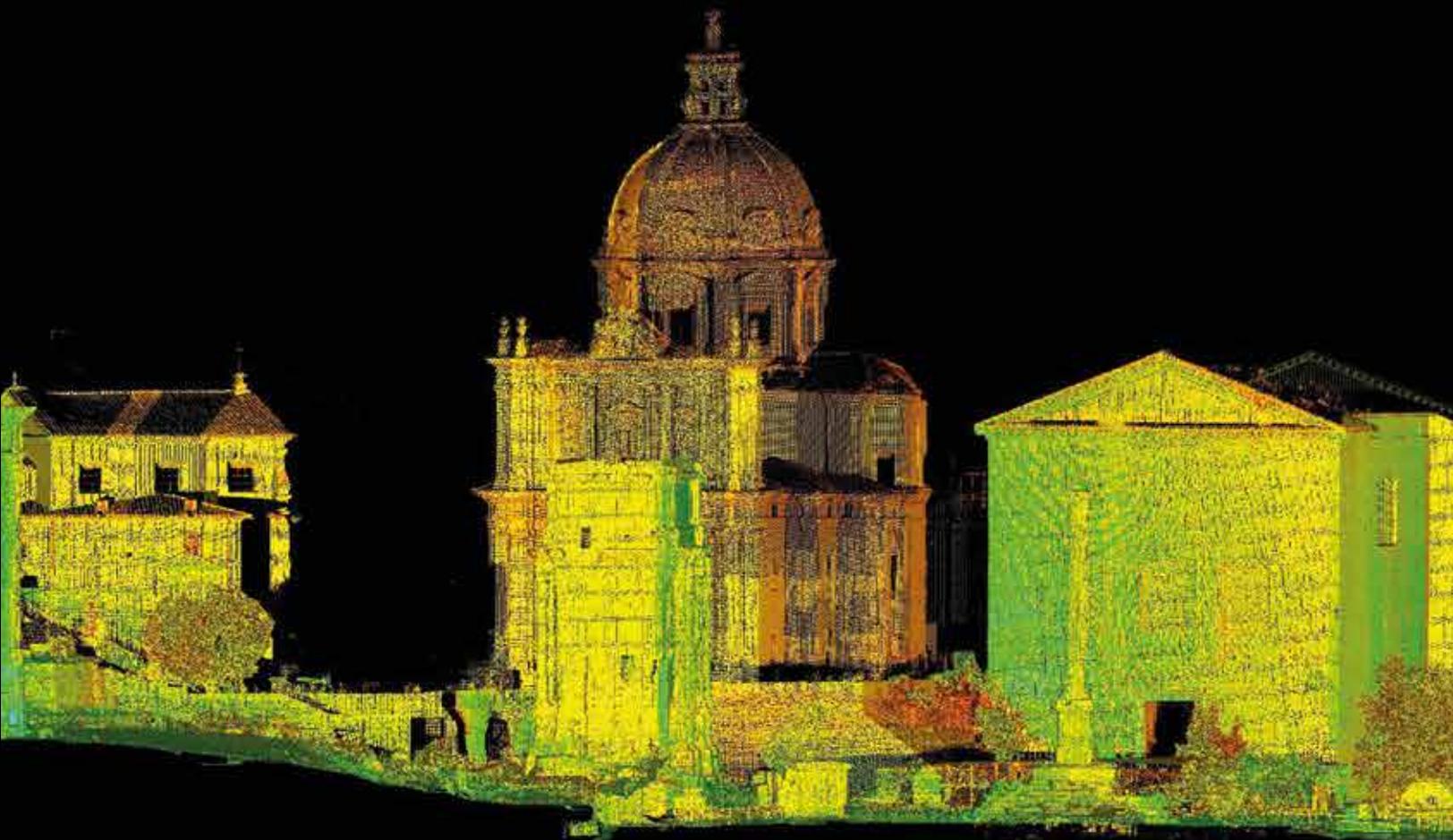


FROM PEN TO PIXEL STUDIES OF THE ROMAN FORUM AND THE DIGITAL FUTURE OF WORLD HERITAGE

Edited by

PATRIZIA FORTINI, KRUPALI KRUSCHE



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UNIVERSITY OF NOTRE DAME

FROM PEN TO PIXEL

Studies of the Roman Forum
and the Digital Future of World Heritage

Foreword

ALFONSINA RUSSO

Edited by

PATRIZIA FORTINI, KRUPALI KRUSCHE

with collaboration of

GIOVANNA LENZI-SANDUSKY

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«L'ERMA» di BRETSCHNEIDER

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FOREWORD

Starting in 2009, the Ministry of Cultural Heritage and Activities and Tourism (MIBACT), through the Parco archeologico del Colosseo (P.A.R.Co) – formerly the Archaeological Superintendency – established a relationship of scientific collaboration with the University of Notre Dame’s Digital Historic Architectural Research and Material Analysis (DHARMA) lab, (IN, USA) directed by Prof. Dr. Ing. Krupali Krusche to carry out the architectural survey of the monumental realities at the Roman Forum, using the laser scanner, hand measure drawing, and very high definition photography. The work was conducted under the scientific expertise of Krupali Krusche with the research assistance of architecture students from the University of Notre Dame, and the scientific inputs of Dr. Patrizia Fortini, on behalf of the P.A.R.Co. The first and most complete surveys that documented the complex topographical articulation at the Roman Forum (plans, sections, axonometries etc.) date back to the 19th century, when at the behest of the then director of the excavations Giacomo Boni, the plano-altimetric archaeological maps were made and updated during the course of the excavations. In executing his plan, Boni utilized innovative detection techniques, including such techniques as aerial photography. Between 1898 and 1909 the Ministry of Defence’s Department of Military Engineering collaborated with their own tools to carry out orthophotos using the braked ball and the draken, capturing the Roman Forum and Palatine from various heights. These images are fundamental documents for the history of Italian archaeological research.

The awareness that a critical review of the documentation collected over time, at various degrees and in different forms, can provide concrete contributions to the study of such a complex context as the Roman Forum, is the basis of the project “Memory and reality: the excavations of Giacomo Boni at the Roman Forum ” curated by Patrizia Fortini in collaboration with Krupali Krusche.

