

# NEH Application Cover Sheet

## Digital Humanities Start-up Grants

### PROJECT DIRECTOR

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**Field of Expertise:** Arts: Art History and Criticism

### INSTITUTION

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The Florida State University  
Tallahassee, FL UNITED STATES

### APPLICATION INFORMATION

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**Title:** *The Mesoamerican Corpus of Formative Period Art and Writing*

**Grant Period:** From 5/2014 to 9/2015

**Field of Project:** Arts: Art History and Criticism; Social Science: Archaeology

**Description of Project:** This project explores the origins and development of the first writing in the New World by constructing a comprehensive database of Formative period, 1500-400 BCE, iconography and a suite of database-driven digital tools. In collaboration with two of the largest repositories of Formative period Mesoamerican art in Mexico, the project integrates the work of archaeologists, art historians, and scientific computing specialists to plan and begin the production of a database, digital assets, and visual search software that permit the visualization of spatial, chronological, and contextual relationships among iconographic and archaeological datasets. These resources will eventually support mobile and web based applications that allow for the search, comparison, and analysis of a corpus of material currently only partially documented. The start-up phase will generate a functional prototype database, project website, wireframe user interfaces, and a report summarizing project development.

### BUDGET

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<b>Outright Request</b>	\$59,993.00	<b>Cost Sharing</b>	
<b>Matching Request</b>		<b>Total Budget</b>	\$59,993.00
<b>Total NEH</b>	\$59,993.00		

### GRANT ADMINISTRATOR

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# The Mesoamerican Corpus of Formative Period Art and Writing

NEH Level II Start-Up Project

Michael D. Carrasco, Department of Art History, Florida State University  
Joshua D. Englehardt, Centro de Estudios Arqueológicos, El Colegio de Michoacán  
Dennis E. Slice, Department of Scientific Computing, Florida State University

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## LIST OF PROJECT PARTICIPANTS

Carrasco, Michael D., Ph.D.  
*Co-Director*

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Berkley, Cameron  
*Database and Software Developer*

Department of Scientific Computing,  
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Centro de Estudios Arqueológicos,  
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Lunagómez Reyes, Roberto, M.A.  
*Project Advisor: Curator of Olmec Collections,  
Museo de Antropología de Xalapa*

Universidad Veracruzana

Perales Vela, Rebeca, M.A.  
*Project Advisor: Director of Museo Regional de  
Antropología Carlos Pellicer Cámara*

Instituto Estatal de Cultura del Estado  
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Slice, Dennis E., Ph.D.  
*Co-Director*

Department of Scientific Computing,  
Morphometrics Lab, Florida State  
University

# **The Mesoamerican Corpus of Formative Period Art and Writing**

NEH Level II Start-Up Project

Michael D. Carrasco, Department of Art History, Florida State University  
Joshua D. Englehardt, Centro de Estudios Arqueológicos, El Colegio de Michoacán  
Dennis E. Slice, Department of Scientific Computing, Florida State University

## **ABSTRACT**

This project explores the origins and development of the first writing in the New World by constructing a comprehensive database of Formative period (1500–400 BCE) iconography and a suite of database-driven digital tools. In collaboration with two of the largest repositories of Formative period Mesoamerican art in Mexico, the project integrates the work of archaeologists, art historians, and scientific computing specialists to plan and begin the production of a database, digital assets, and visual search software that permit the visualization of spatial, chronological, and contextual relationships among iconographic and archaeological datasets. These resources will eventually support mobile and web-based applications that allow for the search, comparison, and analysis of a corpus of material currently only partially documented. The start-up phase will generate a functional prototype database, project website, wireframe user interfaces, and a report summarizing project development.

## **STATEMENT OF INNOVATION**

A resource that permits scholars to analyze visual elements across media, historical, and archaeological contexts is essential to understanding the origins and development of Mesoamerican writing. This project will develop original, database-driven digital tools that will allow novel visualizations and comparisons of a broad corpus of iconography and early writing, aiding the exploration of complex relationships among datasets to model the invention of New World writing in its cultural context.

