MOBILIZING *the* PAST *for a* DIGITAL FUTURE

The Potential of Digital Archaeology

Edited by

Erin Walcek Averett
Jody Michael Gordon
Derek B. Counts

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Preface & Acknowledgments

This volume stems from the workshop, "Mobilizing the Past for a Digital Future: the Future of Digital Archaeology," funded by a National Endowment for the Humanities Digital Humanities Start-Up grant (#HD-51851-14), which took place 27-28 February 2015 at Wentworth Institute of Technology in Boston (http://uwm.edu/mobilizing-the-past/). The workshop, organized by this volume's editors, was largely spurred by our own attempts with developing a digital archaeological workflow using mobile tablet computers on the Athienou Archaeological Project (http://aap.toumazou.org; Gordon *et al.*, Ch. 1.4) and our concern for what the future of a mobile and digital archaeology might be. Our initial experiments were exciting, challenging, and rewarding; yet, we were also frustrated by the lack of intra-disciplinary discourse between projects utilizing digital approaches to facilitate archaeological data recording and processing.

Based on our experiences, we decided to initiate a dialogue that could inform our own work and be of use to other projects struggling with similar challenges. Hence, the "Mobilizing the Past" workshop concept was born and a range of digital archaeologists, working in private and academic settings in both Old World and New World archaeology, were invited to participate. In addition, a livestream of the workshop allowed the active participation on Twitter from over 21 countires, including 31 US states (@MobileArc15, #MobileArc).[1]

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[1] For commentary produced by the social media followers for this event, see: https://twitter.com/electricarchaeo/status/571866193667047424, http://shawngraham.github.io/exercise/mobilearcday1wordcloud.html, https://twitter.com/electricarchaeo/status/571867092091338752, http://www.diachronicdesign.com/blog/2015/02/28/15-mobilizing-the-past-for-the-digital-future-conference-day-1-roundup/.

Although the workshop was initially aimed at processes of archaeological data recording in the field, it soon became clear that these practices were entangled with larger digital archaeological systems and even socio-economic and ethical concerns. Thus, the final workshop's discursive purview expanded beyond the use of mobile devices in the field to embrace a range of issues currently affecting digital archaeology, which we define as the use of computerized, and especially internet-compatible and portable, tools and systems aimed at facilitating the documentation and interpretation of material culture as well as its publication and dissemination. In total, the workshop included 21 presentations organized into five sessions (see program, http://mobilizingthepast.mukurtu.net/digital-heritage/mobilizing-past-conference-program), including a keynote lecture by John Wallrodt on the state of the field, "Why paperless?: Digital Technology and Archaeology," and a plenary lecture by Bernard Frischer, "The Ara Pacis and Montecitorio Obelisk of Augustus: A Simpirical Investigation," which explored how digital data can be transformed into virtual archaeological landscapes.

The session themes were specifically devised to explore how archaeological data was digitally collected, processed, and analyzed as it moved from the trench to the lab to the digital repository. The first session, "App/Database Development and Use for Mobile Computing in Archaeology," included papers primarily focused on software for field recording and spatial visualization. The second session, "Mobile Computing in the Field," assembled a range of presenters whose projects had actively utilized mobile computing devices (such as Apple iPads) for archaeological data recording and was concerned with shedding light on their utility within a range of fieldwork situations. The third session, "Systems for Archaeological Data Management," offered presentations on several types of archaeological workflows that marshal born-digital data from the field to publication, including fully bespoken paperless systems, do-it-yourself ("DIY") paperless systems, and hybrid digital-paper systems. The fourth and final session, "Pedagogy, Data Curation, and Reflection," mainly dealt with teaching digital methodologies and the use of digital repositories and linked open data to enhance field research. This session's final paper, William Caraher's "Toward a Slow Archaeology," however, noted digital archaeology's successes in terms of

time and money saved and the collection of more data, but also called for a more measured consideration of the significant changes that these technologies are having on how archaeologists engage with and interpret archaeological materials.

The workshop's overarching goal was to bring together leading practitioners of digital archaeology in order to discuss the use, creation, and implementation of mobile and digital, or so-called "paperless," archaeological data recording systems. Originally, we hoped to come up with a range of best practices for mobile computing in the field – a manual of sorts – that could be used by newer projects interested in experimenting with digital methods, or even by established projects hoping to revise their digital workflows in order to increase their efficiency or, alternatively, reflect on their utility and ethical implications. Yet, what the workshop ultimately proved is that there are many ways to "do" digital archaeology, and that archaeology as a discipline is engaged in a process of discovering what digital archaeology should (and, perhaps, should not) be as we progress towards a future where all archaeologists, whether they like it or not, must engage with what Steven Ellis has called the "digital filter."

