



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, 18-21 April 2017)

edited by  
Simone Garagnani, Andrea Gucci

ARCHEOLOGIA E CALCOLATORI

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*All'Insegna del Giglio*

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ANCIENT REALITY AND CONTEMPORARY RESEARCH.  
AN INTRODUCTION TO THE CONFERENCE KAINUA 2017  
AND ITS PROCEEDINGS

1. THE CONFERENCE

The KAINUA 2017 Conference was held between April 18<sup>th</sup>-21<sup>st</sup> 2017 in Bologna, organized by the Department of History and Cultures and the Department of Architecture of the *Alma Mater Studiorum* – University of Bologna, in collaboration with CINECA, the Soprintendenza Archeologia, Belle Arti e Paesaggio per la città metropolitana di Bologna e le province di Modena, Reggio Emilia e Ferrara, the Polo Museale dell’Emilia Romagna and the Journal «Archeologia e Calcolatori» of the Istituto di Studi sul Mediterraneo antico (ISMA – CNR).

The initiative is part of the Project FIR 2013 KAINUA. *Reconstructing, Perceiving, Disseminating the Lost Reality. Transmedial Technologies for the Etruscan City of Marzabotto* (Principal Investigator: Andrea Gaucci, Department of History and Cultures; Supervisor of Research Unit: Simone Garagnani, Department of Architecture).

The Conference and its Proceedings are in honour of Professor Giuseppe Sassatelli’s 70<sup>th</sup> birthday, who always encourages students and scholars towards multidisciplinary research in archaeology. Regarding the Etruscan city of Marzabotto, the ancient Kainua, his uninterrupted work has opened a new season of research and has changed the historical perspective of this city.

The Conference has focused on multi-disciplinary reflection in order to formulate new methods of investigating and analyzing the archaeological research of ancient cities, new tools for the virtual reconstruction of the ancient structures, and more effective processes of distribution.

Elisabetta Govi, President of the Scientific Committee, introduced the work on April 18<sup>th</sup> with a Speech (see below, *Introduction to the Conference*). Several institutions attended the Opening Ceremony (Fig. 1):

- Giovannangelo Camporeale, President of the Istituto Nazionale di Studi Etruschi ed Italici;
- Virginio Merola, Mayor of Bologna;
- Luigi Malnati, Superintendent of the Soprintendenza Archeologia, Belle Arti e Paesaggio per la città metropolitana di Bologna e le province di Modena, Reggio Emilia e Ferrara;
- Fabio Roversi Monaco, President of the Foundation *Genus Bononiae* – Musei nella Città di Bologna;
- Antonino Rotolo, Vice-Rector for Research of the University of Bologna;





Fig. 1 – The Opening Ceremony (from left to right: Elisabetta Govi, Giovannangelo Camporeale, Francesca Sofia, Fabio Roversi Monaco, Luigi Malnati, Virginio Merola, Antonino Rotolo).

- Francesca Sofia, Director of the Department of History and Cultures of the University of Bologna;
- Marco Gaiani, representative of the Director of the Department of Architecture of the University of Bologna.

The Conference was structured across four days, each of them dedicated to a specific theme:

- April 18<sup>th</sup>, *Archaeological Analysis of Ancient Cities and their Landscape*: interventions related to the application of innovative methodologies in archaeological analysis of urban sites, with particular attention to Italian cases. The day opened with the Keynote Speech of Mario TORELLI and the Opening Speech of Paola MOSCATI. The chairmen of the session were Mario Torelli and Vincent Jolivet.
- April 19<sup>th</sup>, *Kainua Project Special Session*: presentations of the results achieved during the project and a demonstration of the virtual reconstruction of the Etruscan city, which took place in the afternoon directly in the Archaeological Park of the Etruscan National Museum of Marzabotto. On this day, the 70<sup>th</sup> birthday of Professor Giuseppe SASSATELLI was celebrated. He acted as the chairman of the Special Session and developed the conclusions. Mario Scalini, Director of the Polo Museale dell'Emilia Romagna, and Franco Romano, Mayor of Marzabotto, opened the celebration in honour of the 70<sup>th</sup> birthday of Professor Sassatelli and the subsequent demonstration in the Archaeological Park (Figs. 2-3).
- April 20<sup>th</sup>, *Architectural Analysis and Virtual Reconstruction*: interventions linked to the study and reconstruction of ancient monuments and



Fig. 2 – The demonstration in the Archaeological Park of Marzabotto (in the first line, from the right: Giuseppe Sassatelli, Francesco Roncalli, Adriano Maggiani, Mario Torelli).