## **STATEMENT OF HUMANITIES SIGNIFICANCE**

This project presents the evolution of writing in Mesoamerica to a broad audience. Technologies for multimedia data analysis produced by the project will have wide potential application in the humanities, facilitating the study of similar topics that may benefit from the visualization of complex relationships among datasets. The project enhances access to data and resources for comparative research on the origins of writing in other early civilizations, such as those in the Near East or China.

## PROPOSAL NARRATIVE

### ***Project Description: Enhancing the Humanities through Innovation***

This project seeks Level II Start-Up Grant funding to create *The Mesoamerican Corpus of Formative Period Art and Writing*, a digital resource that will expand currently available data to facilitate and robustly support research on the emergence of writing in the New World by developing a suite of digital research tools. The goal of the project is to reveal the artistic and scribal traditions of the Olmec culture, Mesoamerica's first civilization and the originator of an ancestral sign system from which all later Mesoamerican writing developed. To achieve this goal, the *Corpus* assembles a database of Formative period (ca. 1500–400 BCE) Mesoamerican iconography and writing in a digital catalogue accessible via intuitive, interactive applications and targeted to a broad range of users, from academic researchers to K–12 teachers and students. Start-Up funding will allow us to build the project's core database, assemble digital assets, and plan for the incorporation of visual recognition software into mobile and web applications to be developed during the implementation phase. Digital tools based on emerging technologies will allow for innovative ways of searching—such as visual input searches—comparing, analyzing, and visualizing relationships among a broad corpus of visual data, archaeological materials, and contextual information. This project both constructs a critical resource for scholars of the Formative period Americas and extends and develops technologies and data management architectures that will have wide application in art history, archaeology, and kindred humanities disciplines. Our long term goal is the creation of a sophisticated, bilingual digital asset and software toolkit that presents the full richness of Formative period art and writing to a broad audience and introduces new ways of conceptualizing and approaching visual data in humanities research.

During the grant period we will develop the database architecture and supporting software, populate the database, and create an initial set of “iconographic data documents” for each object represented in the database that will ultimately be incorporated into the project website and mobile device application. These products will form the cornerstone of a future proposal for an NEH Digital Implementation Grant. Level II Start-Up funding will allow us to evaluate open-source resources, specify data structures, and develop a searchable proof of concept prototype database, as well as to survey state-of-the-art visual search technologies and extend and develop new software to meet task-specific goals using the database prototype. Our work will facilitate the exploration of Formative period Mesoamerican art and writing, develop new technologies for visual searches valuable to the study of visual culture more generally, and build a solid foundation for the implementation of the long-range goals of the *Corpus* project.

### ***Project Rationale***

Investigations of the origins of writing and decipherments of unknown scripts rely on a comprehensive corpus of material subjected to analysis from a broad range of fields. This project creates just such a catalogue for Formative period Mesoamerican iconography and writing, which has been understudied. The Olmec corpus is unusually rich, but widely scattered, and access to data is frequently restricted. Further, some scholars have questioned the place of the Olmec sign system in the history of writing in the New World, arguing that the Olmec iconographic system was of insufficient visual and narrative complexity to provide the basis for Mesoamerican writing (Houston 2004). However, as Schmandt-Besserat (2007, 2010) has shown, art played a vital role in the emergence of the cuneiform script in the Near East. This project traces a similar trajectory in Mesoamerica, in which Formative period Olmec iconography played a crucial role in the development of all Mesoamerican scripts.

Exciting new discoveries and four decades of intensive research have provided a clear view of the steps spanning art and writing in Mesoamerica that potentially illustrate the critical moment when writing was invented. This project will significantly advance research on this period of transition from iconography to phonetic scripts and thereby test current hypotheses on the emergence of writing in one of the few locations in the world where writing developed. By combining new archaeological finds with poorly documented data gleaned from disparate, restricted sources into a centralized database, and

creating a suite of analytic digital tools accessible through web and mobile device applications, our project will allow investigators to consider the evidence in a new light, to generate new hypotheses, and to reassess the critical role of Olmec art in the invention of writing in the Americas.