So, (un)fortunately, this volume is not a "how-to" manual. In the end, there seems to be no uniform way to "mobilize the past." Instead, this volume reprises the workshop's presentations—now revised and enriched based on the meeting's debates as well as the editorial and peer review processes—in order to provide archaeologists with an extremely rich, diverse, and reflexive overview of the process of defining what digital archaeology is and what it can and should perhaps be. It also provides two erudite response papers that together form a didactic manifesto aimed at outlining a possible future for digital archaeology that is critical, diverse, data-rich, efficient, open, and most importantly, ethical. If this volume, which we offer both expeditiously and freely, helps make this ethos a reality, we foresee a bright future for mobilizing the past.

* * *

No multifaceted academic endeavor like *Mobilizing the Past* can be realized without the support of a range of institutions and individ-

research and for allowing us to integrate mobile devices and digital workflows in the field.

The workshop itself benefitted from the help of Kathryn Grossman (Massachusetts Institute of Technology) and Tate Paulette (Brown University) for on-site registration and much more. Special thanks goes to Daniel Coslett (University of Washington) for graphic design work for both the workshop materials and this volume. We would also like to thank Scott Moore (Indiana University of Pennsylvania) for managing our workshop social media presence and his support throughout this project from workshop to publication.

This publication was a pleasure to edit, thanks in no small part to Bill Caraher (Director and Publisher, The Digital Press at the University of North Dakota), who provided us with an outstanding collaborative publishing experience. We would also like to thank Jennifer Sacher (Managing Editor, INSTAP Academic Press) for her conscientious copyediting and Brandon Olson for his careful reading of the final proofs. Moreover, we sincerely appreciate the efforts of this volume's anonymous reviewers, who provided detailed, thought-provoking, and timely feedback on the papers; their insights greatly improved this publication. We are also grateful to Michael Ashley and his team at the Center for Digital Archaeology for their help setting up the accompanying Mobilizing the Past Mukurtu site and Kristin M. Woodward of the University of Wisconsin-Milwaukee Libraries for assistance with publishing and archiving this project through UWM Digital Commons. In addition, we are grateful to the volume's two respondents, Morag Kersel (DePaul University) and Adam Rabinowitz (University of Texas at Austin), who generated erudite responses to the chapters in the volume. Last but not least, we owe our gratitude to all of the presenters who attended the workshop in Boston, our audience from the Boston area, and our colleagues on Twitter (and most notably, Shawn Graham of Carlton University for his word clouds) who keenly "tuned in" via the workshop's livestream. Finally, we extend our warmest thanks to the contributors of this volume for their excellent and timely chapters. This volume, of course, would not have been possible without such excellent papers.

As this list of collaborators demonstrates, the discipline of archaeology and its digital future remains a vital area of interest for people who value the past's ability to inform the present, and who

recognize our ethical responsibility to consider technology's role in contemporary society. For our part, we hope that the experiences and issues presented in this volume help to shape new intra-disciplinary and critical ways of mobilizing the past so that human knowledge can continue to develop ethically at the intersection of archaeology and technology.

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October 1, 2016
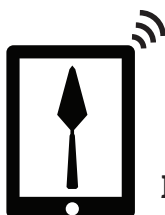
How To Use This Book

The Digital Press at the University of North Dakota is a collaborative press and *Mobilizing the Past for a Digital Future* is an open, collaborative project. The synergistic nature of this project manifests itself in the two links that appear in a box at the end of every chapter.

The first link directs the reader to a site dedicated to the book, which is powered and hosted by the Center for Digital Archaeology's (CoDA) Mukurtu.net. The Murkutu application was designed to help indigenous communities share and manage their cultural heritage, but we have adapted it to share the digital heritage produced at the "Mobilizing the Past" workshop and during the course of making this book. Michael Ashley, the Director of Technology at CoDA, participated in the "Mobilizing the Past" workshop and facilitated our collaboration. The Mukurtu.net site (https://mobilizingthepast.mukurtu.net) has space dedicated to every chapter that includes a PDF of the chapter, a video of the paper presented at the workshop, and any supplemental material supplied by the authors. The QR code in the box directs readers to the same space and is designed to streamline the digital integration of the paper book.

The second link in the box provides open access to the individual chapter archived within University of Wisconsin-Milwaukee's installation of Digital Commons, where the entire volume can also be downloaded. Kristin M. Woodward (UWM Libraries) facilitated the creation of these pages and ensured that the book and individual chapters included proper metadata.

Our hope is that these collaborations, in addition to the open license under which this book is published, expose the book to a wider audience and provide a platform that ensures the continued availability of the digital complements and supplements to the text. Partnerships with CoDA and the University of Wisconsin-Milwaukee reflect the collaborative spirit of The Digital Press, this project, and digital archaeology in general.

