

# ARCHEOLOGIA E CALCOLATORI

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FROM POTTERY TO CONTEXT.  
ARCHAEOLOGY AND VIRTUAL MODELLING

edited by  
Vincenzo Baldoni



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## VIRTUAL ARCHAEOLOGY AND THE STUDY OF NECROPOLISES AS A SYSTEM: METHODOLOGY AND PRACTICE IN THE CASE STUDY OF NUMANA (AN), ITALY

### 1. THE STUDY OF NECROPOLISES: METHODOLOGY AND PRACTICE

The primary aim of the *From Pottery to Context* Project is the reconstruction of the ancient funerary landscape of the pre-Roman settlement of Numana (Ancona), selecting one of the main necropolises as case study. This aim entails the effort to collect all the available data, certainly primarily archaeological, but also archival and geomorphological. The analysis has been already undertaken (see BALDONI in this volume) through methodologies more closely linked to traditional archaeological research, such as the study of the necropolis of Valle Trebba belonging to the Etruscan port-city of Spina in the Po Delta. There, the reconstruction of a funerary landscape totally lost, due to the profound changes that have taken place over 2.300 years in one of the most dynamic geomorphological environments in the world, has led the research group of the Chair of Etruscology of Bologna University to reconstruct the ancient morphology of the islands emerging from the lagoon in which the necropolis was established, starting from the maps of the 19<sup>th</sup> century and the excavation data (Fig. 1; GAUCCI 2015, 118-125). Thanks to the philological reconstruction of the grave goods, it was possible to anchor the individual burials to the funeral space and therefore undertake the analysis of the dynamics of occupation. The two poles of this methodological approach, which is part of a consolidated practice, are on the one hand finds and structures that form the funerary contexts and on the other the environment of the necropolis, an exceptional diachronic palimpsest of social dynamics of a community filtered through funerary ideology.

The aforementioned practice is part of a tradition of Etruscan and Italic studies and it distinguishes the Bolognese School in particular, starting from the study of the Etruscan necropolis of Bologna (SASSATELLI 1988; most recently, MORPURGO 2018). The methodological premises underlying the team work are inserted within a broader and international debate which now benefits from important analysis tools, allowing us for the integration of spatial and landscape analysis with the study of grave goods and funerary ideology (see CERCHIAI 2018, with references).

Thanks to the continuous updating of funerary studies with increasingly innovative methods, the reconstruction of complex systems, such as the necropolises, currently allows scholars to probe more deeply the historical and social framework within which the funerary landscape developed. It is

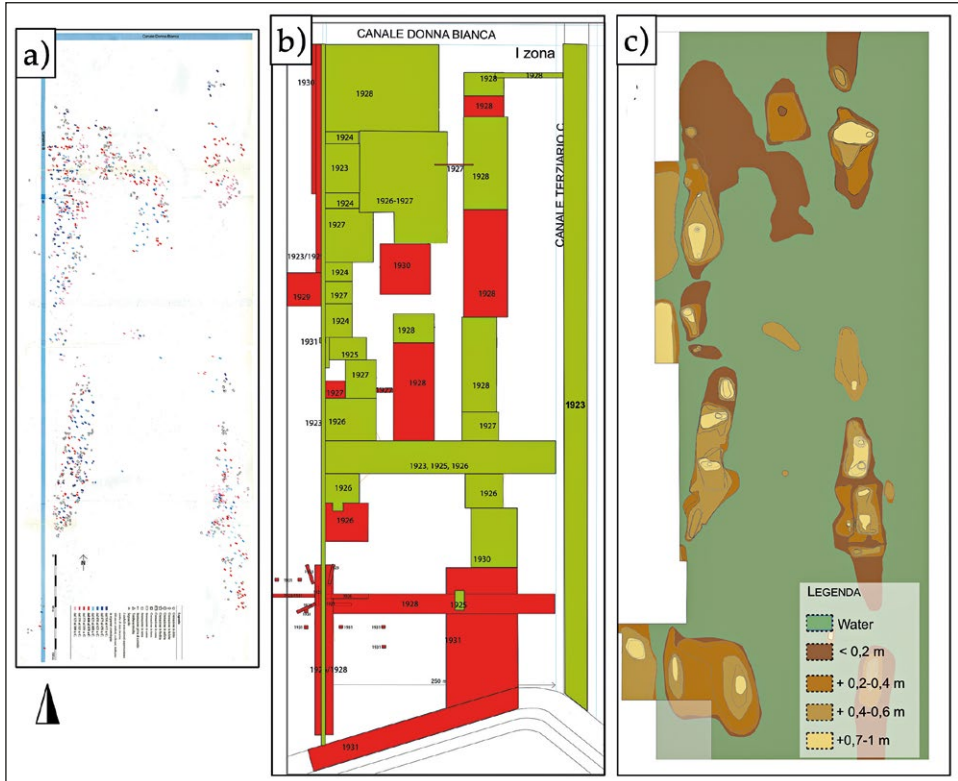


Fig. 1 – Plan of the main area of the Valle Trebba necropolis, Spina: from the plan edited in 1993 (on the left) to the reconstruction of the excavated areas and the reconstruction of its geomorphology (on the right; after GAUCCI 2015, Figs. 4, 5, 9).

