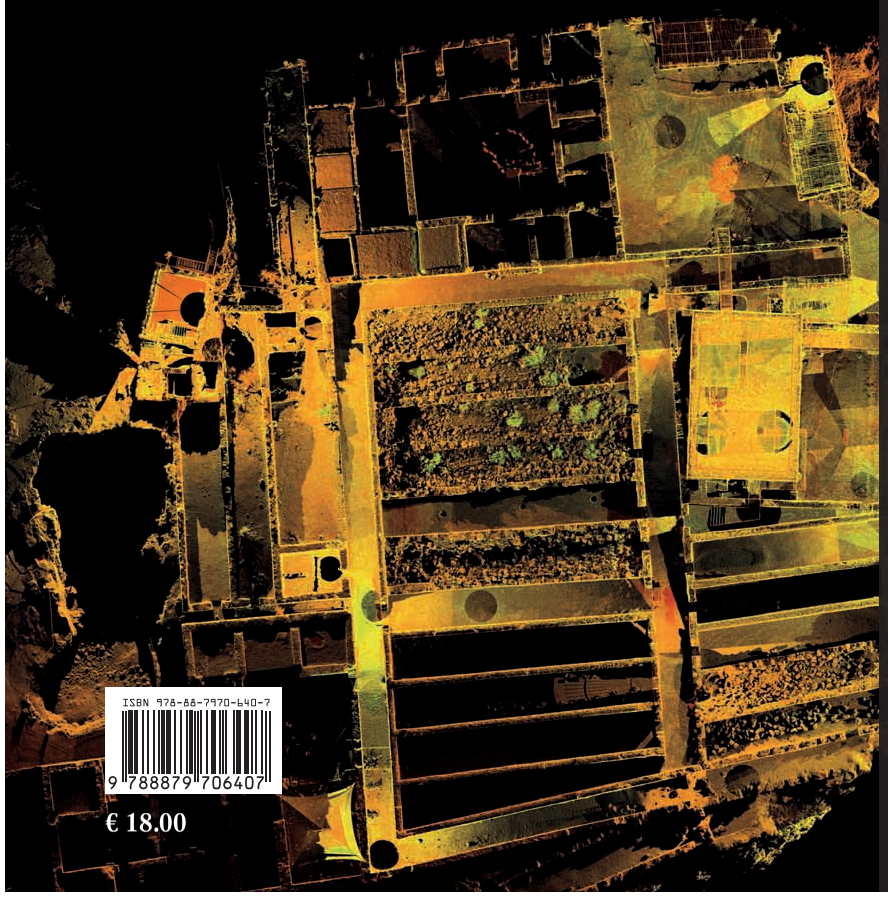
A program of International cooperation Italy-Israel

The Masada project was developed as an on-going research collaboration between the Department of Interior Building and Environment Design of Shenkar College of Design and Engineering, the Department of Architecture of the University of Florence and the Department of Architecture and Civil Engineering of the University of Pavia. Beyond the research aspects, the project has didactic aspects as well. The project, consisting in a proposal for digital documentation of Masada cultural heritage sites.



ISBN 978-88-7970-640-7

€ 18.00

- I -

MASADA NOTEBOOKS REPORT OF THE RESEARCH PROJECT 2013

edifir EDIZIONI FIRENZE

DIGITAL SURVEY IN ARCHEOLOGY

STEFANO BERTOCCI SANDRO PARRINELLO REBEKA VITAL

MASADA NOTEBOOKS

REPORT OF THE RESEARCH PROJECT 2013

VOL. I

edifir EDIZIONI FIRENZE

DIGITAL SURVEY IN ARCHEOLOGY

STEFANO BERTOCCI SANDRO PARRINELLO REBEKA VITAL

MASADA NOTEBOOKS

REPORT OF THE RESEARCH PROJECT 2013

VOL. I

edifir
EDIZIONI FIRENZE

This publication is realized with the contribution of several istitutions that sponsor the research project. In particular, the support has been provided by:

University of Florence, Italy

University of Pavia, Italy

Shenkar Collage, Israel

&

Autodesk

Managing Editor
Simone Gismondi

Design and Production Editor
Elena Mariotti

Editing
Sara Bua

Graphic design proiect
Sara Bua

Printed by
Pacini Editore Industrie Grafiche,
Ospedaletto (Pisa)

ISBN 978-88-7970-640-7

On cover: General view of the point cloud about Herod's Palace area.