Abbreviations

AAI	Alexandria Archive Institute
AAP	Athienou Archaeological Project
ABS	acrylonitrile butadiene styrene (plastic)
ADS	Archaeological Data Service
Alt-Acs	Alternative Academics
API	application programming interface
ARA	archaeological resource assessment
ARC	Australian Research Council
ARIS	adaptive resolution imaging sonar
ASV	autonomous surface vehicle
BLM	Bureau of Land Management
BLOB	Binary Large Object
BOR	Bureau of Reclamation
BYOD	bring your own device
CAD	computer-aided design
CDL	California Digital Library
CHDK	Canon Hack Development Kit
cm	centimeter/s
CMOS	complementary metal-oxide semiconductor
CoDA	Center for Digital Archaeology
COLLADA	COLLAborative Design Activity
CRM	cultural resource management
CSS	Cascading Style Sheet
CSV	comma separated values
DBMS	desktop database management system
DEM	digital elevation model
DINAA	Digital Index of North American Archaeology
DIY	do-it-yourself
DoD	Department of Defense
DVL	doppler velocity log
EAV	entity-attribute-value
EDM	electronic distance measurement
EU	excavation unit/s
FAIMS	Federated Archaeological Information Management System
fMRI	functional magnetic resonance imaging
GIS	geographical information system
GCP	ground control point
GNSS	global navigation satellite system
GPR	ground-penetrating radar

GUI	graphic user interface
ha	hectare/s
hr	hour/s
Hz	Hertz
HDSM	high-density survey and measurement
ICE	Image Composite Editor (Microsoft)
iOS	iPhone operating system
INS	inertial motion sensor
IPinCH	Intellectual Property in Cultural Heritage
IT	information technology
KAP	Kaymakçı Archaeological Project
KARS	Keos Archaeological Regional Survey
km	kilometer/s
LABUST	Laboratory for Underwater Systems and Technologies (University of Zagreb)
LAN	local area network
LIEF	Linkage Infrastructure Equipment and Facilities
LOD	linked open data
LTE	Long-Term Evolution
m	meter/s
masl	meters above sea level
MEMSAP	Malawi Earlier-Middle Stone Age Project
MOA	memoranda of agreement
MOOC	Massive Online Open Course
NGWSP	Navajo-Gallup Water Supply Project
NeCTAR	National eResearch Collaboration Tools and Resources
NEH	National Endowment for the Humanities
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
NSF	National Science Foundation
OCR	optical character reader
OS	operating system
PA	programmatic agreement
PAP	pole aerial photography
PARP:PS	Pompeii Archaeological Research Project: Porta Stabia
PATA	Proyecto Arqueológico Tuti Antiguo
PBMP	Pompeii Bibliography and Mapping Project
PDA	personal digital assistant

PIARA	Proyecto de Investigación Arqueológico Regional Ancash
PKAP	Pyla-Koutsopetra Archaeological Project
Pladypos	PLAtform for DYnamic POSitioning
PLoS	Public Library of Science
PQP	Pompeii Quadriporticus Project
PZAC	Proyecto Arqueológico Zaña Colonial
QA	quality assurance
QC	quality control
QR	quick response
REVEAL	Reconstruction and Exploratory Visualization: Engineering meets ArchaeoLogy
ROS	robot operating system
ROV	remotely operated vehicle
RRN	Reciprocal Research Network
RSS	Rich Site Summary
RTK	real-time kinetic global navigation satellite system
SfM	structure from motion
SHPO	State Historic Preservation Office
SKAP	Say Kah Archaeological Project
SLAM	simultaneous localization and mapping
SMU	square meter unit/s
SU	stratigraphic unit/s
SVP	Sangro Valley Project
TCP	traditional cultural properties
tDAR	the Digital Archaeological Record
UAV	unmanned aerial vehicle
UNASAM	National University of Ancash, Santiago Antúnez de Mayolo
UQ	University of Queensland
USACE	U.S. Army Corp of Engineers
USBL	ultra-short baseline
USFS	U.S. Forest Service
USV	unmanned surface vehicle
UTM	universal transverse mercator
XML	Extensible Markup Language
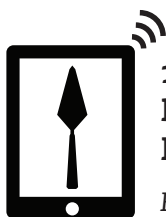
1.7.
Digital Pompeii: Dissolving the Fieldwork-Library Research Divide

Eric E. Poehler

Sometime before October 31, 1766, excavation began inside a porticoed building in the south of an area that would soon become the archaeological site of Pompeii (FIG. 1). The pace of work to clear the building was swift but episodic as crews were frequently reassigned to more exciting discoveries in the early years of Pompeii's rediscovery. Moving in bursts along the southern colonnade, the excavators seemed to be able to move at least 140 m³ of material in a week before halting for nearly two months. Another burst of activity pushed to reveal the southeast corner, and the first half of 1768 was spent clearing the eastern colonnade (Pagano and Prisciandaro 2006: 58–64). Excavation of the northern and western colonnades is not specifically dated in the archival records, but images show that into the 1780s a great mound of volcanic debris at least 4 m high still covered much of these areas and persisted into the first decade of the 19th century (FIG. 2). In the course of those excavations, stunning images and artifacts were revealed, including real and painted armaments that would give the Quadriporticus its colloquial name: the Barracks of the Gladiators (FIG. 3).