### ***Background: Olmec Iconography and Writing***

The Olmec are known both as a Formative period culture centered along the coast of the Gulf of Mexico and as an iconographic assemblage and artistic style that stretched from western Mexico to Costa Rica from approximately 1500–400 BCE. The recent excavations of the Cascajal Block (Rodríguez Martínez et al. 2006) and the San Andrés roller stamp (Pohl et al. 2002), dating to 900–600 BCE, isolate the emergence of Mesoamerican writing in the Olmec heartland. The antiquity of Olmec culture and the widespread presence of Olmec iconographic elements in subsequent traditions suggest that later regional writing systems, such as Mayan hieroglyphs, developed from a Formative period Olmec iconographic and sign system. Accordingly an understanding of this foundational system is vital for comprehending many of the hallmark features of later Mesoamerican cultures, in which writing played a significant social role as a medium of artistic expression and a communicative technology.

Current scholarship on script emergence in Mesoamerica (Houston 2004; Justeson 1986; Pohl et al. 2008) suggests that the critical transition from iconography to writing involves the “divorce” of iconic elements from a purely visual frame of reference and the subsequent recontextualization of signs or motifs within a grammatical, linguistic framework. As iconography moves towards writing, the organization and interpretation of signs conforms to the structure of language, as opposed to the representational schemes of which a given sign was originally an element. To understand how and why signs were pulled from iconographic contexts and incorporated into the structure of writing, researchers must focus on the interplay between the different contexts in which specific signs were deployed.

To unravel these contexts, investigators need a complete catalogue and searchable database of Formative period iconographic and archaeological data that goes beyond the sole existing catalogue (Joralemon 1971), which lacks the wealth of new evidence that has come to light since its publication. Selective studies of Olmec iconography (e.g., Clark and Pye 2000; Coe 1965; Quirarte 2007; Reilly 1991, 1996; Taube 2004) are similarly incomplete and are limited to specific regions or periods. Therefore despite decades of investigation, our understanding of the origins and development of Mesoamerican writing remains limited. To address this problem the proposed project will wed this past material with unpublished objects and recent discoveries to build a comprehensive database. Through the use of innovative digital tools, the primary goal of this project is precisely to track the development of specific signs during the Formative period so as to visualize the recontextualizations of iconographic motifs in ways that will most advance research on Formative period art and script development.

### ***Project Contribution***

Our proposal takes a holistic view, acknowledging that both scholarly and technological progress is needed to elucidate Formative period iconographic systems and script emergence in the ancient New World. This project addresses these lacunae in four ways:

1. By providing a comprehensive corpus that unites limited existing catalogues with the large collection of unpublished or partially published Formative period iconography and writing in one easily searchable location through an intuitive and interactive digital resource;
2. By producing an initial chronological seriation and spatial contextualization of Formative period signs tied to firmly dated, scientifically excavated material that allow researchers to visualize and generate hypotheses about the spatial and temporal distribution of Formative period iconography;
3. By outlining methodologies for approaching the origins and development of Mesoamerican scripts that have generally been overlooked by researchers; and
4. By extending and developing digital assets and computational tools that facilitate the visualization of complex relationships otherwise difficult to express among diverse datasets (see appendices 1-2).

We will achieve these goals by surveying new technologies based on advances in visual recognition software, including shape context description (Belongie et al. 2002; Hyder et al. 2009; Roman–Rangel et al. 2009), optical character recognition and pattern analysis (Bataineh et al. 2012; Batuwita et al. 2011; Dalitz et al. 2008; Smith 2007), and polymorphic shape rule–based detection (Frauel et al. 2006), as well as probabilistic machine learning and computer vision, to extend and develop original digital tools for visual input searches and the presentation and comparison of data. Given the inherent visual nature of the material, searches that are based on the input of images—such as a researcher’s own drawing of a motif—will permit investigators to explore the corpus of Formative period Mesoamerican art and writing in ways impossible with keyword searches. Just as whole document searches revolutionized the possibilities for text–based research and made available sources that were previously restricted to specialists, visual input searches will allow investigators to pose fundamentally different questions of visual datasets, and to create new ways of expressing their findings. The adaptation of the technologies used in this project also poses exciting possibilities in the humanities for those areas in which there is a need for the visualization of complex relationships among multiple datasets that are difficult to express in narrative alone.