ORGANIZERS

University of Florence, Italy

University of Pavia, Italy

Shenkar Collage, Israel

Department of Architecture
University of Florence,
Italy

Laboratory of Landscape
Survey & Design
University of Florence, Italy

Department of Civil
Engineering and Architecture
University af Pavia, Italy

PARTNERSHIP

Israel Nature and Parks
Authority

Mabat
3D Technologies ltd

Leica
Geosystems

Autodesk

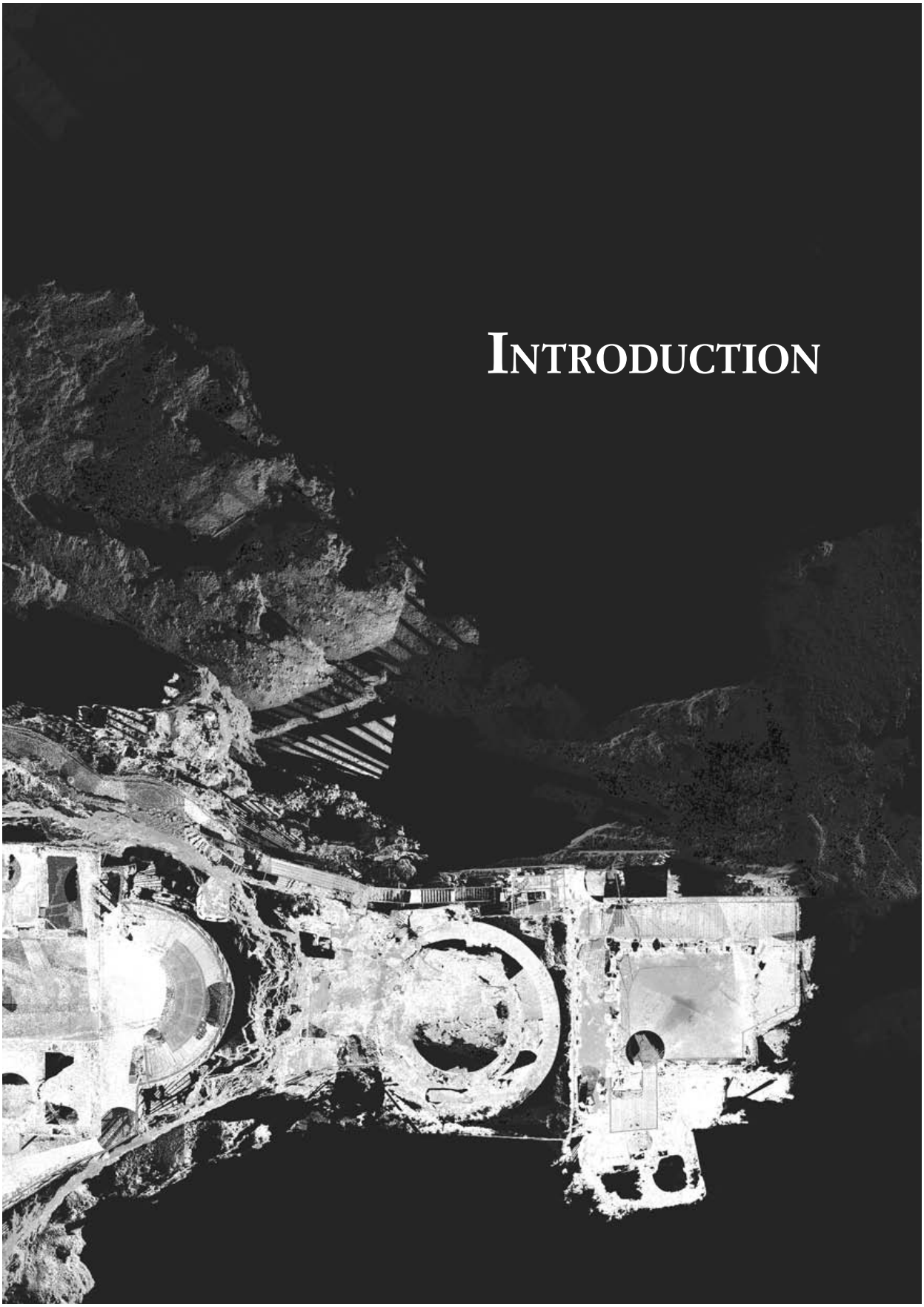
PATRONAGE

Embassy of Italy
Tel Aviv

SCIENTIFIC COMMITTEE

Ferdinando Auricchio	*University of Pavia, Italy*
Benedetta Adembri	*Director of Archaeological Area of Villa Adriana, Tivoli, Italy*
Stefano Bertocci	*University of Florence, Italy*
Marco Bini	*University of Florence, Italy*
Elena Calandra	*Superintendent for Archaeological Heritage of Lazio, Italy*
Eitan Cambell	*Director of Masada Archaeological Site, Israel*
Vittorio Casella	*University of Pavia, Italy*
Carlo Ciaponi	*University of Pavia, Italy*
Riccardo Galletto	*University of Pavia, Italy*
Maria Elena Gorrini	*University of Pavia, Italy*
Eri Goshen	*Shenkar College of Design and Engineering, Israel*
Maria Teresa Grassi	*University of Milan, Italy*
Maurizio Harari	*University of Pavia, Italy*
Shraga Kirshner	*Shenkar College of Design and Engineering, Israel*
Stefano Maggi	*University of Pavia, Italy*
Saverio Mecca	*University of Florence, Italy*
Roberto Parenti	*University of Siena, Italy*
Sandro Parrinello	*University of Pavia, Italy*
Anna Spalla	*University of Pavia, Italy*
Rebeka Vital	*Shenkar College of Design and Engineering, Israel*

INDEX



Introduction

INTRODUCTION

A program of International cooperation Italy-Israel

The Masada project was developed as an on-going research collaboration between the Department of Interior Building and Environment Design of Shenkar College of Design and Engineering, the Department of Architecture of the University of Florence and the Department of Architecture and Civil Engineering of the University of Pavia. Beyond the research aspects, the project has didactic aspects as well. The project, consisting in a proposal for digital documentation of Masada cultural heritage sites, is directed by Stefano Bertocci, Sandro Parrinello and Rebeka Vital.

Methodology

This project is part of our research in the field of three-dimensional digital documentation and mapping of sites of cultural importance. A team of professors, research scholars and students works together to document the selected site through laser scanning. The equipment that was used is a Leica Scanstation C-10.
The cloud of points that comes from the scanning, was compiled as raw data and was part of the documentation database. Further, the team is processed the cloud of points and extract information to make 2D as-built drawings (plans, sections and elevations), 3D renderings and 2D and 3D details of building elements of interest.

The aims of these projects are:

- To create a comprehensive digital documentation of the existing state of important sites.

- To create an opportunity for collaborative work between Israeli and Italian academic institutions.

- To create learning opportunities for Israeli and Italian students in the latest advancements of architectural and archaeological documentation.

- Such databases can serve as a base for further historic preservation and actual restoration done by companies or academic institutions.

Masada Project

The general aim of the project is to create a comprehensive digital documentation of the archaeological site of Masada. The data acquisition is done through laser scanning and photogrammetry. This methodology will give us a data base of accurate three-dimensional geometrical information in the form of a point cloud and extensive photographic imagery, which can be used to create textured three-dimensional geometry. Once all raw data is collected, 2D architectural drawings and 3D models of the site can be produced. The 3D models can represent the site "as-is" and can further serve as a basis for o digital reconstruction that can illustrate the state of our knowledge about the site, for different time periods.

The didactic aspect of the project was in the form of a workshop. The workshop focused on digital documentation of historical sites and the use of 3D laser scanning in the research and analysis of built environments. During the workshop the participants were shown the methodology and strategies related to the acquisition and management of three-dimensional data from the site. Further, the possibilities of using acquired data for the construction of two-dimensional drawings and three-dimensional models were explained.

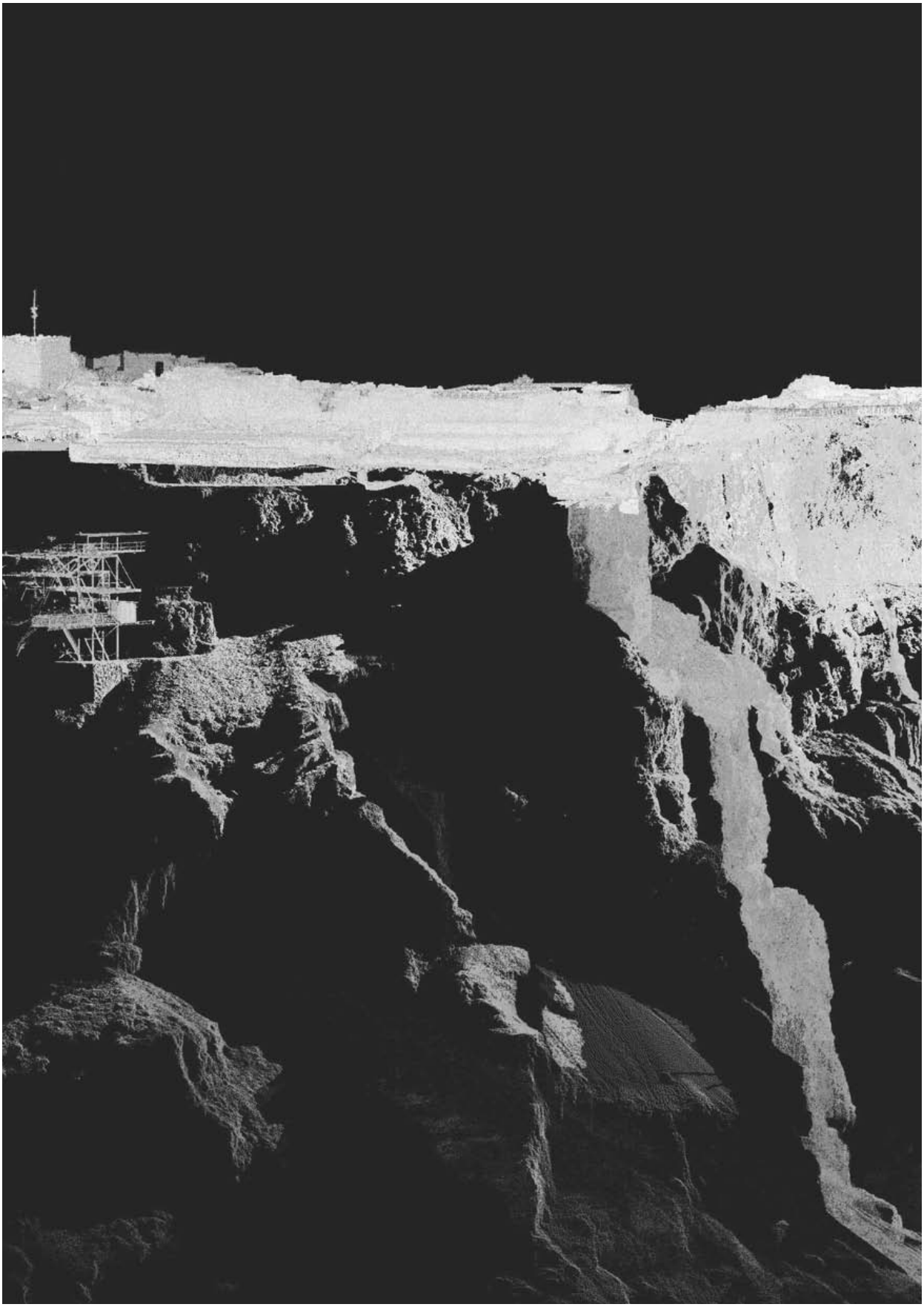
The participants had the opportunity to use the site of Masada as a laboratory for applying all steps of the methodology: they were familiarized with the laser scanning equipment and the digital acquisition of three-dimensional data, they were acquainted with the laser scanning software used for the registration of the various laser scans acquired on-site and they took active part both in collecting the information on-site and in the post-processing the cloud of points and extracting architectural drawings.