certainly a metaphor for the society of the living (D'AGOSTINO 1985), but at the same time it implies planning strategies, diversified use and exploitation of spaces, as well as preservation and governance through labor (CERCHIAI 2018, 156). This is not the place to deepen theoretical reflections on the funeral sphere by connecting it to a lively and very articulated debate, but it is rather important to underline how the involvement of disciplines such as virtual archaeology and the application of new methods can certainly bring a significant contribution to the reconstruction of the necropolis system (e.g. the Greek necropolis of Itanos, Crete: ERCEK, VIVIERS, WARZÉE 2010).

In the case of Numana, the possibility of accessing an accurate and copious excavation documentation and the incentive to work on a site where different Universities and Research Institutes operate at different levels and with an effective synergy (in addition to Bologna, the Sapienza University of

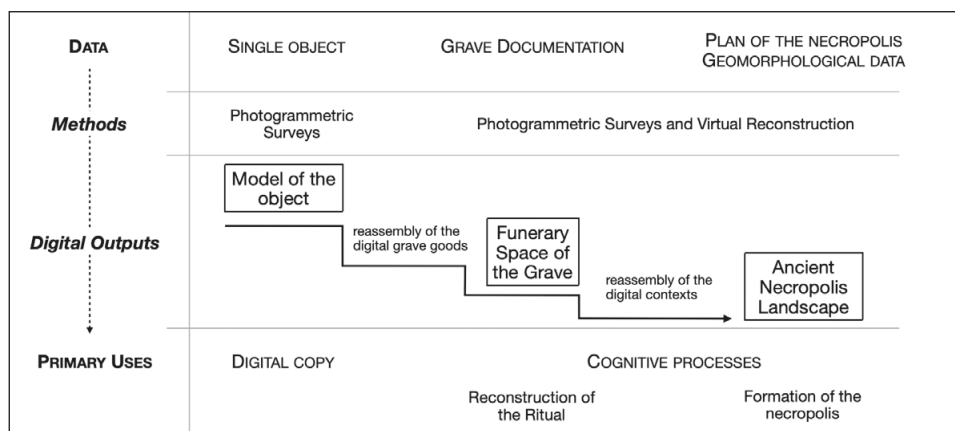


Fig. 2 – Scheme of the process adopted during the project, from the data to the primary uses of the digital outputs.

Rome and the Zentralmuseum of Mainz), thanks to the farsighted work of the local Soprintendenza and the Direzione Musei of the Marche Region, have favored the integration in research of the most recent and innovative methodologies of archaeological informatics (see MOSCATI 2019, 21-24) and in particular of virtual archaeology (for an overview on the discipline and its main issues, see A. GAUCCI in GARAGNANI *et al.* 2021).

In order to achieve the primary aim of the project, the funerary area is limited, in order to test the potentiality of the virtual environment and whether it is possible to operate interactively within it or not (see FORTE, BELTRAMI 2000, *passim*). Ultimately, the development of the virtual environment should be an opportunity to reconstruct and understand the formation process of the archaeological deposit and how it interacted with the environment during centuries.

This ambitious goal can only be achieved if we work both on grave goods of funerary contexts of the area and on the relationship between the Digital Terrain Model as an ancient geomorphological structure and the arrangement of the graves within it. Indeed, this is the twofold research front on which the team has focused his efforts (Fig. 2).

## 2. THE GRAVE GOODS: FROM OBJECTS TO DIGITAL MODELS

Regarding the grave goods, it should be emphasized that in the field of archaeological researching the acquisition of digital models is a step felt to be increasingly important, currently resulting a very lively and fruitful field of investigation and increasingly integrated into theoretical and methodological

reflections. In fact, it is now established that the digital model has a triple function: it is a tool for conservation, dissemination and research (see GARAGNANI, GAUCCI 2020; on the topic, also REILLY 2015, focused on the role of 3D printers).