Fig. 3 – Giuseppe Sassatelli and Giovanni Colonna at the celebration in the Etruscan National Museum of Marzabotto.

methodological reflections. The day's events were opened by Stephan Fai's Keynote Speech on the relationship between quantity and quality in the digital documentation of architectural cultural assets (*Too much is never enough... or is it? Documentation modelling and dissemination*: the contribution is not included in this volume for causes independent of the will of author and editors), and Marco GAIANI intervened about digital data management systems. The day closed with the Session *Starting and Ongoing Projects* and Maria Roussou's Keynote Presentation on museum-based dissemination experiences (ROUSSO, RIPANTI, SERVI). The chairmen of the two sessions were Stephen Fai and Maria Roussou.

– April 21<sup>th</sup>, *Applications and Integrated Solutions for Cultural Heritage and Short Presentations*. The chairmen of the two sessions were Paola Moscati and Patricia Lulof.

ALL THE AUTHORS

### 1.1 *Introduction to the Conference*

This Conference is the final result of a three-year Future in Research Project funded by the Ministry of Education, University and Research (MIUR) and dedicated to the Etruscan city of Marzabotto, the ancient Kainua. The project was developed by two young researchers from the University of Bologna, the archaeologist Andrea Gaucci and engineer Simone Garagnani, who started an extremely profitable dialogue on two fields of research that are normally kept separate because of their different perspectives and skills. The project has already achieved a considerable goal in having framed a very stimulating dialogue which has enriched all those who have participated in the work, namely young students of various levels of training. Therefore, this experience has been a real opportunity for the growth and training of many young people who can now develop the skills they have acquired in other experiences, as is already happening.

At the base of the project and during its planning, the main question was how the most modern and advanced technology could promote archaeological research, develop innovative study approaches, allow for a better understanding of ancient reality, and ultimately offer a different and useful point of view compared to more traditional practices. The important consequence of this reflection immediately affects the reconstruction and the enjoyment of the archaeological heritage by the scientific community and the general public. This is a theme that nowadays seems trivial, given the ever-increasing presence that media technologies have in archaeological research. However, the question becomes more interesting when evaluating the most correct approach in extremely complex and varied contexts such as the ancient cities as a whole (and not individual areas or even single monuments). In particular, urban

areas, which are generally meager of data because of their state of conservation and lesser degree of monumentality than necropolises, lend themselves to this methodological reflection for the need to simultaneously investigate multiple aspects, each with its specifics and its consolidated analysis systems. Therefore, the case of Marzabotto represents an exceptional reality for its completeness, investigable in all its parts despite the limitations of discontinuous documentation due to the historical research starting in the 19<sup>th</sup> century and the systematic depletion of ancient structures throughout the centuries. The integrated approach needed in a city such as Marzabotto involves the adoption of different perspectives of analysis that must be combined in a detailed and general reconstruction from all points of view, understandable to those who approach that ancient reality for study as well as for curiosity.

The FIR Project was therefore an experimental laboratory but also a reflection of everything that the research of the University of Bologna at Marzabotto, for thirty years, has produced in terms of results and methodology. This Conference therefore seeks to be a sort of trial balance of this work and a precious opportunity for discussion. It is especially a pleasure to propose this report for the 70<sup>th</sup> birthday of Giuseppe Sassatelli, who dedicated his whole life as scholar and archaeologist to Marzabotto, transforming the excavation into a gym for many young people over the past thirty years. He has been able to pass down some of the principles of research that seem to be even more advisable nowadays, such as using the most complete and non-sectoral concrete data as a base (often recovered through patient and tedious “excavation” in the archives); while at the same time adopting an overall historical view of problems that goes deeper than the level of details; the drive to study all aspects that make up the complex picture of ancient reality, from urbanism to architecture, from artisan and artistic production to religious manifestations, to epigraphy. Many of us have treasured his teaching and this Conference is the best opportunity to thank him.