The precise date when excavation in the Quadriporticus was completed is not terribly important as the volume of material removed was astounding: over 15,000 cubic meters of earth, ash, and lapilli were removed, as well the trees that grew atop the buried city. On average, 18th-century excavators (and we should hesitate to call them archaeologists) removed at least 300 m³ of material each year from the Quadriporticus, but that average dramatically underestimates the pace of work. We know that at times they could shift
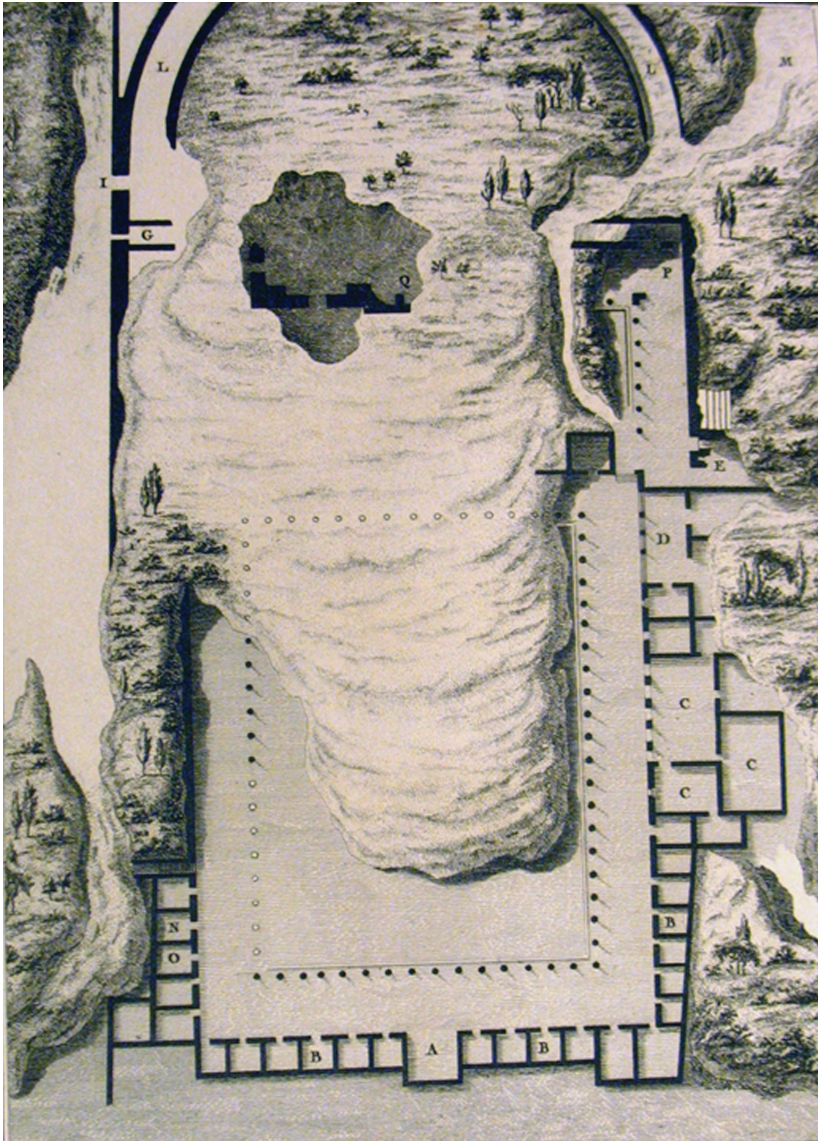
Figure 1: Plan *Géométral de l'Etat actuel de la fouille du Quartier des Soldats à Pompeii*. Reproduced from de Saint-Non 1781–1786, vol. 2, pl. 84.

Figure 2: *Vue Perspective de la Colonnade du Quartier des Soldats à Pompeii*. Reproduced from de Saint-Non 1781–1786, vol. 2, pl. 86.

Figure 3: Detail of a gladiator's helmet in a fresco depicting armaments from the Quadriporticus. (MANN n. 9702). Photo by Bettina Bergmann.

Figure 4: Insulae VIII 7, 1-15 and I.1: plan of trenches, 2005–2012.
Pompeii Archaeological Research Project: Porta Stabia. Map courtesy
of Steven Ellis.

two-thirds of that in a single week; for example, from February 14th to February 21st, 1767, an estimated 212 cubic meters of material from the southern exedra and its adjacent colonnade was cleared (Pagano and Prisciandaro 2006: 60). By contrast, modern excavation at Pompeii is excruciatingly slow. In eight years of research on the pre-79 A.D. development of insulae VIII 7, 1-15 and I.1 (FIG. 4), the Pompeii Archaeological Research Project: Porta Stabia (hereafter, PARP:PS; http://classics.uc.edu/pompeii), directed by Steven Ellis, excavated 40 trenches below the final Roman levels, exploring 770 m² of the 2,660 m² of these humble city blocks, and removed about 1,150 m³ of material (see Devore and Ellis 2005, 2008; Ellis and Devore 2006, 2009, 2010; Ellis *et al*. 2011, 2012, 2015).