The life cycle can trivially include the production and use phase, that of burial and then move on to that of archaeological record. In this sequence (which could be much more complex), the digital model can take on the dignity of a life phase, as demonstrated for example by the virtual heritage projects relating to the reconstruction of lost monuments due to conflicts in the contemporary age, such as the recent *Million Images Project* concerning the Triumphal Arch of the temple of Bel di Palmira destroyed by ISIS in 2016 (KHUNTI 2018). Indeed, we can assume that the authenticity of cultural heritage is a process of social mediation that varies over time and this assumption can also be applied to replicas, whether physical or digital (DI GIUSEPPANTONIO DI FRANCO, GALEAZZI, VASSALLO 2018b, 2). With respect to the concept of 'aura' of authentic objects and the loss of it in replicas, to date scholars are arguing about the possible migration of the aura from the formers to the latter (LATOUR, LOWE 2011; DI GIUSEPPANTONIO DI FRANCO, GALEAZZI, VASSALLO 2018b, 2, with references). In a broader perspective, the scientific community has thus started a debate on the complex relationships between the original object and its digital copy (see DI GIUSEPPANTONIO DI FRANCO, GALEAZZI, VASSALLO 2018a).

As already stated, from the point of view of the biography of objects (KOPYTOFF 1986), the digital model can be claimed as a new phase of its life cycle. However, besides more intuitive conservation and dissemination purposes (e.g. portability and access: digital models are extraordinary source of information for persons who may not have access to originals; safety: working on models allows authentic objects not to be damaged; manifold usability: 'copy' has the same etymology of 'copious', i.e. abundant; etc.), the digital model also plays an important role in archaeological analysis.

First of all, a fundamental field of investigation is that of the digital acquisition of the artefact for its study. From this point of view, it seems not very fruitful to recall the experimentation of many methodologies (see the recent review of computer methods for the reconstruction of ceramic sherds offered in ESLAMI *et al.* 2020), from those of great detail on individual objects, such as the works on Attic figured ceramics, a complex production from many points of view (see the contribution of D. BURISCH and A. PACE in this volume), up to the attempt to standardize the acquisition process (SANTOS *et al.* 2017). These are only a few examples of the variety of methodologies and techniques used in order to achieve different objectives. In our point of view, it is clear that the acquisition process is strictly bound by the aims of the project itself in which it operates. In the case of Numana, the goal has been to develop a

system for creating a digital model of the objects that balances accuracy and speed both in the acquisition phase and in the post-production phase, thanks to a 'light' instrumentation which allows at the same time satisfactory results in terms of documentation. The underlying reasons are the high number of finds, their variety in terms of material and technology (e.g. within pottery, Athenian figured and local hand-formed vessels) and the need not to stop at the single object but to reconstruct entire grave goods.

As will be seen, if this allows us the acquisition of satisfactory digital models, it should not be underestimated that the goal is to have a model that is not only the bearer of geometric information (and possibly textures), from which to extrapolate more traditional documentation, but it should be the repository of all information on the object (material, historical, archival, etc.), thus resulting its digital copy and so fulfilling its entire biography. This process is currently satisfactorily pursued within Architecture using the Building Information Modeling (BIM) method (amongst others, see SCIANNA *et al.* 2020 and the overview in GARAGNANI *et al.* 2021), where a deep and dynamic cognitive interaction enhances the archaeological analysis process.

### 3. ZOOMING OUT: FROM THE SCALE OF THE OBJECT TO THE SCALE OF THE LANDSCAPE

Within the project, the development of digital models of all the objects of a single assemblage and the reconstruction of its burial structure lead to the digital restitution of the funerary space of a single grave as a result of the organization and arrangement of the objects resulting from a ritual. Regarding this very last topic, in past years important projects focused on this field of study using Virtual Archaeology methodologies. An interesting case study is *Etruscanning* (HUPPERETZ *et al.* 2012; PIETRONI, ADAMI 2014), a project focused on the virtual restitution of two Etruscan monumental tombs of the 7<sup>th</sup> century BCE. The reconstruction of the funerary space as it could have been at the time of its closure required careful examination and verification of the various documentary sources available. This case is an excellent example of how 3D reconstruction is primarily a tool of analysis and interpretation. Moreover, the model thus created is also a product for dissemination. Therefore, *Etruscanning* effectively represents the cognitive process deriving from the reassembly of the grave goods, as an action of rewinding time until the reconstitution of a closed environment, namely that of the tomb at the time of its closure.

