptive section is dedicated to notes, particular observations, and preliminary interpretations of bone assemblage.

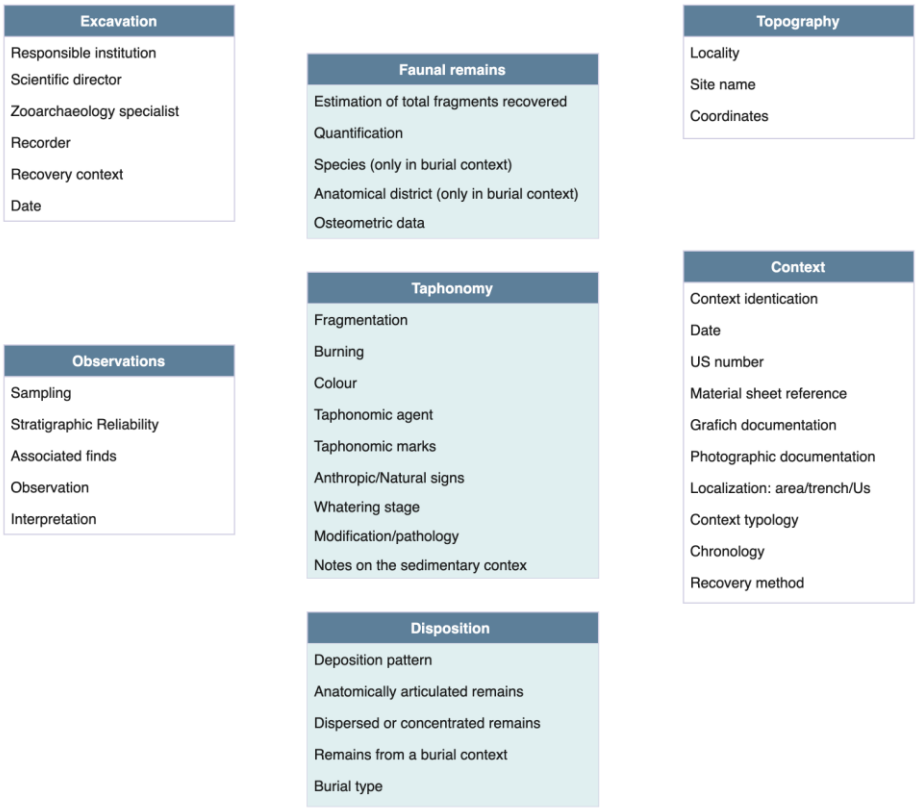

Figure 6 Organization of the sections that make up the "FR table" (created by Erica Platania).

At the conclusion of the theoretical development of the recording sheet – also prepared in a paper version to facilitate data collection during excavation – (Figure 5) several key considerations guided the selection of the most appropriate digital tool for processing and archiving the resulting data. First, the selected tool needed to be compatible with other standard excavation documentation systems, including US sheets, USM sheets, material recording forms, and graphic or photographic records. Second, it was essential for the tool to support spatial data management through integration with Geographic Information Systems (GIS), which are widely used in the documentation of archaeological excavations. This led to the decision to use an existing tool, specifically the "PyArchInit" plugin for the open-source software QGIS [18], [19] created for the cataloguing, management, visualization, and analysis of data from archaeological excavations, surveys, and topographic studies, and extensively used by public and private research entities. The plugin manages alphanumeric tables, GIS geometries, topographic, and multimedia data within a single platform. The benefits include the ability to accelerate the data collection process, while ensuring standardization and consistency in documentation, and also enabling advanced queries and analysis. As part of the collaboration established with the developers of "PyArchInit" (adArte S.r.l.) [4], the work to create an extension for the plugin, the "FR table" was undertaken. This table is designed to integrate with existing sources that manage excavation documentation (US and UM, inventoried materials, etc.).

6. Conclusions

The work presented demonstrates how, through collaboration between specialists in humanities and informatics, it is possible to address some of the methodological issues that characterize the relationship between the two disciplines.

The case study of digital management of zooarchaeological sources from prehistoric eastern Sicily formed the foundation for developing strategies and tools to address the specific challenges of this category of archaeological finds, thereby enhancing their informative potential. In the design and development of REFOCUS, particular attention was paid to aspects such as reconsidering all legacy data, systematizing and standardizing the structure of data and reference vocabularies, flexibility in handling inherently disparate information from different chronological contexts and geographical scopes, the possibility of preserving data uncertainty through the application of fuzzy methodology, and creating a system for validating the reliability of sources. The developed database meets fundamental requirements such as accessibility, through the development of a web interface, and the conscious reuse of sources, preserving the origin of the information to avoid simplifications and to trace all data, even conflicting, ensuring the system evolves into a sort of container of memories. Within the PNRR CHANGES project, we extended the methodological reflection on the digital handling of faunal data to the initial phase of data acquisition from archaeological excavations and began designing a field sheet for managing faunal data, a category of finds for which no specific tools exist. The creation of an "FR table" for field documentation responds to specific needs and allows for the standardization of archiving procedures, positively impacting the overall management of excavation data, processing timelines, and accuracy. Additionally, in line with the goals pursued by Spoke 6, it is designed as a standardized, user-friendly tool for the scientific community in open-source mode, open to future updates, and integrates with existing archaeological excavation documentation systems.

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