A project based on the collection and analysis of the documentation – photographic and archival graphic archeology preserved in the archives – using in addition to the usual research tools, current information and multimedia technologies. The belief that comparing the historical documentation with today’s, both being the result of the use of cutting-edge technologies, and that it would bring important results to the scientific field, is at the base of the scientific collaboration between the two institutions a collaboration which is still in progress today. An integrated project was born in which the students of the University of Notre Dame learned what were the survey techniques of the late 19th century and tackled them treasuring the experimental nature of this learning experience. Together with drawings taken from the laser scanner tool, students created freehand drawings according to methods that were also used in Boni’s age. The P.A.R.Co has consequently obtained an analysis tool for the monuments of the Roman Forum. A tool that has been, and continues to be, an aid in the preparation of planned restoration and maintenance activities and in the creation of those products aimed at the general public (app., website etc). Besides these important contributions, the materials obtained increase the scientific study of the monuments themselves.

As part of the project, both partners worked on transforming historical drawings into digital files. The two teams experimented with new technologies to bring new knowledge to the scientific world and, at the same time, translate scientific data into expressive means understandable to the new generations. The collaboration was also important for bringing a significant number of young overseas students of Roman history and archeology to interact with a context of high cultural value. Together they worked towards the creation of a digital platform through which future generations will access and interact with historical and archaeological sites of world heritage, such as the Roman Forum. The experience gained ultimately led the two institutions to collaborate in the organization of an exhibition and a related conference. The exhibition with the significant title, “From Pen to Pixel. Studies at the Roman Forum”, was inaugurated at the Curia on April 2, 2014, with a considerable public response. The conference, scheduled from 3 to 4 April 2014, entitled “The Digital Future of World Heritage”, aimed at examining the state of the art between technology, knowledge, and conservation of cultural heritage. The result of this exchange of experiences and knowledge is this volume that wants to communicate History with stories of written words and visual representations.