Further, the workshop created an international collaborative framework for working with students, lecturers and professors from around the world. Within the framework of the signed collaboration between Shenkar College of Design and Engineering, the University of Florence and the University of Pavia, two workshops on digital documentation of cultural heritage sites have taken place:

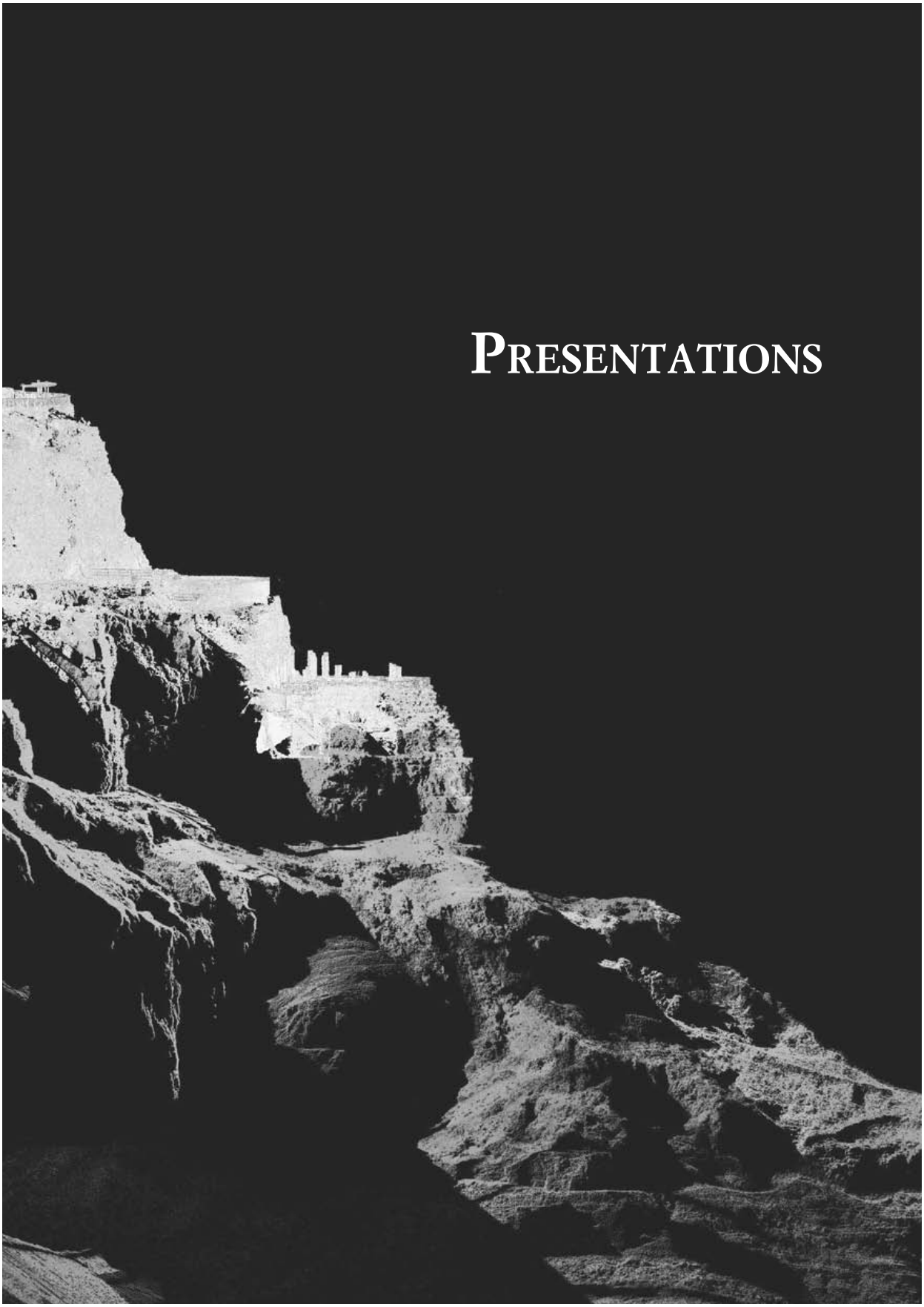
- Urban Archaeology in the Center of Florence – 3D laser scanning survey and 3D modeling, Florence, Italy; October 2012

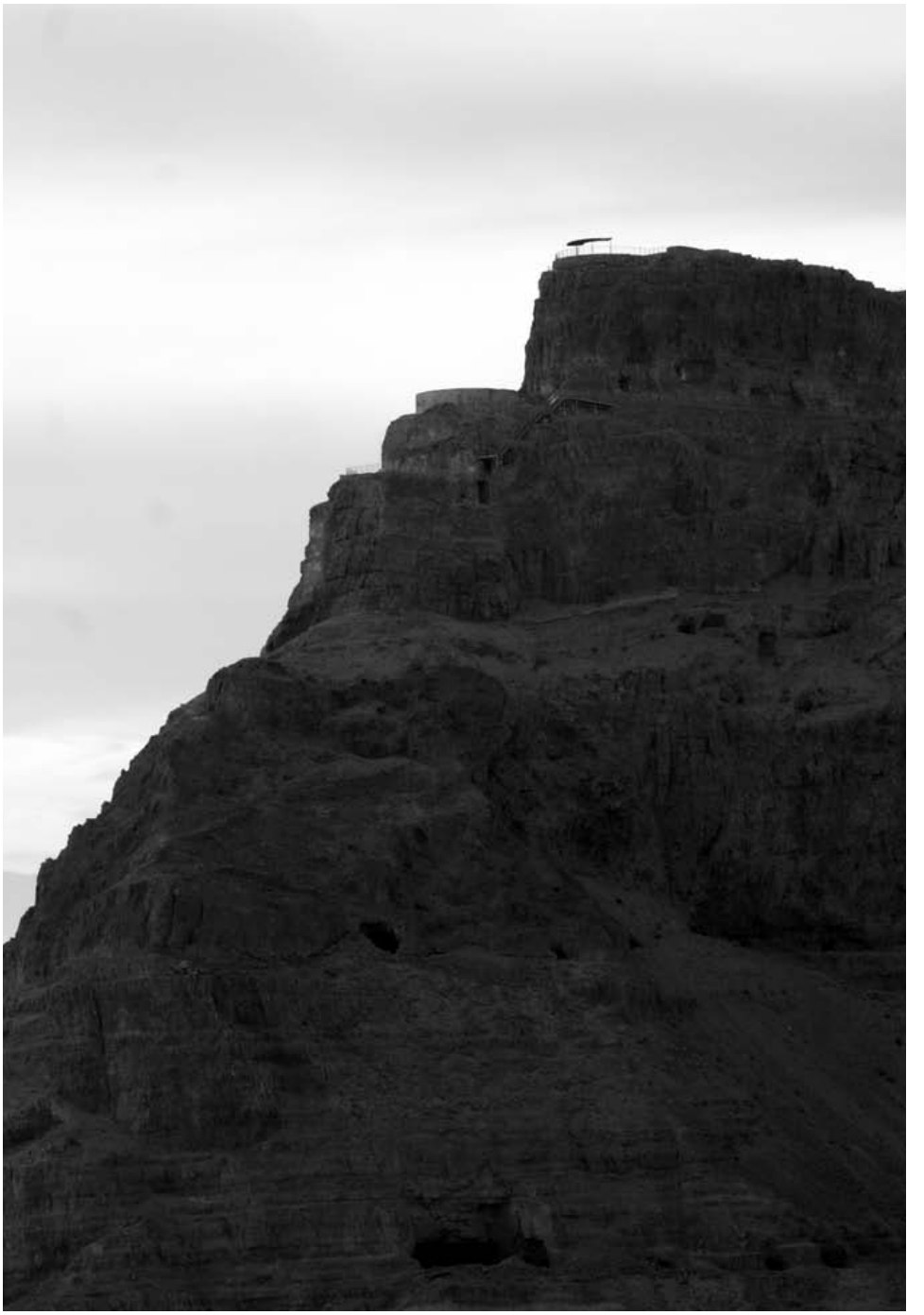
- Masada International Workshop – How we document a heritage site digitally? Masada, Israel; February 2013