The PARP:PS excavation seasons are only five weeks long, so the average pace of excavation is 29 m³ per week, or 10% of the average rate of the previous (Bourbon-era) excavators. While only 80 objects were recorded in the Quadriporticus (concentrated almost entirely in the first three years; Pagano and Prisciandaro 2006, vol. II, 259–60), PARP:PS recovered more than 280,000 objects during their eight years of investigation. Moreover, Ellis and his team identified and documented over 4,500 individual stratigraphic units (SUs) to which these finds belong and relate, providing, on average, an archaeologically meaningful distinction to every 0.25 m³ of soil at a rate of 114 times a week (S. Ellis, personal communication). By contrast, the archival records of the Quadriporticus make no useful mention of any distinction in what they were digging through.

Between 2010 and 2013 I directed a non-invasive, born-digital, architectural analysis project in the Quadriporticus with Ellis that sought to decode the construction and life history of this remarkable structure that had existed for over two hundred years in both the ancient (ca. 130 B.C.–A.D. 79) and modern (1766–present) eras. In addition to understanding the building, part of our research design was to test how far one could extend and how much one could gain from non-invasive techniques and technologies. Our plan included the use of excavation data from PARP:PS, but permitted no new trenches. In the four, three-week campaigns of the Pompeii Quadriporticus Project (hereafter, PQP; https://www.umass.edu/classics/pqp) we recorded over 2,500 stratigraphic units reflecting changes to the masonry, decor, and function of the Quadriporticus and documented another 1,700 SUs within the 77 columns of its colonnades. On average, we identified and documented more than 350 stratigraphic units per week.

Workflow is Dataflow

The point of this unequal and perhaps even unfair comparison is to draw a stark, unmistakable line around an obvious statement: as the priorities of archaeological research have changed, so too have our methods, techniques, and results. The dominant trend, at Pompeii and elsewhere, has been an ever-widening gulf between the decreasing volume excavated and the density of material recovery and documentation. Indeed, PQP recorded as much stratigraphic information as any other research project without conducting any excavation. While modern research projects have fewer infrastructural and logistical challenges compared to early modern excavations in managing smaller labor forces for shorter periods, our ethos of information maximization has replaced these with an enormous data management load. Today, every project has a database and most have an organizational chart of personnel that represents a map of dataflow through that project: from excavators to trench supervisors to object specialists to directors (e.g., see: Motz, Ch. 1.3; Wallrodt, Ch. 1.1). On the front line of excavation are spatial people, the taphonomic specialists (i.e., excavators) who interpret and faithfully record every aspect of a trench, but who also give up much of their object analysis to the next layer in the flow of evidence. It is the object specialists who provide the final identifying, functional, and chronological information for the artifacts recovered. In some cases it is first up to the trench supervisor to minimally reintegrate the specialist's spot reports back into excavation practice. Ultimately, it is the project director's responsibility to reunite the space of a trench and the objects ripped out of it and place it within a historical narrative that explains the social forces in the past that brought these material realities into being. There are still more processes and personnel on a modern research project. Many projects have an artifact registrar, spatial specialists (who work with survey instruments, computer-aided design (CAD), geographic information systems (GIS), or the like), and now dedicated information technologists to deal with the constant flow of data and metadata that results from archaeological research.

In addition to and in place of these information specialists, some projects have looked longingly toward the revolution in portable computing and information technologies. These devices and software (particularly tablets and drafting apps) have allowed archaeologists to

take the work of data management back to the trench edge and make it the point of origin for precise and accurate digital recording. As many contributions to this volume demonstrate, we have already witnessed the first part of the revolution of our discipline: the transformation of archaeological methods of data collection and, to a lesser extent, how such data are accessed and deployed in the field. Today iPads are everywhere, and though they are the flavor of the moment and eventually will be superseded, they are not going away.

Such is the formulation of modern archaeological practice: dense networks of technology and personnel enmeshed within an ethos to collect more evidence from smaller trenches using less invasive methods. It is within this context that I want to explore what I believe will be a second act in our revolution in digital archaeological practice. Put simply, in the very near future, an entirely new set of tools and an enormous dataset for archaeological inquiry will also arrive at the trench edge: the library. It is a good thing in theory to bring all information to bear on a given inquiry, but in practice we know that it is not only impossible, but often counterproductive to try to employ every method or apply every dataset to a given problem. Breaking down the geographical wall between fieldwork and library research—the hundreds to thousands of miles separating the field site and the university—is well underway, but its impact on how archaeologists do research is yet unknown (or rather, yet undecided by us).