A partire dal 2009 il Ministero per i beni e le attività culturali e per il turismo (MIBACT), attraverso il Parco archeologico del Colosseo (P.A.R.Co, già Soprintendenza Archeologica), ha instaurato un rapporto di collaborazione scientifica con la University of Notre Dame (IN, USA), e in particolare con l'istituto Digital Historic Architectural Research and Material Analysis (DHARMA) diretto dalla arch. Prof.ssa Krupali Krusche per eseguire il rilevamento architettonico delle realtà monumentali del Foro Romano, impiegando tra l'altro la tecnologia laser scanner e la fotografia ad altissima definizione. Il lavoro è stato condotto dagli studenti di architettura della University of Notre Dame guidati dalla consulenza scientifica della Prof.ssa Krupali Krusche, con la supervisione scientifica della Dr.ssa Patrizia Fortini, da parte del Parco archeologico del Colosseo. La prima e la più completa documentazione della complessa articolazione topografica del Foro Romano con rilievi (piante, sezioni, assonometrie etc.) risale al XIX secolo, quando per volere dell'allora direttore degli scavi Giacomo Boni, furono realizzate le carte archeologiche piano-altimetriche da aggiornare in relazione con il progredire degli scavi. Boni attuò questo suo proposito impiegando tecniche di rilevamento innovative, come la foto aerea. Tra il 1898 ed il 1909 il Ministero della Difesa autorizzò il Genio Militare a collaborare con i propri mezzi ad eseguire ortofoto utilizzando il pallone frenato ed il draken e riprendere a varie altezze il Foro Romano e il Palatino. Le immagini allora ottenute sono ancora oggi documenti fondamentali per ripercorrere la storia della ricerca archeologica italiana. La consapevolezza che il riesame critico della documentazione raccolta nel tempo, a vario titolo e in diversa forma, potesse fornire apporti concreti allo studio di un contesto tanto complesso come il Foro Romano, è alla base del progetto “Memoria e realtà: gli scavi di Giacomo Boni al Foro Romano”, curato da Patrizia Fortini, al quale hanno collaborato anche la University of Notre Dame, istituto Digital Historic Architectural Research and Material Analysis (DHARMA) sotto la direzione ancora oggi di Krupali Krusche.

È nata così una esperienza condivisa in cui gli studenti dell'Università di Notre Dame hanno appreso quali fossero le tecniche di rilevamento di fine '800; si sono confrontati con esse; ne hanno fatto tesoro; e le hanno sperimentate. Accanto a disegni tratti dallo strumento del laser scanner hanno realizzato disegni a mano libera secondo il metodo dell'età di Boni. Il Parco archeologico del Colosseo ha ottenuto la disponibilità di uno strumento di analisi dei monumenti del Foro Romano che è risultato d'ausilio, e

continua ad esserlo, nella predisposizione delle attività programmate di restauro e manutenzione degli stessi e di quei prodotti rivolti al grande pubblico (App., sito web etc.). Senza dimenticare poi l'apporto all'incremento dello studio scientifico dei monumenti stessi attraverso i materiali ottenuti. Nell'ambito del progetto, entrambi i partners hanno sperimentato come, utilizzando le nuove tecnologie, fosse possibile portare nuove conoscenze al mondo scientifico e contemporaneamente tradurre i dati scientifici in mezzi espressivi comprensibili alle nuove generazioni. La collaborazione è stata anche importante per avvicinare alla storia e all'archeologia romana un rilevante numero di giovani studenti d'oltreoceano che hanno potuto interagire con un contesto di alto valore culturale. Insieme hanno lavorato per dare vita ad una piattaforma digitale grazie alla quale le future generazioni avranno accesso e potranno interagire con i siti del patrimonio storico archeologico di interesse mondiale, come il Foro Romano. L'esperienza maturata ha portato le due istituzioni a collaborare, organizzando in primo luogo una mostra e un convegno collegato. La mostra, dal significativo titolo "From Pen to Pixel. Revisiting the Roman Forum / Dalla matita al pixel. Ricerche al Foro Romano" è stata inaugurata alla Curia il 2 aprile 2014, con notevole riscontro di pubblico. Il convegno, programmato nei giorni 2-4 aprile del 2014, intitolato "The Digital Future of World Heritage / Il Futuro del Patrimonio Mondiale nell'Era Digitale", ha inteso esaminare lo stato dell'arte tra tecnologia, sapere, e conservazione del patrimonio culturale. Il frutto di questo scambio di esperienze e conoscenze è questo volume che vuole comunicare la Storia con racconti di parole scritte e rappresentazioni visive.