Stefano Bertocci, Sandro Parrinello, Rebeka Vital



Presentations





A project for the archaeological survey of the site of Masada, Israel

Stefano Bertocci

Introduction

Architect and Antiques

The scholar of architecture is undoubtedly interested in the study of the ancient world, a research that has always been carried out thanks to both historical and literary sources and through the direct knowledge of the remains of the architectural production of the past. Moreover the research has been carried out by drawing and surveying, as demonstrated by the fifteenth century studies of Renaissance humanists, artists and architects that documented the traces of the past with sketches, measurements and representations of various kinds, as well as with accurate literary descriptions[1].

However, until the seventeenth century, only the contents related to architecture were the subject matter for the investigation of scholars, who developed theories and methodologies, in part supported by the survey of the remains of ancient buildings, and paying less attention to archaeology even though they were interested in ancient architecture.

The surveying activities often seem to be a pedantic exercise, essential for the training of architects, but only rarely these experiences are considered to be an essential research tool aimed at studying archaeology.

Near the end of the seventeenth century, the European scholars required more careful studies and investigations about ancient architecture, based on detailed

View of the Herode's Palace from the largest roman camp surrounding Masada.

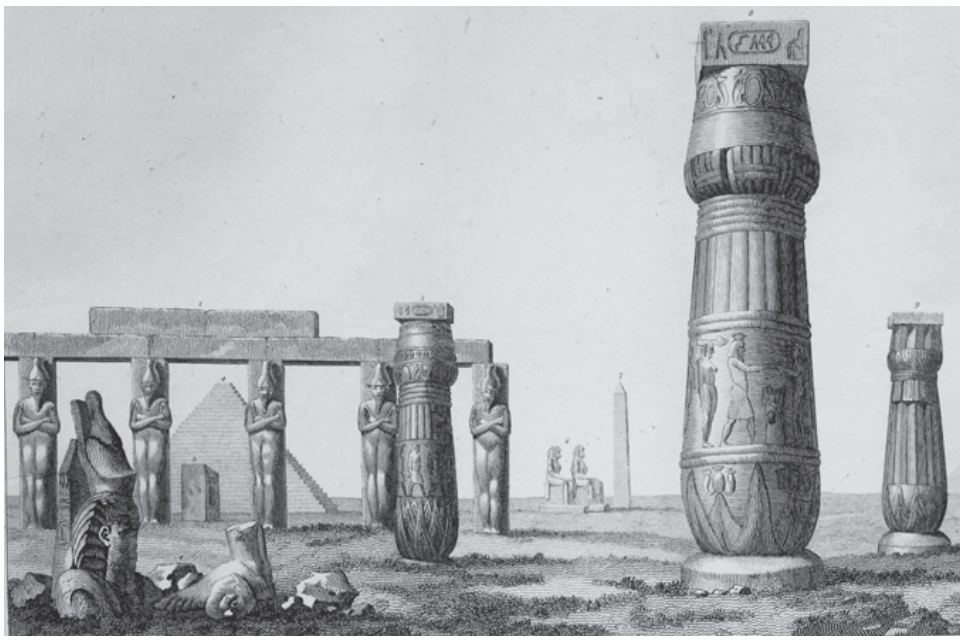
Engraving by H. Schliemann (Ilios), with the view of the base of the wall of the acropolis of Troy II.

surveys of the ancient remains: the architectural survey, as an instrument of knowledge and cultural dissemination, becomes the subject of numerous published works, also with educational purpose.

In the eighteenth century the discovery and exploration of the cities hidden by the eruption of Vesuvius in Pompeii and Ercolano (Italy) contributed to the development of a more systematic search on ancient remains, after carried out on a more or less scientific approach until the discoveries made by Schliemann, who worked in the period 1870-1880 in Troy (Turkey) and Mycenae (Greece).

In the early years of the nineteenth century, the entourage of illustrators and detectors during the Napoleonic campaigns made some important experiences, for instance the drawings of Egyptian ruins by Vivant Dénon. They are an eminent example of precision in the representation of the object, with an accurate ob-

Vivant Denon (1802): Reiunion de divers Fragments d'Architecture Egyptienne.



servation about the state of conservation of the buildings, even representing the cracks and damages of every single stone[2].

In 1812 the Swiss explorer Johann Ludwig Burkhardt[3] revealed to the West countries the amazing rupestrian architecture of Petra, for the most part survived almost intact to this day, thanks to both the geo-morphological features of the site and the peculiar monolithic construction technique.

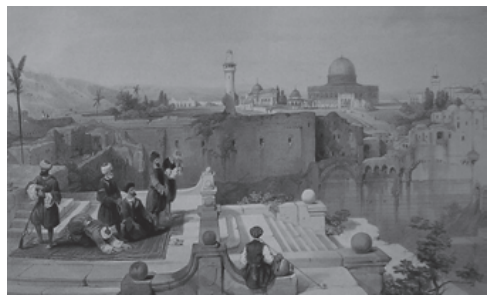
The great success of the very first reports, enriched with excellent graphic illustrations[4] and, above all, with several beautiful lithographs by David Roberts[5] (realized in 1839 during a special expedition from Egypt to the Holy Land and published between 1842 and 1849), increased more and more the interest towards the legendary city.

The nineteenth century is characterized by the development of the activities carried out by the pension-

Pierre Nicolas Ransonnette, (1837): A street in Old Jerusalem.

Pierre Nicolas Ransonnette, (1837): Jerusalem from the Mount of Olives.

David Roberts (1842): View of the Temple Mount.