The process outlined so far in its theoretical features leads to the restitution of the entire landscape, thus achieving a complex digital environment that can be investigated in every single part and in its diachronic formation

process (cfr. § 1). The potentialities of this analytical approach (including organization of spaces and paths) have been tested in the *Kainua Project* regarding the cityscape of the Etruscan *Kainua*-Marzabotto (GAUCCI 2017, 106-107; GOVI 2017, 94; GAUCCI, GOVI, PIZZIRANI 2020). Furthermore, as already mentioned, the process of populating the graves will constitute an important moment of reflection, because the insertion of these virtual spaces according to the correct chronological sequence allows us to grasp the occupation strategies (see TACCOLA *et al.* in this volume).

As already mentioned, the digital products thus obtained, in addition to an advancement of knowledge and methodologies and an important basis for conservation, also represent effective dissemination tools. In particular, the latter aspect is primary in the perspective of communicating the results of the project to an increasingly wider audience, according to the principles of virtual museums as defined by François DJINDJIAN (2007). In the case of Numana, the exhibitions of the recently renovated Antiquarium and the National Archaeological Museum of Ancona will be able to use tools such as tablets and viewers that allow visitors a more direct interaction with the finds and their location within the graves. The use of Internet will make it possible to disseminate these products to an increasingly broader public and also to aspire to virtually return the ancient landscape in the archaeological area, as already experimented for the project of virtual restitution of the Etruscan city of *Kainua* in the archaeological area of Marzabotto (GAUCCI 2017; GARAGNANI 2017).

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## REFERENCES

- CERCHIAI L. 2018, *Società dei vivi, comunità dei morti: qualche anno dopo*, «Annali di Archeologia e Storia antica», n.s. 25, 152-158.
- D'AGOSTINO B. 1985, *Società dei vivi, comunità dei morti: un rapporto difficile*, «Dialoghi di archeologia», n.s. 1, 47-58.
- DI GIUSEPPANTONIO DI FRANCO P., GALEAZZI F., VASSALLO V. 2018a, *Authenticity and Cultural Heritage in the Age of 3D Digital Reproductions*, Cambridge, McDonald Institute for Archaeological Research.
- DI GIUSEPPANTONIO DI FRANCO P., GALEAZZI F., VASSALLO V. 2018b, *Introduction. Why authenticity still matters today*, in DI GIUSEPPANTONIO DI FRANCO, GALEAZZI, VASSALLO 2018a, 1-9.
- DJINDJIAN F. 2007, *The virtual museum: An introduction*, in P. MOSCATI (ed.), *Virtual Museums and Archaeology. The Contribution of the Italian National Research Council*, «Archeologia e Calcolatori», Suppl. 1, 9-14 ([http://www.archcalc.cnr.it/indice/Suppl\\_1/2\\_Djindjian.pdf](http://www.archcalc.cnr.it/indice/Suppl_1/2_Djindjian.pdf)).
- ERCEK R., VIVIERS D., WARZÉE N. 2010, *3D reconstruction and digitalization of an archaeological site, Itanos, Crete*, «Virtual Archaeology Review», 1, 1, 81-85 (<https://doi.org/10.4995/var.2010.4794>).