ALFONSINA RUSSO
Direttore Parco archeologico del Colosseo

INTRODUCTION

On the occasion of the 3D Exhibit “From Pen to Pixel. Revisiting the Roman Forum / *Dalla matita al pixel. Ricerche al Foro Romano*”, a symposium on blended scholarship and management in the new millennium at the University of Notre Dame in Rome, 2-4 April 2014, I would like to thank the University of Notre Dame, in particular Prof. Dr. Ing. Krupali Krusche, for the kind invitation to address you here this evening and to participate in the symposium on “The Digital Future of World Heritage”.

This symposium attests to the growing awareness that the active use of digital documentation techniques is vital for the safeguarding of our cultural and natural heritage and I congratulate the DHARMA Lab at the School of Architecture and the Center for Research Computing of the University of Notre Dame in Rome for organizing this event.

Through the case study of the Roman Forum, located within the transboundary World Heritage property “Historic Centre of Rome, the Properties of the Holy See in that City Enjoying Extraterritorial Rights and San Paolo Fuori le Mura” (Italy / Holy See), the remarkable 3D Exhibit “Revisiting the Roman Forum: from Pen to Pixel: Methods of Documentation in the 20th and 21st Centuries” shows us that the art of architectural documentation is not a recent phenomenon but presents a rich history, worthy of being recorded itself.

On the occasion of the First International Congress on Digital Heritage, organized under the patronage of UNESCO in Marseille, France, between 28 October and 1 November 2013, UNESCO stressed the importance that it attributes to conserving documentary heritage. UNESCO’s *Memory of the World* programme, founded in 1992, has been actively involved in the preservation of the World’s heritage, representing UNESCO’s commitment to both tangible and intangible heritage.

Preserving digital information for current and future use is a major challenge, and UNESCO has undertaken several initiatives that put this issue on the international agenda.

During the same congress, Mr Francesco Bandarin, the Assistant Director-General for Culture, expressed UNESCO’s high interest to continue and expand the cooperation with scientists and companies involved in the field of digital heritage and highlighted the importance of research, experimentation and innovation for heritage management.

In contrast to traditional documentation techniques such as drawings, photography or photogrammetry, digital documentation techniques such as laser-scanning make it possible today to record a monument or site in all of its dimensions and to monitor them over time.

UNESCO shares with the University of Notre Dame the belief that innovative technologies should not only be used for the purpose of scientific research, but also serve to interpret the research and to make the Outstanding Universal Value of World Heritage sites understandable for the local, national and international communities. These communities could and should also be more involved

through the use of mobile applications designed to contribute in the ongoing inventorying and monitoring of monuments and sites.

In contrast to academic texts, 3D technologies present an opportunity to make heritage more inclusive since they overcome language barriers by communicating through one universal language, understandable by almost everyone: the visual language of images.

Within the field of conservation ethics, these images also present new opportunities to transcend the old dichotomy, personified by Ruskin's philosophy that "it is *impossible* [...] to restore anything that has ever been great or beautiful in architecture" versus Viollet-le-Duc's pragmatic definition of restoration as a means "to re-establish [a building] to a finished state, which may in fact never have actually existed at any given time." 3D models have the capacity to include the advantages of both philosophies. They can reduce the necessity to intervene on the historic fabric while at the same time allow the public to understand the different historical layers of a site through the creation of different virtual reconstructions.

In recent years, UNESCO has continuously underlined the importance of using non-destructive methods to document monuments and evaluate their state of conservation.

The creation of digital records and reconstructions is also a way to mitigate the possible loss of historic fabric due to natural hazards and human destruction. This insight has been the trigger for initiatives such as the 3D Exhibit of the Roman Forum or the *CyArk 500 Challenge*, committed to the 3D scanning and digital preservation of 500 World Heritage and other significant sites within a period of 5 years.

The long-term objectives we want to achieve through technology should remain the focus, rather than technology as a means in itself. The truth is that the majority of the World Heritage sites around the globe cannot afford to continuously invest in the latest equipment. The challenge for future experts will therefore consist in creatively choosing and combining the adequate traditional and new documentation techniques in a cost-efficient and sustainable way, with particular attention to the data-management and follow-up afterwards. Keeping in mind the objectives of economic sustainability and inclusive access, the introduction of crowdsourcing mechanisms and the use of existing and newly created digital open-source data should be stimulated as much as possible.

In the future, the digital shift in heritage management presents an opportunity for new synergies between heritage and the broader creative economy, as was recently highlighted by the European Expert Network on Culture (EENC). The digital data of World Heritage sites can contribute to UNESCO's objective of sustainable development by making them widely accessible for other purposes as well, such as education or tourism.