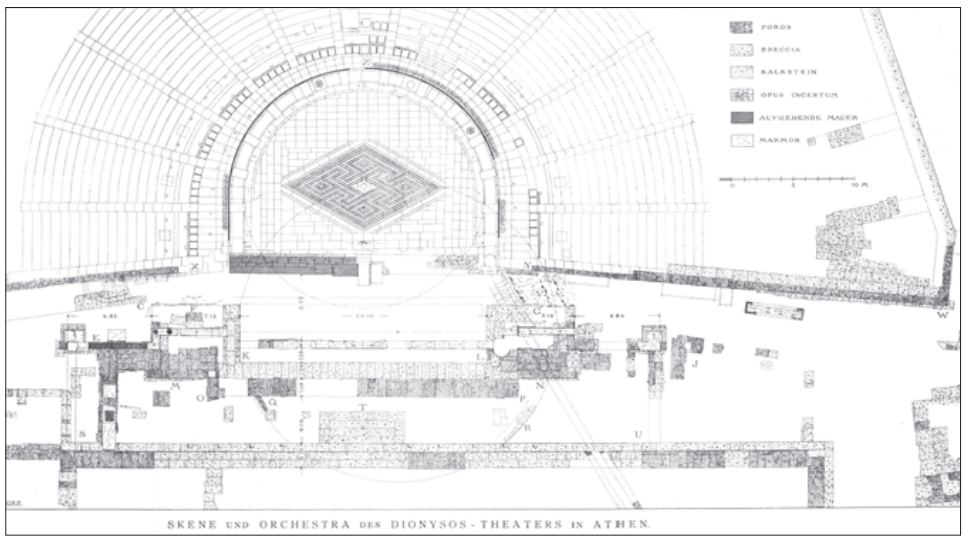


L. Ross, E. Schaubert, Ch. Hansen (1836): Restoration of the temple of Athena Nike.

naires of the French Academy in Rome[6]. The main feature of these studies is the survey of the ruins and the subsequent activity of "restoration", that is to say the graphic reconstruction of the monument based on the evidences of the archaeological site and especially on the concepts and theories of the classical architectural orders.

Pierre Adrien Paris is certainly one of the most representative among the architects, who, between the eighteenth and nineteenth century, have dedicated the majority of their lives to the research and to the survey of ancient architecture and archaeology. Educated in Rome, at the Academy of France, he prepared a large number of drawings (over 500 drawings of ancient monuments), exploring in Rome, among other things, the Circus of Caracalla, the Forum Holitorium and the Colosseum, and making very accurate measurements and restitutions. Even many Italian architects, just like Emmanuel Pontremoli, considered the Roman education as essential, and they prepared some envois at the end of the courses at the Academy of France or other

Roman academies, such as Luigi Canina at the Academy of St. Luca.
The French School, founded in Athens in 1846 as a section of Fine Arts for artists sojourning at Villa Medici in Rome, began an excavation project with Théophile Homolle in Delos in 1877. He became the director of the School and, starting from 1880, he obtained the concession for the archaeological site in Delphi, assisted by the "Prix de Rome" Henri-Paul Nénot.
According to Homolle's point of view, the function of an architect is closely related to the activities of surveying and drawing, in order to prepare graphic documents that will be used as the support for the divulgation among people, to justify the impressive excavating in Delphi.
Architects, such as Jacob Ignaz Hittorf, who became famous with his activities in the archaeological site in Sicily, Jacques Clerget, who worked in Turkey at Magnesia on the Maeander, and many others such as Eduard Scaubert and Christian Hansen, together with the archaeologist Ludwig Ross, who reconstructed the

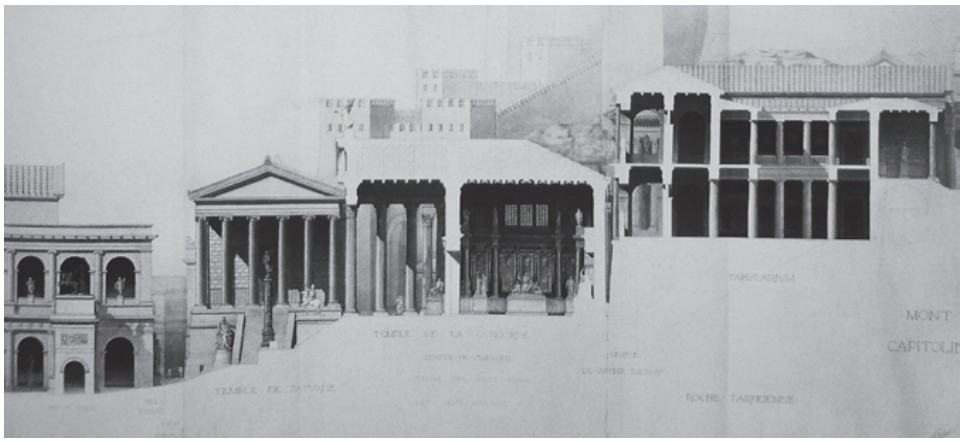


Wilhelm Dörpfeld: Plan of the theatre at Olympia.

F. Dutert (1874): Roman Forum. Section and reconstruction at the time of the Antonini.

temple of Victory in the Acropolis of Athens through the reassembly of the ruins[7].

The first campaign by the Archaeological Institute in Berlin was conducted in 1875 at Olympia, directed by the archaeologist Curtis together with the architect Friedrich Alder, and then by the architect Wilhelm Dorpfeld. The latter, known in Germany as the real founder of scientific research in architecture, had an extraordinary career as an architect and archaeologist, committing himself to the excavations in Troy, Tirinto, Athens and Lefkada, where he died in 1940. The German Carl Humann, who was first of all an engineer



who worked in Turkey for the construction of roads and railways, discovered Pergamon and its sanctuary of Asclepius. In 1878 he was granted the permission to excavate and was in charge of the transportation of the Great altar to Berlin, where today is preserved.
Between 1895 and the early years of the twentieth century, with the discovery of the pre-classical world, several architects and archaeologists with specific skills worked in some of the most important archaeological sites, like in Susa, Babylon, Assur and Boğazkale.
With Evans, the person who made the extraordinary discovery of the Minoan civilization (1900-1905), have worked several architects, such as Théodore Fyfe, Christian Doll and Piet de Jong, who contributed to the surveys and the evocative graphical representations as well as to the daring reconstructions in situ[8].

Survey and detection drawings as a fundamental document for the archaeological analysis

Nowadays, in a general context that considers the specificity and the skills of the surveying specialist useful for the conservation and restoration project, there is an increasingly great interest towards this profession in the field of archaeological researches, insomuch as to become an independent sector.
Archaeology is traditionally divided into different disciplines depending on the historical period or on the culture subject matter of the research, or according to special methodologies for the study, or to particular problems or even it uses different definitions that are based on the typologies of materials.
The discipline is described in relation with well-defined specificities of the field, in any case dealing with the systematic recovery and study of evidences, more

generally "antiquities", and therefore objects found in in their context.
Today the term "context" has cultural, chronological, but also spatial and environmental meanings: the architect, being an expert in describing events in terms of space and environment, can therefore be included with good reason among the scholars who, in the specific field of each archaeological research, have a key role like other professionals: experts in charge of the excavation and of recording the finds work together with archaeologists, historians, architects, restorers and laboratory technicians[9].
With the development of methodologies for stratigraphic research, with more and more attention to the traces of material culture[10], now the same methods of study are used not only for ruins but also for wall structures and therefore for architecture in general: the fields of application of architectural, structural, typological, geometric and formal researches, typical of architectural studies, have found useful applications also in archaeology.
Measuring a wall structure and its functional and aesthetic nature can become a fundamental support for the historic and architectural study, besides from the archaeological point of view, but above all for the reading of the structures: this activity if correctly carried out is aimed at comparing masonry structures, the characters of wall outer layers, the architectural and finishing techniques in the whole geographical area.
This is also the case of extended archaeological regions of great interest as the site Masada in Israel, where the remains of buildings both of monumental interest and of lesser importance are present in the area.
Infographic technologies and digital surveying systems can be used in various fields of archaeological studies and, first of all, they offer numerous applications concerning the management of the extensive documenta-

tion of the excavation and survey for each campaign.
Generally one of the main purpose is to prepare a database concerning the documentation of each site, that can be easily consulted and updated, organized in order to be online in consultation and at research teams disposal, even internationally, due to the interdisciplinary nature of the study.
These databases are essential tools for the management and the archiving of survey documentation, for instance of notes taken during the fieldwork, of surveys made by means of digital equipment, of source files up to definitive documentation and drawings, of images and pictures. If well organized, this data gathering can offer the possibility to carry out studies for didactic works or researches in various fields.
The introduction of such devices, adapted to the requirements of each different sector, allows the enhancement of the wide iconographic and documentary material gathered by a team of scholars and experts working in a particular area.
In the end, another distinctive element is the *GPS georeference* of the topographic data of the buildings described by the drawings, that allows a quick maps updating with any new information (e.g. excavations campaigns).
Digital maps can be the support for the gathering of *GIS data systems*, useful for researches that are directly based on the cartographic map of the site, and they can provide thematic maps for each different level of the study[11].
A digital database should therefore give the necessary information for the management of an archaeological site, especially for the scheduling of excavation activities, for the planned preventative or emergency maintenance, for the monitoring of the state of preservation of a site.