Technology > Method > Interpretation

In what remains of this article I want to outline very briefly two projects I direct that scratch the surface of this second act in digital archaeological practice in order to explore very briefly what the future might look like. These examples demonstrate the value of doing archival research in the field and that soon a visit to Pompeii can mean a tour through its bibliography as well. The mechanisms by which we deliver secondary materials to the field are already being built, and now we must begin to question how to incorporate books and articles (at least) into our actual fieldwork practices. To do this we need to begin to imagine not only the possibilities, but also the impediments: when do we dig and when do we read? Most importantly, if we are going to integrate a significant component of secondary source material, we must also ask: where in the process will we find the time to do so?

Figure 5: Watercolor of fountain and interior of the Quadriporticus. W.J. Hüber, lithograph by L. T. Müller, 1818–1819. Columns of tholos are circled in light blue. Reproduced from Pagano and Prisciandaro 2006: 176; copyright by N. Longobardi.

The first project, the Pompeii Quadriporticus Project, has already been introduced as part of the opening discussion on the increasing elision between fieldwork practices and information management. In this context, PQP's use of more than 186 archival images in the field to identify and document changes to the building that occurred in the two and one half centuries since its initial excavation are also relevant to the fieldwork-library question. These images were loaded into both an offline database and an online (and now defunct) platform called DM, which provided a set of basic markup tools for drafting and annotating the images themselves as well as creating links between images (Poehler and Ellis 2014: 3–4). It was during the process of examining these archival images, and creating an absolute (by the dates of the images) sequence of modern architectural changes to the Quadriporticus, that we first noticed that a few important components of the building's architecture had been removed. The most obvious removal was the large fountain that several artists and cartographers had depicted in the northeast corner of the portico prior to 1837 (FIG. 5).

Less obvious was the circular, colonnaded structure that had once existed—or was still under construction—in the center of the Quadriporticus. Hints of this tholos-like structure were first noticed as curious stray column drums along the edge of the unexcavated central mound and in the column standing in the tunnel excavated through it (FIG. 2). It was only when looking for images of the lost fountain that we noticed a circle of column drums surrounding a cylindrical altar or cistern head (Poehler and Ellis 2014: 4–6). That some circular structure inhabited the middle of the Quadriporticus was not surprising to us: our ground-penetrating radar (GPR) results had already proven its existence (FIG. 6). A cursory examination of early maps of Pompeii (and an over-abundance of caution), however, had convinced us that these subsurface structures were related to the center of a modern cruciform garden design imposed on the interior of the colonnade (Poehler and Ellis 2012: 3–4). The combined weight of imagery from both the 19th and 21st centuries, however, could not be ignored and caused us to change our interpretation. Interestingly, another image with evidence for the circular structure was identified by Ellis while in the audience at the "Mobilizing the Past" workshop (FIG. 7). The drawing by Gudeson, made from his balloon flight over Pompeii in the
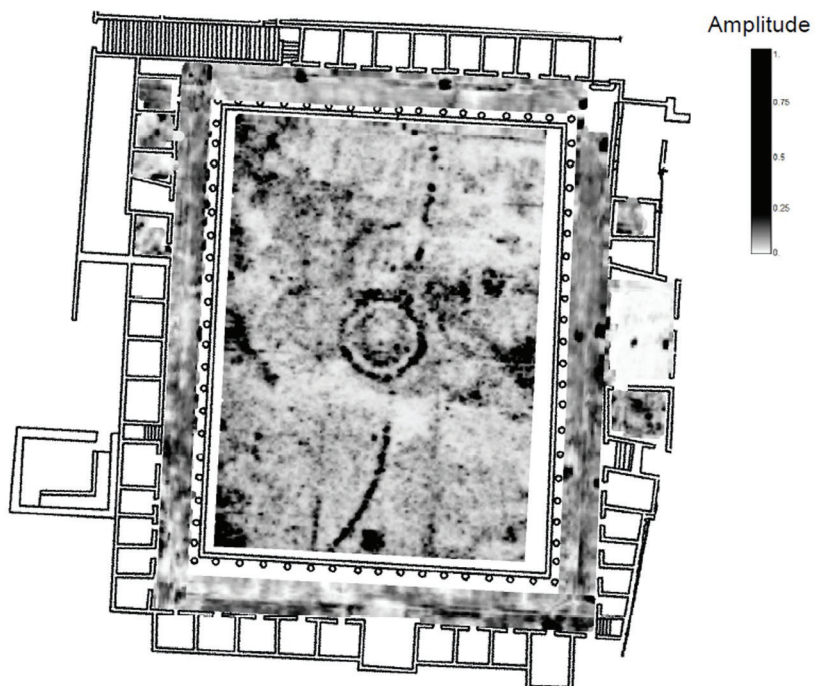
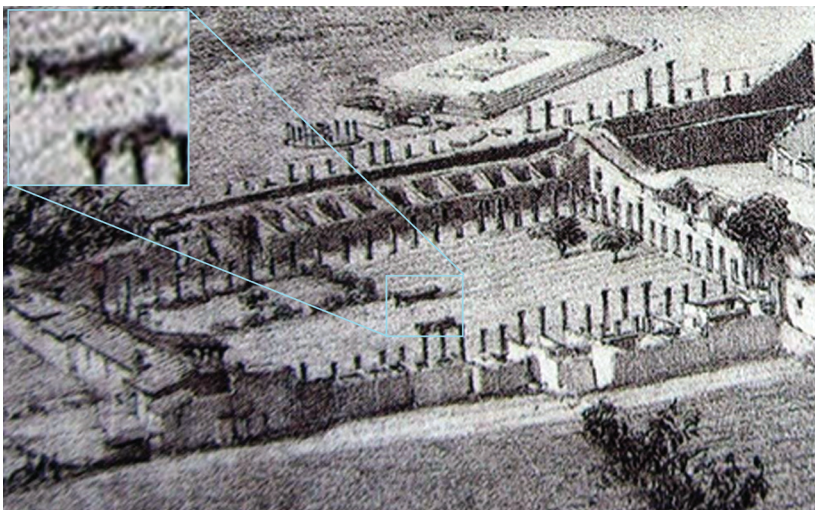**Figure 6:** Ground-penetrating radar image of the Quadriporticus, slice 4 (depth ca. 66–92 cm).