The World Heritage Centre has been promoting access to virtual World Heritage through the creation of partnerships with private companies.

Since 1996, a partnership between the World Heritage Centre and the Tokyo Broadcasting System (TBS), one of the leading private broadcasters in Japan, has been in effect for the production of documentaries on World Heritage. TBS started its documentary series "The World Heritage" at a time before the World Heritage Convention was well known among the Japanese public.

The weekly 30-minute programme, with its striking images and compelling narration generated interest among many Japanese people. The series contributed to increase World Heritage-related tourism, publications and television programmes, leading to a broader understanding and conveying the true value of the Convention to a wide public.

Through a strategic partnership with the World Heritage Centre, the Panasonic Corporation created the 3D Dive Experience at

the UNESCO headquarters in Paris for the occasion of the 36th General Conference in October 2011. Using Panasonic's newly developed multi-screen panoramic 3D display system, special contents were produced, allowing visitors to be immersed in the life-like 3D grandeur of Stonehenge, Yellowstone and other outstanding sites. Recently, more sites, such as the Taj Mahal or the ancient city of Kyoto have been added. In this way people who do not have the opportunity to witness these World Heritage sites with their own eyes, can still feel connected to them. These technologies have also an important role to play to facilitate access to cultural resources for people with disabilities.

UNESCO and its World Heritage Centre are particularly interested in the way governments, foundations, NGOs and companies will continue to use ground-breaking technologies to contribute to the overall UNESCO objectives of "peace through culture" and sustainable development.

With this in mind, I wish you a fruitful symposium and look forward to sharing its enriching insights with the broader heritage community world-wide.

IRINA BOKOVA
Former UNESCO Director-General

PREFACE

A Forum is a consortium for people, cultures, politics, religion, histories, and architecture of all kinds. Ideas, opinions, conflicts, and gossip all formed their firm roots in this place and when combined with exceptional skills created history on many occasions of Western Civilization. One such place, that has been idealized in its tiny footprint is the most revered location in all of history. Every king and emperor wanted to deify themselves in this small piece of land and leave a mark to be venerated in history. How and why did the Roman Forum gain such reverence that it is still such an object of scrutiny with four million people visiting the site every year? In burning heat you can spot a known scholar just walking away with a herd of inquisitive learners trying to get a piece of insight on this barren, abandoned, archeologically significant ruinous site.

THE INTENT OF THIS BOOK

The history of the Roman Forum has been told a thousand times. From Livy to Cicero people have written at length about it and enunciated the most articulate of speeches at the Rostra. In the Medieval lost history of the Forum, it became home to countless churches and local families and was even used as pasture grounds. In the Renaissance period, it spoke through the numerous artistic reiterations of its ruins and the scavenger hunts to re-establish the bygone glory and its lost history. Ever since then, archeologists, historians and architects alike have gone back to these ruins in the hope of learning, uncovering, and discovering new knowledge about this age-old site.

Documentation in its present form has been innovative and new but in its traditional form has been here for ages. The written accounts of those witnessing the Forum in its various written and verbal histories, all share some form of documentation about the site. Over the years these written forms of documentation were further enhanced by drawings, sketches and sometimes plans of the Forum. Be it quick ink sketches, by Palladio along with proportional studies for the standing monuments or detailed surveys done by Antoine Desgodetz, or Cressy and Taylor's beautiful renderings of the capitals and monuments in the Forum. These demonstrated the eye of the architect wanting to study and capture the knowledge of the ancients and how they designed, composed and built. The romantic poetry of the ruins was celebrated by Piranesi and Watkins and still finds its way into debates related to the state of preservation of architectural ruinous sites of world heritage value.

Rodolfo Lanciani and Giacomo Boni transformed the study of cartography for the Roman Forum as a large area mapped in precise plans of the full site. Created with multiple means of documentation combined to create one common result, a cartographic survey of the whole Palatine and the Imperial forums along with the Celio, created a very comprehensive study of the site.