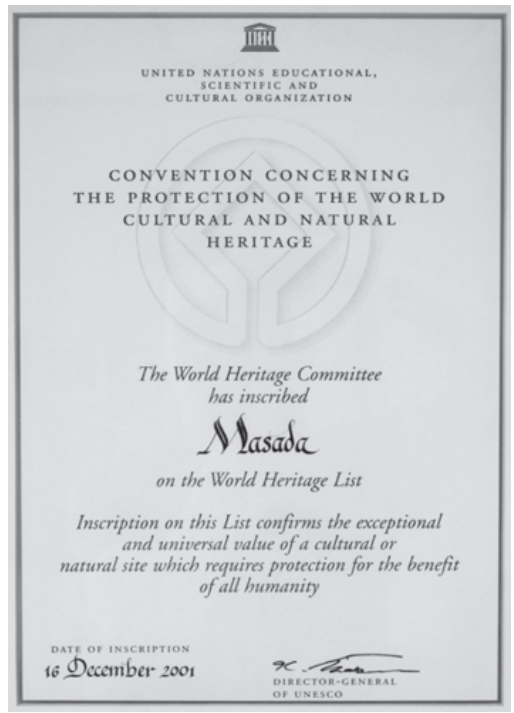
The site of Masada

The main purpose of the researches dealing with wide archaeological sites and complexes, even in urban areas, like in Masada considered in its territorial context, is therefore to provide documentary evidences to every historic period shown by the archaeological stratification: no monument, no activity and no period can be considered more important than others, since the fact-finding survey concerns the knowledge of the whole area in all its aspects.
The analysis of the territory, both as a preliminary study with the aim to find archaeological remains and to gather general statistical data about the history of the region, uses a survey made by means of 3D laser scanner on an urban and territorial scale, completed by traditional methods of research[12].

Aerial view of the fortress of Masada.

The site of Masada, discovered in 1828 by a traveller on the rugged mountains that rise East of the Dead Sea in the south-eastern Judea, is in current-day part of the Israeli territory at about one hundred kilometres south-east from Jerusalem.
The site had been studied in 1933 by the famous expert Schulte[13], but only during the excavation activities carried out from 1963 to 1965, the great fortress was identified by the expedition led by the archaeologist Yigael Yadin[14].
Since 1966, Masada and its territory has become a protected area by the Ministry of Antiquities and starting from 1998 it was protected as National Parks, Nature Reserves, National Sites and Memorial Sites.
It became an UNESCO protected site in 2000 and today it is a wide archaeological park open to tourists, one of the most important in Israel, provided with a

Amir Drori e Yigael Yadin at Masada's archaeological excavations in 1963.



UNITED NATIONS EDUCATIONAL,
SCIENTIFIC AND
CULTURAL ORGANIZATION

CONVENTION CONCERNING
THE PROTECTION OF THE WORLD
CULTURAL AND NATURAL
HERITAGE

The World Heritage Committee
has inscribed

Masada

on the World Heritage List

Inscription on this List confirms the exceptional and universal value of a cultural or natural site which requires protection for the benefit of all humanity

DATE OF INSCRIPTION
16 December 2001

DIRECTOR-GENERAL
OF UNESCO

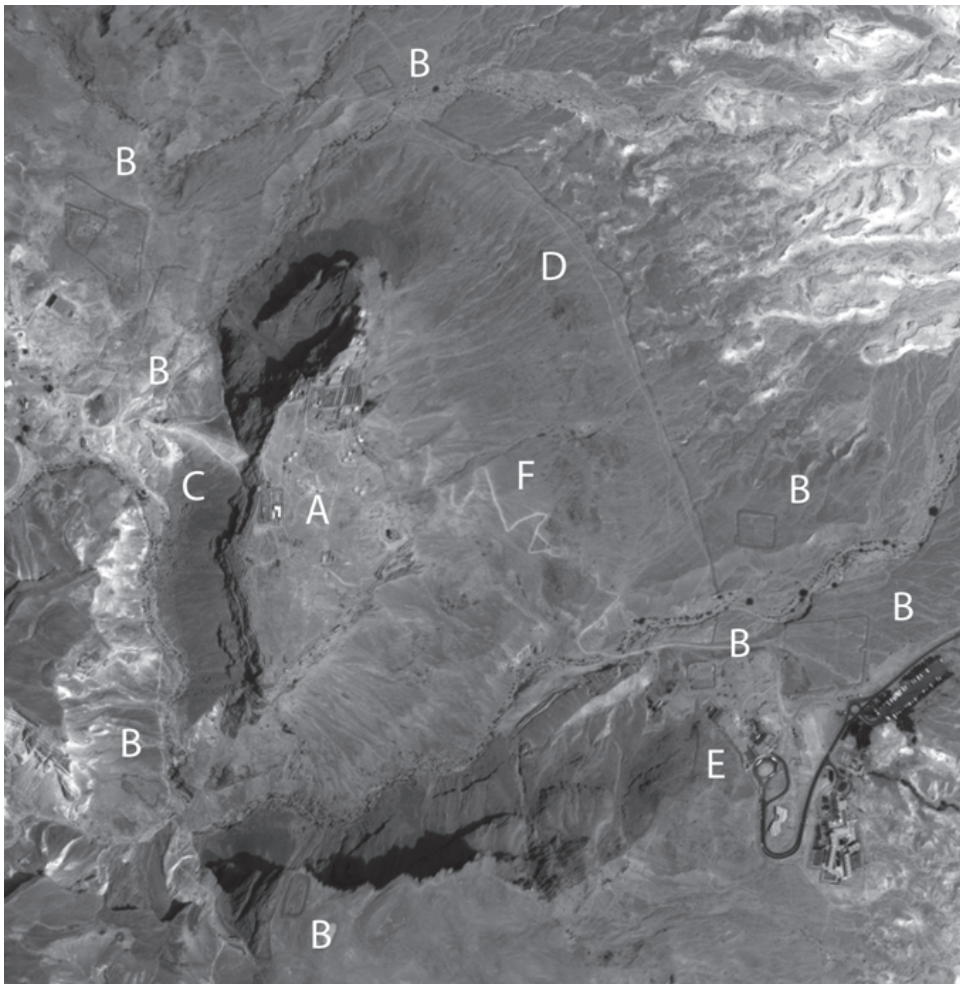
Inscription on the World Heritage List.

Localization of the site of Masada in Israel.