If Giuseppe Sassatelli has been able to build a thirty-year project at Marzabotto he also had some institutions and people who have supported him and who continue to support us in research, who are also presenting at the opening of the Conference today. The University of Bologna, firstly, which in late 1988 allowed the recovery of the excavations after a nearly twenty year hiatus, and then Rector Fabio Roversi Monaco, now President of *Genus Bononiae*, who firmly believed in this project. Since then, excavations have been carried out annually thanks to university funding. In addition, the Archaeological Superintendence, now with a new name, and in particular the Superintendent Luigi Malnati, former Director of the Marzabotto Etruscan National Museum, have favored the excavations and study of the University with a full and active collaboration throughout all these years.

E.G.

## 2. THE PROCEEDINGS

Every single context presented during the Conference has brought specific issues to scientific debate. However, it has become clear that only through an integrated system of documentation and data collection methodologies in medium or large contexts such as urban ones (or even larger if we include the territory) and their effective management is it possible to draw up analyses that give satisfactory results. Moreover, it is worth emphasizing how these methods should not be a means to an end. Indeed, the “case study of the moment” does not have to be only the field for experimenting new methods on which the debate must to be focused, but rather the opposite, namely for experimenting innovative methods aimed at a more accurate and effective study of the context. The analysis of the projects regarding urban complexes hosted in the past years in the Journal «Archeologia e Calcolatori», topic of the opening presentation of Paola MOSCATI, effectively highlights this fundamental aspect of the research. Indeed, we should always keep in mind that the ultimate purpose of our work in archaeological contexts is to pursue the historical reflection and share it with the community.

In his Keynote Presentation, Mario TORELLI presented us with the risks involved in dealing with reconstructions of the ancient reality. This operation is never free from the current time in which we are immersed. This is not the main risk, but rather a fundamental value if the researcher is completely integrated in his time. Instead, we realise that the real risk lies in the lack of awareness of the historical dimension, which leads to the creation of enclosures devoid of contents and meanings (or even simply bizarre). In Torelli’s opinion, a fundamental tool for knowing and evoking the ancient reality therefore is “memory”. Such must be the main baggage of whoever faces this risky path. However, the message must be transmitted in the most effective way, so that the fruits of the work can be available to everyone. In this way, we continue to build “memory” brick by brick, researching and sharing results. Therefore, the virtual reconstruction, albeit pleasing and spectacular, remains “silent” when considered the main object of the communication. It is instead a tool to be used in a historical-narrative route, which is our essential perspective, namely the perspective of the “historical man”, according to the definition of Mircea ELIADE (1954). This route can be developed in many ways and bypassed according to the different needs of contemporaneity. The Keynote Presentation of Maria Roussou dealt with this very topic (ROUSSOU, RIPANTI, SERVI).

The scientific community too has its own (historical) “memory”, once again the fundamental tool for reflecting critically on progress and better understand the challenges of the future. About these topics, we refer to the stimulating reflections of Paola Moscati in this volume. She starts her

contribution from a statement of Giuseppe Sassatelli, an effective tribute to the celebrated Professor. In this regard, it may seem confusing to concluding these few words about the role of “memory” summoning the photographic album of the participants to the V<sup>th</sup> International Congress of Anthropology and Prehistoric Archaeology held in Bologna in 1871, that they donated to the President Giovanni Gozzadini, and object of a study by the same SASSATELLI (2015). During that Conference (and in a time of great change for the discipline), Bologna was the seat of confluence of a whole scientific community and significantly Marzabotto was the destination of a visit during the Conference and object of lively debate. The same album – and here I quote Sassatelli – was the manifestation of the full awareness of the scholars to be part of a community at a precise historical moment and therefore we can consider the will to exhibit it as a physical “memory” of their work (SASSATELLI 2015, 38). In a more modest way, we hope this volume can be a witness that this perception is still alive today.