THE STRUCTURE OF THIS BOOK

Boni's work has been the focus of research for Dr. Patrizia Fortini as the main archaeologist excavating and studying his work for over 25 years. Boni's work is presented in the chapters related to the exhibit in the first part of the book. Many drawings from Boni in this book are being published by the Parco archeologico del Colosseo (P.AR.Co) for the first time. These rare drawings are very large in scale and have been digitized for the purpose of this book. They give incredible insight into what Boni documented when he studied the Forum while excavating the site's multiple layers from Protohistoric to Roman antiquity. These are coupled with new research by Fortini along with the digital study of the underground Cloaca Maxima below the Forum. Bringing together historic evidence on the site combined by new means of technological innovation to support the study.

Even with these many studies, there still is a lack of precise understanding of how the Forum was created, adapted, and transformed over time. On a small footprint for the scale of the city, this dense compilation with more than twenty-two monuments jam-packed in a very small area poses questions about the relationship of every monument to each other. There is a big gap in knowledge regarding the relationship between monuments presented in various studies of recent years.

The work of Prof. Dr. Ing. Krupali Krusche, for the last ten years with her DHARMA (Digital Historic Architectural Research and Material Analysis) Lab has been recording the Forum as an urban precinct of some of the most important ancient monuments of Italy. This book is supported with a synopsis of never before published drawings with a complete set of measure drawn plans, elevations, and panoramic views of the Forum in 3D point cloud, Gigapan photographs, line drawing, and watercolor formats. And is a precursor to the study and analysis of the urban relationships and new findings in the Forum.

Part two of the book contains the work of other scholars in recent years that have worked on innovative ways of documenting archeological sites. The Symposium presented by the University of Notre Dame and the UNESCO World Heritage Center (WHC), in collaboration with Parco archeologico del Colosseo (P.AR.Co) and the National Aeronautics and Space Administration (NASA). *The Digital Future of World Heritage* symposium took place in Rome, Italy, on April 2-4, 2014. The papers in this section of the book represent innovative techniques that are used in the field to transform the way in which archeological and architectural sites are documented and studied by scholars. The book brings together in these two parts the importance of historical references that advance documentation techniques and further the innovation in the field today. Beyond the innovation perspective, a major aspect is the merging of traditional methods of advanced learning of a site with that of new means.

This book would not have been possible without the continuous contributions, translations and curatorial efforts of Prof. Giovanna Lenzi-Sandusky. A great thank you goes to all the team members of the P.AR.Co for their invaluable contributions. The conference was funded largely through the support of the Nanovic Institute for European Studies, the University of Notre Dame with special thanks to James McAdams, Monica Caro, Anthony Monta, Melanie Webb, and Jenn Lechtanski for the organization and logistic support for the whole conference. The conference and exhibit was supported through the Office of Research, the University of Notre Dame with the involvement of Dr. Robert Bernhard, VP for Research for his support of Dharma research in all these years. The School of Architecture, University of Notre Dame special thanks goes to Dean Michael Lykoudis, Jennifer Hoover, and Dennis Doordan for their trust and support over the years.

Thanks also goes to Leica Geosystems HDS USA and Italy (special thanks to Geoff Jacobs, Justin Barton, and Valentina Albano for all the scanning equipment and logistic support throughout the years). Digital support for the exhibit was provided by Juan Roberto Vásquez Herrero at the Indissoluble.

Also thank you to the Kellogg Institute, University of Notre Dame and Center for Undergraduate Scholarly Engagement (CUSE), University of Notre Dame for students' research support. Last but not least a big thank you goes to the whole DHARMA and Center for Research Computing teams and our families that have given many years of dedicated effort for the results visible through this book.