Visitors Centre and a funicular railway for a fast connection to the main site area, the fortress, which is located on the wide tableland on the top of the mountain. There is evidence in the form of archaeological finds in a cave that there was human settlement there in the Chalcolithic period (4th millennium BC) and then in the Early Iron Age (10th -7th century BC).
A big artificial underground cistern, together with numerous others basins for water conservation, both on the top of the site and located on the steep slopes

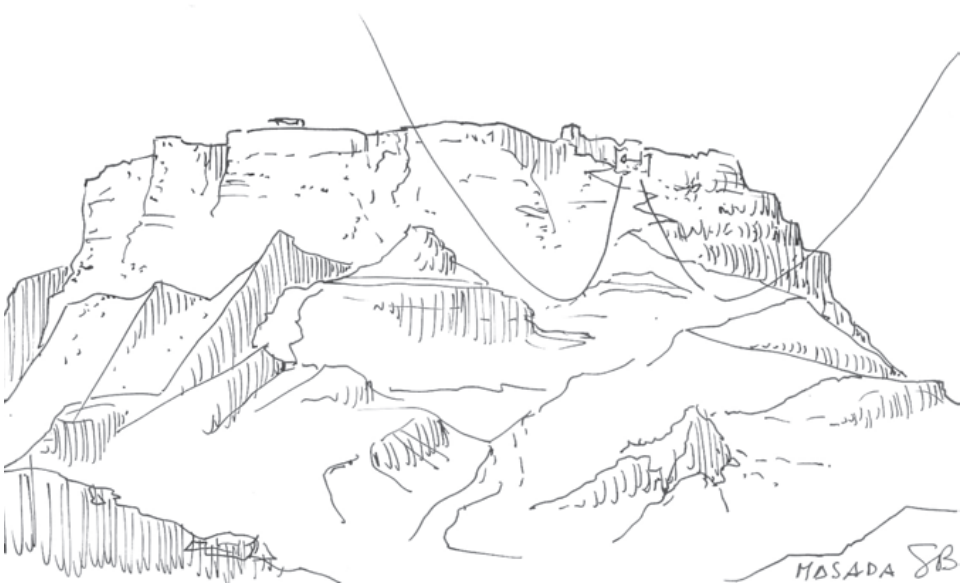
In the next page: Masada site with localization of the system of siege made by the Romans:
A. fortress of Masada;
B. fields of siege;
C. the great siege ramp;
D. system of walls with towers;
E. current visitor centre and funicular;
F. path access called the "snake".

of the mountain, demonstrate the long-time human presence in the area. As many historian stated, among them in particular Titus Flavius Josephus, the location had been used as a fortification from the second century BC, due to a rocky isolated mountain with only two access roads[15].
On top of the hill, at a height of about four hundred meters above the Dead Sea depression, there is a flatland of an area of about ten hectares. This summit plateau is fenced in by a walled curtain that extends for



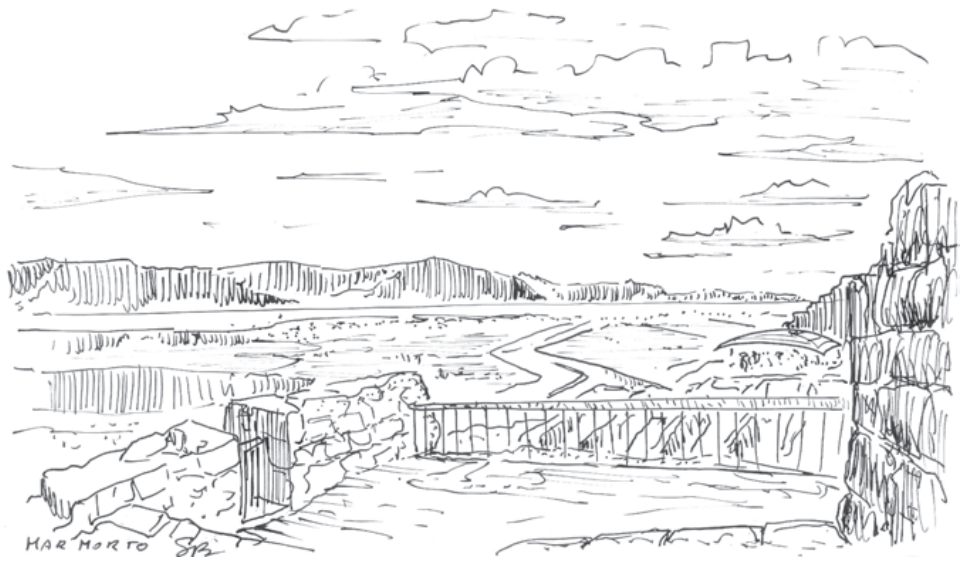
View of Masada from the visitor centre.

about 1,300 meters, and it is made of a double wall, with an outer curtain and reinforcement towers and with an interior wall, connected by transverse walls that form a series of communicating compartments (called casemate system), once used as warehouses, arsenals as well as residences. Among these spaces there is also a synagogue (considered one of the most ancient of Palestine), and some buildings used as columbaria.
Inside the fortified wall, in the northern area, there is an well-structured building complex: the storehouses, made up of two series of buildings with long rooms (from 20 to 27 metres) and inner road network, the wide residences with inner courtyards, including the so-called Herod's Palace dating back to the first century BC. It is an amazing monumental complex located on three terraces of the rocky summit over the desert and with the beautiful panorama of the Dead Sea[16].
Within the complex there is also a big watering place (the numerous room have been restored) opened on a



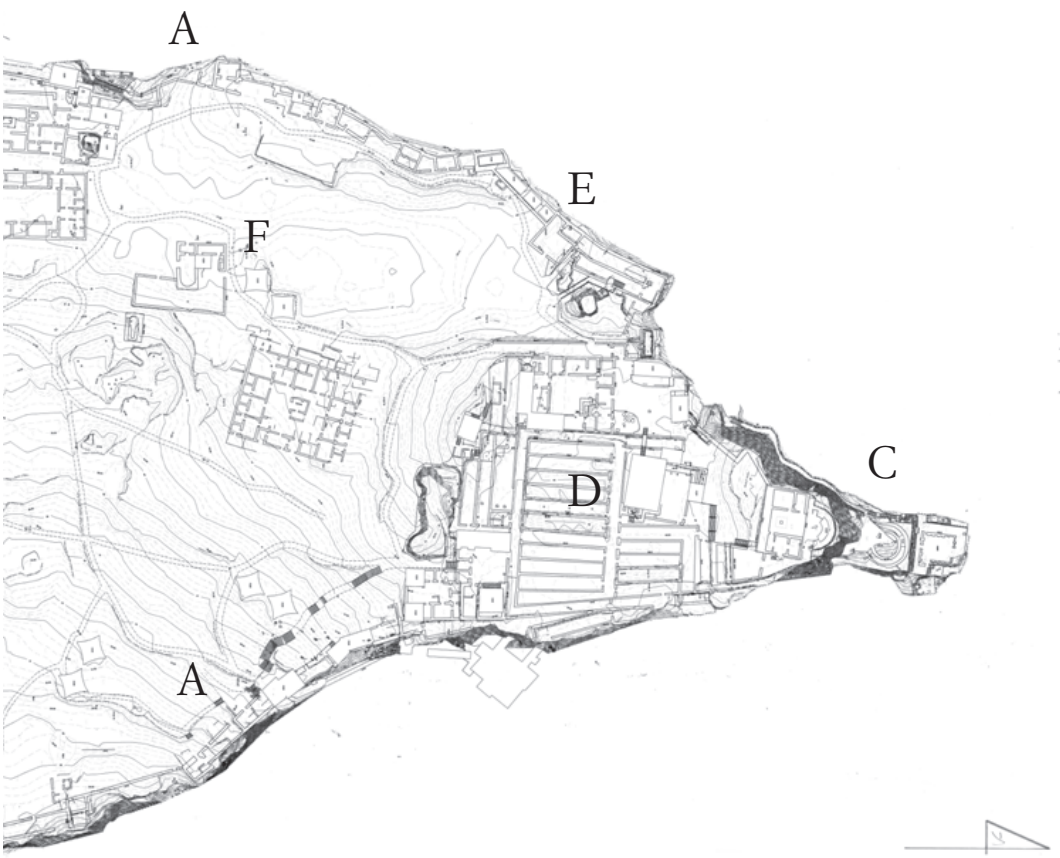
courtyard with swimming pool and cisterns.
Another palace complex with various residences is situated in the south-western area of the fortified site and it consist of various rooms around courtyards with unusual long entrance walls[17].
In the central part of the area there are the remains of a building from the Byzantine period, with a central plan, and so the settlement in the site is supposed to exist at least up to that period[18].
Well-preserved also the ruins of the great structures for the siege of Masada, built by the Romans between 72 and 73 AC, consisting of a wall surrounding the hill, reinforced by the presence of eight military camps, fortified with the traditional quadrilateral plan structure.
Among the siege structures, the most impressive remain is the artificial ramp, made of earth and protected with wooden structures (some traces still existing), used as sloping plane to reach the walls on the hilltop

View of the Dead Sea from the terrace of Herod's palace on the acropolis of Masada.



with an huge siege tower celebrated in the writings by Josephus.
The good state of conservation of the entire complex including the fortress and the surrounding area, also with the remains of the siege, made this area of great interest and proclaimed a World Heritage Site by UNESCO[19].