The Proceedings are structured according to a different approach from that of the Conference Program, in order to respond to needs differing from those that had inspired its original conception.

### *2.1 The Kainua Project Special Session and Etruscan Cities and Their Landscapes*

The contributions more closely related to the application of methodologies and analysis on specific sites have been collected with an essential distinction, necessary in our opinion, between those devoted to Etruscan civilization and others. Indeed, not only is the Special Session dedicated to the Kainua Project devoted specifically to the Etruscan world, particularly that of the Po Valley, but the percentage of Etruscan sites or urbanized territories characterized by innovative approaches or projects is nowadays predominant and transversal to all territories populated by Etruscans, from Campania to the Po Valley.

Within ancient Italy (and beyond its geographical boundaries), the Etruscans are considered the people of the cities par excellence (COLONNA 2000, 30). The city and the organization of territory were the cornerstones of the Etruscan presence and expansion in the whole of Italy, from Campania to the Po Valley, according to ancient authors (see Liv. V 33, 7-11). However, we should not forget that the ritual rules relating to the foundation of the city and its organization are the central aspect of this phenomenon, and are the basis of the conception of the city in Roman culture also (COLONNA 2004; G. CAMPOREALE in this volume). Therefore, it is undeniable that Etruscan civilization, precisely because of its urban ideology, has had a fundamental role in the central theme of the Conference. Moreover, we should not forget that the decades of contemporary research of Etruscan urban phenomena

(contrary to a multi-century tradition of studies based mainly on necropolis) is characterized by constructive and monumental models based not on the Classical world, but rather on poorer, often negative evidence. Therefore, there is a greater need to refine research and study tools in order to pursue increasingly satisfactory quantity and quality of data to allow for effective analyses. In this way, it is important to emphasize that the Proceedings are hosted on the Journal founded by Mauro Cristofani together with Riccardo Francovich, and currently directed by Paola Moscati, who has dealt extensively with this field of research starting from the Caere Project (MOSCATI).

Giovannangelo CAMPOREALE introduced the *Kainua Project Special Session*. He honoured us with his presence, though burdened by the weight of a disease which, unfortunately only a few months after the Conference, had the upper hand. In his contribution, he introduces a reflection on the genesis of the city in the Etruscan world with particular attention to ancient sources, and focuses on a particular study case of the Archaic period such as the Accesa site. A privileged research field of the scholar, the site is used as an example where a multidisciplinary approach to archaeological data, already obtained by research on the field, could increase the potential of information and distribution.

At the risk of seeming like too much of a party, we would like to emphasize the role of the Kainua Project in the research on Etruscan cities, as presented in its articulation in the first Session of this volume. This project, in our opinion, is an example of an integrated and multidisciplinary approach to the historical reconstruction of the site and its fruition. For more about this project, please refer to the Conclusions of Giuseppe SASSATELLI.

The contributions of the following Session, *Etruscan Cities and Their Landscapes: New Perspectives, Innovative Methods and Dissemination*, are related to some of the major Etruscan sites where multidisciplinary research groups are active. They are geographically organized from S to N and address different aspects and issues of research and distribution. Indeed, they cover different themes, motivated by the needs of each research group and the environmental, geographical, and historical features of each site. However, there are some *fil rouge*s: the need for an integrated and multidisciplinary approach and the awareness that only this kind of methodology allows for more efficient data collection and problem definition.