PATRIZIA FORTINI – KRUPALI KRUSCHE

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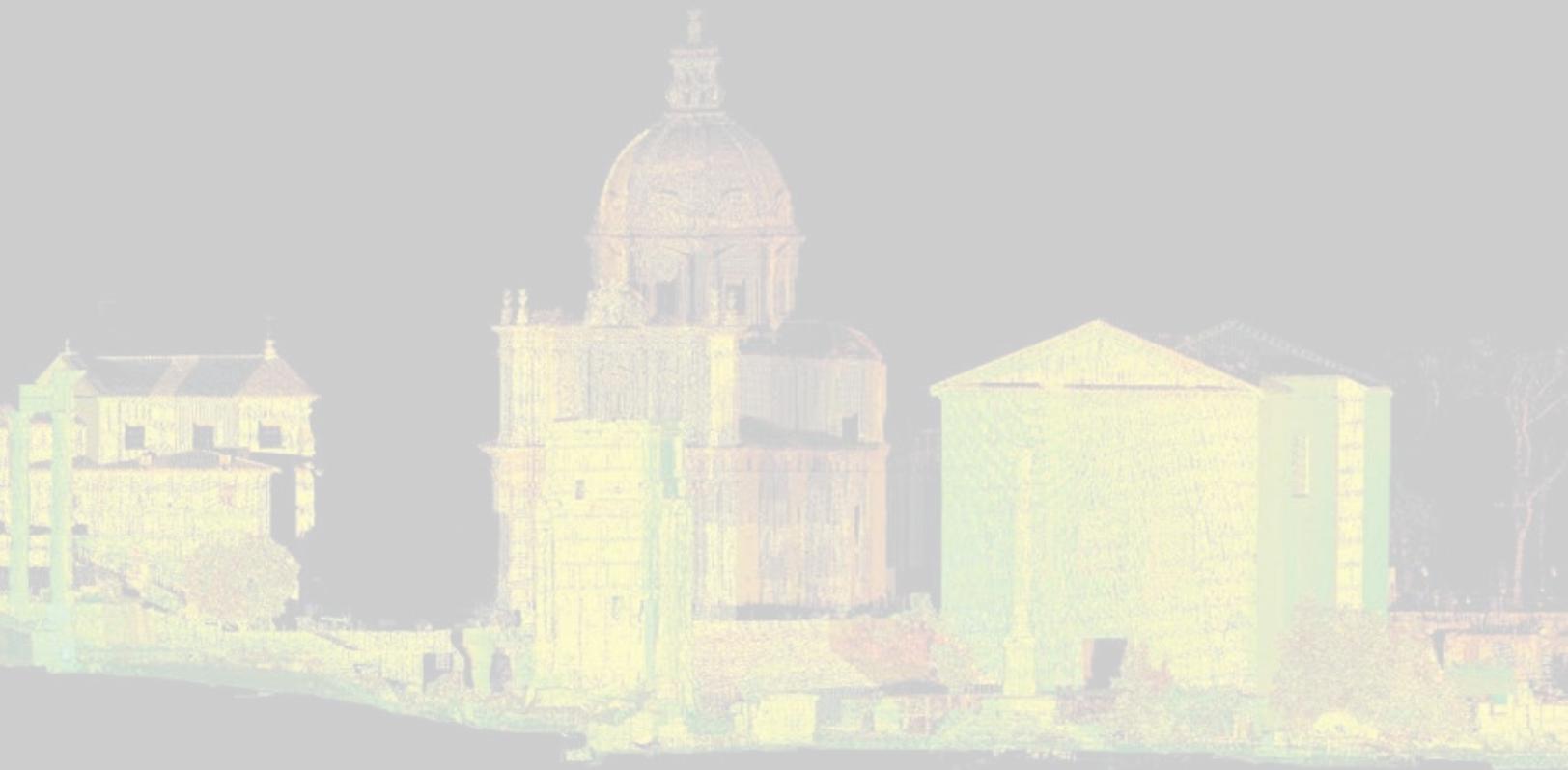
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PART I

FROM PEN TO PIXEL

THE ROMAN FORUM. A NEW READING OF DOCUMENTATION



THE ROMAN FORUM IN OUR CIVILIZATION

Carroll William Westfall*

ABSTRACT

The ruined buildings in the Forum in Rome, more so than Rome's other buildings, have played an ongoing role in the innovations and interpretations of the classical ever since Renaissance architects initiated the restoration of the *mondo antico*. They instructed the Renaissance about classical principles that supported judgments about beauty, and they provided models to surpass. The French replaced judgments based on principles with judgments of the eye, and they instituted precise measurements of the Forum's buildings as standards of excellence. In the nineteenth century the École des Beaux Arts program dominated architectural education, and the concept of style reduced the Forum's ruins to examples of ancient styles. Americans, however, turned to Rome for instruction in the austere classicism that Th. Jefferson had introduced to the new nation, and it continues to do so.