Figure 7: *Vue prise au dessus de l'Odéon de du Téàtre tragique*.
Drawing by A. Gudeson, reproduced from Etiennez 1849–1852, pl. 15.

1840s, shows—when highly magnified or when projected onto a 30 foot screen—a circular projection in the center of the Quadriporticus.

For PQP, the impact of having and interrogating archival materials in the field—in databases on our iPads and in online markup environments (DM)—was both immediate and enormous. Suddenly, our building possessed a structure not seen in nearly 180 years, which changed that building's basic appearance from a Hellenistic gymnasium to a 2nd-century A.D. Macellum. It is the aspiration of the second project I direct to make this kind of discovery from in-field archival and secondary-source research possible for every building at Pompeii. The Pompeii Bibliography and Mapping Project (PBMP; http://digitalhumanities.umass.edu/pbmp/) is the attempt to graft a bibliographic catalog of more than 20,000 references onto an online GIS map (or maps) with thousands of spatial objects. On their own, each component creates a new tool for researching the city that has never before been available in digital form. Together these datasets offer an unique opportunity to explore at once the physical, cultural, and narrative landscapes of the most important site in the world of Roman archaeology. By collocating spatial and bibliographic information within a single representation, users can find information about the ancient city in a particularly intuitive manner—by simply clicking on the space of one's interest.

The true value of the PBMP, however, will come as a querying tool. Attaching the bibliographic data to the GIS permits one to use spatial categories to sort through thousands of citations that might be related only by the locations referenced in those texts. Moreover, because one can sort the bibliography first by the size or variety of a building type (e.g., a house or its area in m^2), its locations in the city (e.g., insula 1 of Region I), and their relationships to other kinds of structures (e.g., workshops), unique and powerful questions that once took weeks to generate the data for will now only take minutes. It is in such experimentation that I hold the greatest hope for the PBMP and where I expect that its use in the field will be the most novel (see Poehler 2014 for an example). Certainly, the ability to quickly find materials on topics related to one's fieldwork will be valuable, but greater still will be the ability to create maps and bibliographies of comparanda for the features and finds discovered in the course of archaeological research.

While the PBMP will have an important impact, it is important to recognize that we already choose from among many possible aspects

of research moment by moment while in the field: from excavation, to primary and secondary analyses, to phasing and contextualization, and finally to report and publication writing. To put this more simply:

> we collect data,
> we analyze them,
> we interpret them,
> we synthesize them, and
> we narrate them.

These activities are natural allies in a process of understanding the past, and there are many reasons why doing all these aspects in the field makes sense. But the purpose of this reductive adumbration is to make easier the task of considering the times when we currently introduce information from secondary sources and where we might add still more in the future.

So when do we think we would want to have access to and read secondary sources? Situations include:

1. *Excavation*: when discovering an unusual feature (e.g., a kiln or soil layer).
2. *Artifact analysis*: when discovering an unusual object (e.g., rare material or form).
3. *Synthesis*: when the combined data lead to a surprising result (e.g., when discovering your building is another building).
4. *Writing*: when making an argument supported by facts (i.e., all the time).

Currently, at the moment of excavation, there are relatively few opportunities to incorporate library resources. Excavation, or equally pedestrian survey or masonry analysis, is primarily a manual process of sampling, collection, and recording that tends to limit the subjects relevant to read about. Background information on the geology or later ancient and modern histories of a location seems an appropriate topic to investigate while digging (or equally, in preparation for digging). The discovery of an important feature, such as the kiln found near the Porta Stabia in 2012, might also drive an excavator toward secondary source materials in order to help understand the function, distributions, and known forms of other excavated kilns (Dicus 2014:66–67;

Figure 8: Photogrammetrical models of (from left to right) Room 35, Column 59, and Room 61 from the Quadriporticus.