The case of Musarna highlights how the collection and processing of all available data of the town and its territory could lead to important conclusions about the foundation rite, and subsequently of the ideas that guided the planning of a city and the organization of the territory (CINQU, BROISE, JOLIVET). This is obviously a very important point because it is a preliminary analysis tool to better understand the city itself. The research group of the University of Milan has presented computer tools for the collection of data,

useful for the study of complex subjects such as Tarquinia, and for a category of very articulated findings such as written texts (BAGNASCO GIANNI, MARZULLO, GARZULINO). Their contribution highlights the need to handle huge amounts of data and to find new tools that allow a more effective analysis of these quantities. QUIRINO's work on the city network in the Po Valley shows instead the potential of applying analytical models in an attempt to reconstruct the ancient landscape, the spread of settlements, and possible routes. These models, however, should be compared and categorized with more traditional methods of investigation. The cases of Pontecagnano (PELLEGRINO, ROSSI) and Pyrgi (BAGLIONE *et al.*) show that a multidisciplinary approach can lead to the reconstruction of the ancient landscape, which is essential for a correct reading of archaeological evidence and the understanding of the potential issues of analyzation. The Acquarossa site is the subject of a highly articulated research project involving the territory (LULOF, SEPERS). This contribution exemplifies the need to use virtual models to better understand structures, particularly to analyze the differing and complex roof systems. It has been rightly brought to attention that this also involves the evaluation of building construction simulation and subsequently the organization of the workers, thus falling into the study of the productive and social process. The Volterra case (TACCOLA, ROSSELLI) shows us how three-dimensional documentation can allow for the development of various dissemination systems based on funerary structures and museum materials, thus creating a virtual museum where objects are appreciable not for their materiality, but for their explorability. The reconstruction of the acropolis of Volterra, on the other hand, has the twofold purpose of reflecting on the architectural structures and allowing us to better understand the complex diachronicity of this sacred space.

## *2.2 From the Ancient Cities to the Landscapes: Case Studies and Starting and Ongoing Projects*

The contributions range from Samarcanda in the E to Spain in the W. The vast geographical and chronological spectrum reinforces rather than compromises the idea that the methodological process of investigating extended urban complexes is essentially independent of temporal and areal constraints. Moreover, the analysis must involve a variety of techniques, both when exploring archaeological areas and when surveying is done in long-lived cities, where it is even more necessary to use non-invasive methods (BOSCHI, GIORGI, SILANI). The archaeological *palinsesto* of an urban site and its diachronic phases can be decoded by systemizing and processing all the data within a same platform (ROSSETTI). The study of ancient urban contexts is a very complex field (starting from their definition: see SMITH 2016), which involves several concerns and a close link with the territory, starting with



the funerary landscape just outside the city (FARISELLI *et al.* and FINOCCHI, BALDONI). Therefore, in a perspective that involves the territory and therefore also the landscape around the city, Geomatic systems of Remote Sensing (CAMPEDELLI, DUBBINI, MARTINA; MANTELLINI; but also PELLEGRINO, ROSSI) come into play. The knowledge of the ancient landscape allows us to better understand the city and the environment in which it was immersed, not necessarily identical to the present which has conditioned its development: this is an element that emerges strongly from all the investigations. The case of the Potenza Valley Project (VERMEULEN) clarifies this point. An area including four medium-sized Roman cities has been the subject of an intensive investigation with various instruments, from aerial surveys to satellite images and geophysics, in different seasonal conditions.

We also recall the Ullastret Project (CODINA *et al.*), for its goals regarding dissemination, but with very tight control of the archaeological data, due to investigations, mainly non-invasive even in this case. Here, CAVE and VR experiences, in both cases led by storytelling (see above the importance of narrative), demonstrate the communicative potential of reconstructing entire urban complexes.

Among the contributions on archaeological analysis, we would like to highlight the cases of the Potentia Valley, Ullastret, Acquarossa, Volterra and also Kainua concerning virtual reconstructions, which is definitely an important tool for dissemination but also useful for research. In particular, our attention should be drawn to the problem of quality standards (LULOË, SEPERS; D'ANDREA, BOSCO, BARBARINO, emphasizing its importance within the International Charts of Virtual Archaeology (GAUCCI). There are many solutions, but it is important to emphasize that the development of the "ArchaeoBIM" process (GARAGNANI) allows to define *a priori* standards and, in this way, is the same model that confirms its validity, starting a virtuous and cyclical process of analysis and control of the reconstruction.