RIASSUNTO

Gli edifici in rovina al Foro Romano, più di altri edifici a Roma, hanno avuto un ruolo importante nella interpretazione del modello classico sin dai tempi del Rinascimento, quando gli architetti iniziarono a praticare il ritorno al mondo antico. Questi informarono il Rinascimento dei principi classici che sostenevano il giudizio del bello fornendo esempi da superare. I francesi sostituirono questi giudizi a giudizi di percezione istituendo criteri basati su misurazioni precise degli edifici. Nell'Ottocento il programma dell'École des Beaux Arts dominò la formazione architettonica di quell'epoca, e il concetto di stile ridusse le rovine del Foro Romano ad esempi di stili antichi. In America tuttavia, gli architetti si rivolsero a Roma per conoscere l'austero classicismo che Th. Jefferson aveva introdotto nella nuova nazione, cosa che continua ancor oggi.

What can people carry away from the Forum in Rome? I recall a moment some years back when I was viewing it from the Capitoline and overheard an older couple say, "I didn't know there was so much damage from the bombing in the war."

The Forum is a major tourist attraction in a walkable city with a vast range of churches, palaces, piazzas, shops, vendors, and wonderful food that makes for a more enjoyable and memorable experience than the obligatory visit to the Forum does. I suspect that people who lack professional experience with architecture will remember the Forum as an unintelligible field of ruins that required a guide or a guidebook to explain. But in modern Rome they will recognize their forebears of the older churches, libraries, schools, and courthouses back home. Perhaps they will also sense that these buildings serve the predecessors of the institutions serving their aspirations back home and offer a pleasure akin to that of renewing attachments at a family gathering with relatives whom they have not seen for years.

For the cognoscenti of architecture the experience can be quite different. Rome's buildings, both ancient and modern, present the

variations across time of the principles of architecture that serve and express the purposes of the civil and religious institutions that are at the heart of the western tradition. The buildings display the creative tension within tradition between what must remain constant and the innovations that have adapted earlier ways of building to make new buildings to serve in new circumstances. This constant emendation accompanies the similar changes in the institutions that facilitate the individual's aspiration for the good and that build buildings to assist them.

Rome's buildings old and new teach how to display the greatness of their institutional masters by clothing them with the beauty they deserve. This beauty shines forth from enduring principles of architecture that are not confined by the various stylistic categories of the classical style. People who turn their eyes to Rome to see examples of specific styles fail to perceive the beautiful that is the counterpart to the good and the true.

For more than two millennia Rome has demonstrated that the enduring principles that guide the institutions of the civil and religious order that facilitate the aspiration for the good are the same as the enduring principles that architects imitate to make the beautiful

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Fig. 1. *Campo Vaccino* (Roman Forum). Roman's Map by Francesco de Paoli, published in 1623 (P.A.R.Co).

visible and perceptible in the buildings serving those institutions. These principles cannot be fully known, but the attempt to make them perceptible produces a stable tradition that is kept vivid and useful through innovation that allows them to serve current circumstances. No city displays this more comprehensively, or more beautifully, than Rome.

The Forum has long served as the best teacher of matters architectural. For nearly a thousand years it was also the cockpit of the west's political life and presented the best, the classic, in architecture serving that political life. When paganism gave way to Christianity the political life of the Romans moved elsewhere, leaving its buildings to deteriorate. By the time the Forum had come to be called the *Campo Vaccino* or cow pasture Brunelleschi and Donatello came to Rome around 1400 to uncover principles of architecture that could serve their fellow Florentines' program that used lessons from ancient Rome reinvigorate their civil and religious life. In the *Campo Vaccino* earth and elsewhere in Rome they dug to recover the secrets of proportionality that the *modo antico* had used to make the order,

harmony, and proportionality of the cosmos perceptible in buildings (Figs. 1-2). Others followed, among them Alberti, another Florentine, who wrote that he searched out any building that attracted praise and "never stopped exploring, considering, and measuring everything, and comparing the information through line drawings".¹ The Renaissance in architecture that would recover the principles of the *modo antico* was well under way.

The recovery's success became the star attraction of the treatise on architecture that Sebastiano Serlio began publishing in 1537. Its novel combination of text and illustrations of ancient and modern buildings would eventually lead to images replacing words as the way people learned architecture. In addition, the prominence it gave the columnar orders opened the way for them to be considered the principal evidence of proportionality's presence in a building.

In traditional theory, to make a beautiful building the architect imitated the order, harmony, and proportionality of nature with the five orders' proportionality being the cause of beauty's perception.

¹ Leon Battista Alberti, *On the Art of Building in Ten Books*, Cambridge-London 1988, VI, 1, p. 155 (trans. J. RYKWERT, N. LEACH, R. TRAVENOR).