Figure 9: View inside the Altstadt sewer, facing north toward the Large Theater and farther to Stabian Baths.

Ellis *et al.* 2015: 2–5). The study of unusual objects at the level of arti-
fact analysis would also benefit from a direct connection to sources
of comparanda for identification, dating, and the determination of
function. Looking toward the future, we should imagine consulting
not only standard reference materials of canonical types, but also
multiple examples from previously excavated sites in the form of
narrative, detailed imagery, and three-dimensional models (FIG 8; see
also Kansa, Ch. 4.2).

   In the future, the point of synthesis seems a natural place to
expand our use of library resources in the field. Synthesis is an all too
neat word for the sloshing back and forth between individual inter-
pretations of data and the arguments they are meant to support. Such
messiness, however, makes room for other peoples' interpretations,
for comparanda, and for unexpected parallels. I suspect that this will
be one activity expanded by access to a library in the field. At the same
time, it seems equally likely that the some of the research burden for
making initial identifications and interpretations of objects, features,
or soils will fall to the trench supervisor during the workday. Those
excavators who can generate not only an interpretation of the trench's
stratigraphy, but also equally timely and synoptic bibliographies on
the fish vats, bar counters, drains, or beaten earth streets will make a
valued contribution to the stage of synthesis and writing.

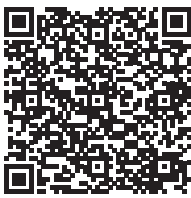## Pay It Forward: Doing More with More

How, then, will we "pay" for the extra time needed to do secondary
source research in the trench or at the specialist's desk or at the dig
house dinner table? That is, how will we replace the lost time for
digging, analysis, interpretation, or, more likely, for sleep or relax-
ation? Excavating fewer trenches certainly is a possibility, but studying
them with less intensive methods is not. Another answer will be to
find efficiency elsewhere in the process. For example, for PQP, it was
in part the speed at which we could document (not make) our inter-
pretations of each wall in a drawing that bought the time to do both
the archival research and the detailed examination of the columns
in the Quadriporticus. What once took an hour to an entire day for
two people to accomplish—stringing a baseline, setting up a drafting
board and Mylar sheets, taking scores of individual measurements by

hand and shouting them to a draftsperson who transposed them into a scale drawing—now could be done by a single person in 30 minutes using the camera and a drafting app on the iPad. Additionally, because PQP closely and intentionally paralleled the processes of archaeological workflow (organization of fieldwork practices) and the dataflow (organization of data derived from fieldwork practices) we made thousands of archaeological observations instantly ready to be combined not only with the observations from other walls but also from rooms and even whole sections of the building. For us, an explicit goal was to reach a stage of interpretation and synthesis beyond an individual wall while still in the field. To do this, we utilized the expertise created within our staff – those individuals who had just analyzed those walls – as well as our digital infrastructure that had contained explicit linkages between evidence and its interpretation. We "paid" for the time to synthesize our interpretations with the increased speed in graphically recording those interpretations.

If the Pompeii Quadriporticus Project were to be started 10 years from now, I imagine we would put greater emphasis on reading about the implications of our initial observations and interpretations, such as understanding the rest of the great Altstadt sewer (FIG. 9) that passes through the Quadriporticus or the use of specific construction techniques and materials in the rest of Pompeii. Certainly, in this imagined future I might have tackled the archival and bibliographic research in search of the tholos structure the very week the GPR results were received, rather than two years later. Finally, I imagine that we would build time to accommodate the most important analog tool we will still be using: the human brain and all its psychological conditioning and quirks (for more on this topic of "Slow Archaeology," see Caraher, Ch. 4.1). Though I have no doubt the future will be "slower" than it is today, I am equally sure that the time for such reflection will come, ironically, on the back of efficiency somewhere else in the fieldwork system.

In sum, the library is coming to a future trench near you. With it are possibilities and pitfalls yet unimagined. This paper has tried to illustrate a few ways the introduction of published scholarship (but only hinted at published, open-data archives) might impact archaeological fieldwork and further imagine its place in the digital archaeological practice of the future. But these few hundred speculative words cannot compare with the value of our collective endeavors— and failures—in

the coming decade. Our experiments to dissolve the library-fieldwork divide will not only find the best and worst places to insert this new dataset into our practices, but they also will bargain with other activities to find the time for such insertions. New efficiencies will be found to implement the library resources and they likely will come at the trench edge, squeezing excavation supervisors—the middle management of archaeological fieldwork—between a confrontation with the physical world and an increasingly complex digital representation of it.

https://mobilizingthepast.mukurtu.net/
collection/17-digital-pompeii-dissolving-fieldwork-library-research-divide

http://dc.uwm.edu/arthist_mobilizingthepast/9

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