Topographic map of the fortress of Masada made by the National Park.
A. access doors;
B. double wall masonry;
C. acropolis vith the Herod's Palace;
D. roman baths;
E. Synagogue;
F. Byzantine church;
G. large cistern



Notes

1. See also S. Bertocci, M. Bini, *Manuale di rilievo architettonico e urbano,* Città Studi Edizioni, Novara, 2012.

2. D. V. Denon, *Voyage dans la Basse et la Haute Egypte*, ed. It. Firenze, 1808.

3. J. L. Burkhardt, Travels in Syria and the Holy Land, London, 1822, pp. 420 - 434.

4. L.M. Leonde, *Journey through Arabia Petrea to Mount Sinai and the excavated city of Petra the Edom of the Prophecies*, 2nd ed., London, 1838. See also L. Marino, I disegnatori di Petra, in VV.AA. Il disegno luogo della memoria, proceedings of the congress in Florence, 21 - 23 September 1995, Firenze, Alinea, 1995.

5. Collection of views by D. Roberts, London, 1839see also D. Roberts, *Journey to Petra and the Holy Land*, introduction and commentary by E. Nistri, English translation by Paula Boomsliter, Florence, 1997.

6. M. Docci, D. Maestri, *Storia del rilevamento architettonico e urbano*, Laterza, Bari, 1993, p. 221.

7. See also M. C. Hellmann, *I grandi scavi francesi e tedeschi in Grecia e in Asia Minore alla fine del XIX secolo*, in "Rassegna" ("L'archeologia degli architetti"), XV, n. 55/3, 1993, pp. 61 - 67.

8. D. Laroche, *Alla scoperta dell'antichità preclassica*, in "Rassegna" ("L'Archeologia degli architetti"), XV, n. 55/3, 1993, pp. 68-73.

9. For example radiometric dating, pollen analysis or microfauna specialists.

10. The main technique for an archaeological research is the stratigraphic excavation that removes layers of soil that are deposited in the basin of a site, usually due to human settlement, respecting the chronological sequence, and to document the materials that have been found, arranging them in a relative chronological sequence. The archaeological survey also uses the formal and stylistic comparison with other similar items (e.g. finds out of context), the archaeometric scientific techniques, and it can take advantage by survey and dating techniques or by scientific analysis, as described above, generally developed in other disciplines.

11. The potentiality by SIT or GIS systems in the field of archaeology are known to everybody and, specifically, in the sector of archaeological survey and urban and regional analysis. Their use is more and more common as a necessary tool for the organization of information in the specific field of survey and data management, in order to plan the conservation of interesting sites from an architectural point of view, even at a territorial scale.

12. Nevertheless the project of digital surveying, described in more detail in the following chapters of this volume, does not exclude the traditional archaeological survey of the outer surfaces (direct observation), the interpretation of aerial photographs and any geophysical exploration.

1**3.** A. Schülte, *«Zeitschrift das deutschen Palästina - Vereins»*, LVI, 1933; M. Avi – Yonah, N. Avigad, Y. Aharoni, L. Dunayevsky, S. Gutman, The Archaeological Survey of Msada, 1955 – 56, *«Israel Exploration Journal», VII, 1957; Y. Yadin, The excavation of Masada* 1963 – 1964. Preliminary Report, *«Israel Exploration Journal»*, XV, 1965; Y. Yadin, Masada. Herod's Fortress and the Zelot's last Stand, London, 1966.
Machaerus: Gyözö Vörös, *Machaerus I. History, Archaeology and Architecture of the Fortified Herodian Royal Palace and City overlooking the Dead Sea in Transjordan*, Edizioni Terra Santa, Milano 2013.

14. Yigael Yadin, together with William F. Albright, was one of the main exponents of the so-called "Biblical Archaeology". He carried out the excavations in Nahal Heve, on the shores of the Dead Sea, and became internationally famous when directing the excavation in Masada, between 1963 and 1965.

15. The history of Masada is known principally from the work of Flavius Josephus, the Jewish

historian of the 1st century AD. For the description of the siege by part of the Romans see also Giuseppe Flavio, Guerra giudaica, edited by G. Vitucci, Arnoldo Mondadori Editore, reprint 2012, chapter VII, 8, pp. 484-488.

16. The main phase of the most important new construction of the Northern Palace is dated to the mid-20s of the 1st century BC. This group of buildings are located at the highest point of the hilltop and Constitute a defensible acropolis of the citadel.

17. To the early phase (around 35 BCE) belong the nucleus of the Western Palace, three small palaces, an administrative building, a barracks, three columbaria (also used as watchtowers), several large cisterns, and a swimming pool.

18. At the beginning of the Jewish Revolt in 66 a group of Zealots led by Menahem, occupy Masada fortress, and many Jews settled there after the fall of Jerusalem and the destruction of the Temple by Titus in 70. Two years later Flavius Silva, the Roman Governor, decided to eliminate this last remaining centre of Jewish resistance. On a rocky site near the western approach to Masada they constructed a massive ramp of stones and rammed earth. A giant siege tower with a battering ram was constructed and moved laboriously up the ramp completed. See Giuseppe Flavio, Guerra giudaica, cit., cap. VII, 8, p. 488.

19. UNESCO Declaration of Authenticity (2010): "This is a site that remained untouched for more than thirteen centuries. The buildings and other evidence of human settlement gradually collapsed and were covered over until they were revealed in the 1960s. There have been no additions or reconstruction, beyond an acceptable level of anastylosis, and inappropriate materials used in early conservation projects are being replaced. Limited restoration works have been carried out to aid visitor interpretation with original archaeological levels being clearly defined by a prominent black line set in the new mortar joints. Certain significant archaeological elements, such as the Roman camps and siege works, remain virtually untouched. The authenticity is therefore of a very high level". The property and buffer zone are owned by the State of Israel, and the archaeological sites are protected by the 1978 Antiquities Law. Since 1966 the entire Masada site, and its surroundings, have been designated a National Park, updated by the 1998 National Parks, Nature Reserves, National Sites and Memorial Sites Law. The National Park is further protected through being entirely surrounded by the Judean Desert Nature Reserve, also established under the 1998 Act. The property is managed by the Israel Nature and Parks Authority, in cooperation with the Israel Antiquities Authority. An important aspect of the current management plan is the decision to carry out no further research excavation on the main site *in the present generation*, although limited excavation will be permitted when required by conservation, maintenance or restoration projects.
Almost entirely invisible from the summit, a new visitor centre was opened on the plain beneath the eastern side of Masada in 2000. Providing all the anticipated facilities, the centre was designed to accommodate the 1.25 million visitors per annum. The cable car, originally installed in the 1970's, was replaced by a new, less intrusive, and heavily used system to connect the visitor centre with the summit. It is also still possible to undertake the arduous climb to the summit by the two historic pedestrian access routes.