A.G.

### 2.3 Methodologies, applications and integrated solutions

From the technical perspective, the KAINUA 2017 International Conference can be considered as a turning point in the research of new approaches specifically designed for intersections between archaeology and architecture.

New technologies are fully pervasive, even in those research fields but, sometimes, digital tools are used without full consciousness about their actual potential (MOSCATI).

Research and data visualization are often considered to be different as components: from one side computer-based tools seem to bring into the discussion the data storing possibility to scholars that have to deal with

documentation, on the other side computer graphics is perceived as a representation tool only, dedicated to renderings or virtual reconstructions often unbound from the whole knowledge behind.

On the contrary, the wide potential of data bases and digital informative systems (GAIANI) is the primary step in the understanding of ancient cultures, while the computer graphics is the ideal complement in visualizing what interpreted by scholars and researchers from their archives.

Following these guidelines, a further progress was reached with KAINUA 2017 with the formal presentation of the original “ArchaeoBIM” approach, which is exactly a methodology that encompasses the information flow among different disciplines sharing the same interest in understanding lost realities.

Digital reconstructions authored following this procedure allowed many branches of research, including the on site representation with Virtual Reality of ancient temples and buildings; the accuracy of the reconstructions, validated by the approach itself, proposed a really new dissemination tool meant for diverse users, which could experience directly on the archaeological site the results of the research work.

This way, it is simple to decipher and understand the preserved structures, even when they are only lightly perceivable on the field.

Spanning from many case studies located in Turkey (Hierapolis of Phrygia by CHIABRANDO *et al.*; the Palatial Complex of Arslantepe by LIBEROTTI, ALVARO; the Episcopal Palace in Side by HERNÁNDEZ CORDERO) to sites based in Italy (especially the Castelmonardo Project by POSCETTI *et al.* and the virtual tour of Nora by BONETTO, ZARA), Spain (the Episcopal Complex of Valentia by ESCRIVÀ *et al.*) and Germany (with the medieval Landscape of Pfalz presented by PATTEE, VOLKMANN, UNTERMANN), the contributions much more concerned about technical applications and digital solutions reflected this multidisciplinary approach as well.

This is a paramount feature of technology applied to the archaeological field, as stated also by Valeria CERA also dealing with low cost equipment for the case study of Liternum.

A common perspective, however, can be identified in the survey that, even considering different needs, is still the first and most important stage of starting researches.

From the urban scale, taking advantage of well established GIS technology (MUZZARELLI, FRANZOIA; ILLIANO; DONADIO, MAZZA, BARELLO), to the historical mapping (BERNARDONI *et al.*) and to the study and analysis of single buildings or remaining (LIBEROTTI, ALVARO; VOTROUBEKOVÁ), it was possible to compare the results of some of the latest 3D digital acquisition techniques.

The experimentation and use of such technologies in the field of archaeological survey spans from the widespread use of systems based on active sensors (range-based methods), such as laser scanners and total stations, to

digital photogrammetry and computer vision algorithms (IPPOLITO, ATTENNI, BARTOLOMEI).

The interesting papers presented in the Conference expressed several methodologies of acquisition and data processing, sometimes following well-known and standardized pipelines applied nevertheless to original case studies.

This collection of all the important papers that were presented is once again the proof of how successful can be the sharing of knowledge and tools, even if they are not part of the same discipline. But when many perspectives converge into a single process, it is way easier to get a consciousness as wide as possible of the themes investigated.

Quoting Stephen Fai in his Keynote Speech during the KAINUA 2017 Conference, the collection of huge quantities of data surely implies to deal with complexity.

This way, technology is naturally a perfect match for management and research, since it is the most valid “language” that can be used to express, manage and give order to complexity.

S.G.

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*We are truly honoured to have been able to organize the Conference on the occasion of Professor Giuseppe Sassatelli's 70<sup>th</sup> birthday, and that he presented the Kainua Project on the very day of his birthday.*

*This volume represents the most lively manifestation of gratitude towards him.*

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