- ESLAMI D., DI ANGELO L., DI STEFANO P., PANE C. 2020, *Review of computer-based methods for archaeological ceramic sherds reconstruction*, «Virtual Archaeology Review», 11, 23, 34-49 (<https://doi.org/10.4995/var.2020.13134>).
- FORTE M., BELTRAMI R. 2000, *A proposito di Virtual Archaeology: disordini, interazioni cognitive e virtualità*, «Archeologia e Calcolatori», 11, 273-300 (<http://www.archcalc.cnr.it/indice/PDF11/1.17%20Forte.pdf>).
- GARAGNANI S. 2017, *Archaeological Building Information Modeling: Beyond scalable representation of architecture and archaeology*, in GARAGNANI, GAUCCI 2017, 141-149 (<https://doi.org/10.19282/AC.28.2.2017.09>).
- GARAGNANI S., GAUCCI A. (eds.) 2017, *Knowledge, Analysis and Innovative Methods for the Study and the Dissemination of Ancient Urban Areas. Proceedings of the KAINUA 2017 International Conference in Honour of Professor Giuseppe Sassatelli's 70<sup>th</sup> Birthday (Bologna 2017)*, «Archeologia e Calcolatori», 28.2 (<http://www.archcalc.cnr.it/journal/idear.php?IDyear=20172-01-01>).
- GARAGNANI S., GAUCCI A. 2020, *The ArchaeoBIM method and the role of digital models in archaeology*, «Archeologia e Calcolatori», 31.2, 181-188 (<https://doi.org/10.19282/ac.31.2.2020.17>).
- GARAGNANI S., GAUCCI A., MOSCATI P., GAIANI M. 2021, *ArchaeoBIM. Theory, Processes and Digital Methodologies for the Lost Heritage*, Bologna, Bologna University Press.
- GAUCCI A. 2015, *Organizzazione degli spazi funerari a Spina e in area deltizia con particolare riguardo al periodo tardo-arcaico*, «Annali della Fondazione per il Museo Claudio Faina», 22, 113-170.
- GAUCCI A. 2017, *Kainua Project: Principles, theoretical framework and archaeological analysis*, in GARAGNANI, GAUCCI 2017, 99-112 (<https://doi.org/10.19282/AC.28.2.2017.06>).
- GAUCCI A., GOVI E., PIZZIRANI C. 2020, *Urbanism and architecture in the Etruscan city of Kainua-Marzabotto: New perspectives*, in L. ZAMBONI, M. FERNÁNDEZ-GÖTZ, C. METZNER-NEBELSICK (eds.), *Crossing the Alps. Early Urbanism between Northern Italy and Central Europe (900-400 BC)*, Leiden, Sidestone Press, 123-136 (<https://www.sidestone.com/books/crossing-the-alps>; accessed 02/05/2021).
- GOVI E. 2017, *Kainua-Marzabotto: The archaeological framework*, in GARAGNANI, GAUCCI 2017, 87-97 (<https://doi.org/10.19282/AC.28.2.2017.05>).
- HUPPERETZ W., CARLANI R., PLETINCKX D., PIETRONI E. 2012, *Etruscanning 3D project. The 3D reconstruction of the Regolini Galassi Tomb as a research tool and a new approach in storytelling*, «Virtual Archaeology Review», 3, 7, 92-96 (<https://doi.org/10.4995/var.2012.4395>).
- KOPYTOFF I. 1986, *The cultural biography of things: commoditization as process*, in A. APPADURAI (ed.), *The Social Life of Things. Commodities in Cultural Perspective*, Cambridge, Cambridge University Press, 64-91.
- KHUNTI R. 2018, *The Problem with Printing Palmyra: Exploring the Ethics of Using 3D Printing Technology to reconstruct Heritage*, «Studies in Digital Heritage», 2, 1, 1-12 (<https://doi.org/10.14434/sdh.v2i1.24590>).
- LATOUR B., LOWE A. 2011, *The migration of the aura, or how to explore the original through its facsimiles*, in T. BARTSCHERER, R. COOVER (eds.), *Switching Codes. Thinking Through Digital Technology in the Humanities and the Arts*, Chicago-London, University of Chicago Press, 275-297.
- MORPURGO 2018, *I sepolcreti etruschi di Bologna nei terreni De Luca e Battistini (fine VI-inizi IV secolo a.C.)*, Bologna, Bononia University Press.
- MOSCATI P. 2019, *Informatica archeologica e archeologia digitale. Le risposte dalla rete*, in P. MOSCATI (ed.), *30 anni di informatica archeologica, tra memoria e progettualità*, «Archeologia e Calcolatori», 30, 21-38 (<https://doi.org/10.19282/ac.30.2019.03>).
- PIETRONI E., ADAMI A. 2014, *Interacting with virtual reconstructions in museums: The Etruscanning Project*, «Journal of Computer and Cultural Heritage», 7, 2 (<https://doi.org/10.1145/2611375>).

- REILLY P. 2015, *Additive archaeology: An alternative framework for recontextualising archaeological entities*, «Open Archaeology», 1, 215-235 (<https://doi.org/10.1515/opar-2015-0013>).
- SANTOS P., RITZ M., FUHRMANN C., FELLNER D. 2017, *3D mass digitization: A milestone for archaeological documentation*, «Virtual Archaeology Review», 8, 16, 1-11 (<https://doi.org/10.4995/var.2017.6321>).
- SASSATELLI G. 1988, *Topografia e "sistemazione monumentale" delle necropoli felsinee*, in *LLa formazione della città preromana in Emilia Romagna. Atti del convegno di studi (Bologna - Marzabotto 1985)*, Bologna, Istituto per la Storia di Bologna, 197-259.
- SCIANNA A., GAGLIO G.F., LA GUARDIA M. 2020, *HBIM data management in historical and archaeological buildings*, «Archeologia e Calcolatori», 31.1, 231-252 (<https://doi.org/10.19282/ac.31.1.2020.11>).

#### ABSTRACT

The paper briefly introduces methodologies and practices of Virtual Archaeology applied to the pre-Roman funerary contexts of Numana (Ancona). Starting from the traditional approach and the concept of necropolis as a system, we will focus on the methodological issues and potentialities related to the use of digital models for the archaeological analysis of grave goods and their contexts.



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