Our applications and digital assets will integrate computational tools capable of describing, identifying, and comparing complex pictorial elements and delivering varied iconographic, contextual, and archaeological data to many types of users. The proposed comprehensive catalogue and searchable database of Formative period iconography will benefit research by greatly expanding resources currently available for research on the development of Mesoamerican writing, thereby making key contributions to the larger fields of art history, archaeology, Mesoamerican studies, and the history of writing.

### ***Environmental Scan***

Two NEH funded projects are similar to the proposed *Corpus*. The University of Houston’s Visual Web Interface for Researchers (Vwire) project has produced an online tool that offers an intuitive way of comparing, categorizing, and sorting visual data. Vwire highlights the power of making visual arguments that are difficult or impossible to achieve through narrative. The second, FACES: Faces, Art, and Computerized Evaluation Systems, based at the University of California, Riverside, utilizes facial recognition software to identify artistic portraits that lack provenience. Our project will incorporate similar technologies to help isolate patterns in Formative period art and writing, as well as present this material in ways that, like Vwire, enable the visualization of relationships between multiple datasets.

In stage three of this project, we plan to adapt the pattern recognition technologies and methodologies for visual searches employed in projects such as Detexify (<http://detexify.kirelabs.org>) and *Leafsnap: An Electronic Field Guide* (<http://leafsnap.com>). Detexify was developed to help those working with the document markup language LaTeX to find specific symbols. It allows users to input visual information, in this case as a drawing, from which a list of similar signs is displayed. Likewise, *Leafsnap* is designed to recognize plant species from photographs taken by the user by comparing images against the Smithsonian Institution’s large centralized specimen collection. Such a feature allows users with no specialized botanical knowledge to access detailed information on taxonomy and species identification. User data are automatically incorporated in the database, thereby expanding the dataset as the program is used. For our project, the Museo de Antropología de Xalapa, Veracruz and the Museo Regional de Antropología Carlos Pellicer Cámara in Villahermosa, Tabasco, which house the largest collections of Olmec art in the world, serve a similar function to make our corpus the largest digitally accessible collection of Formative period iconography and writing.

### ***History and Duration of the Project***

The proposed research is a long term, multi–year project that has grown out of a fusion between Carrasco’s research on Mesoamerican art and epigraphy and Englehardt’s focus on interregional interaction in the Formative Period and the evolution of script traditions in the Americas (Carrasco 2012a, 2012b; Carrasco and Englehardt 2011; Englehardt 2010, 2012). This project will unfold in three stages, the first of which is a 2012–2013 phase of planning and documentation, funded by Florida State

University. During this initial period of support, the co-directors traveled to Mexico in summer 2012 to review collections at the Museo de Antropología de Xalapa and the Museo Carlos Pellicer Cámara. We secured agreements with these institutions to ensure access to their restricted collections. We documented a limited range of material at these museums and regional archaeological sites through high-resolution digital photography and constructed a preliminary database of approximately 150 artifacts that provides chronological, contextual, archaeological, and descriptive information on each object. We also investigated the best practices for the preparation of imagery so that it can be subjected to pattern recognition technologies that will permit both visual searches of the database and multi-channel methods of dissemination. By the end of stage one, we will have identified a range of appropriate technologies for content management and online delivery systems.

Level II Start-Up funding will support the continuation of the project during its second stage, from May 2014 through September 2015. During stage two, we will construct and populate the core database and continue the analysis of the most important motifs in our preliminary corpus. Carrasco and Englehardt will conduct a further four months of museum research in Mexico over 2014 and 2015. Additional fieldwork will add a significant number of poorly documented Formative period objects to the database. We will generate a stylistic seriation and cultural-geographical contextualization of the corpus to refine the current spatial and chronological frameworks for Formative period art and writing.

Funding will also support collaboration with Dennis Slice of the Department of Scientific Computing at FSU, who will oversee the research and preliminary development of the technological infrastructure necessary to display the spatial and temporal relationships among signs and motifs within the database, and to represent the complex regional synchronic and diachronic relationships among datasets. Slice's Morphometrics Lab (<http://morphlab.sc.fsu.edu/>) is a leading center for the development of analytical methods and software for the characterization, comparison, modeling, and manipulation of such complex, multi-dimensional data, thereby providing a solid understanding of and proven experience in the application of existing tools on conceptual and practical levels. During the grant period, Slice and a graduate research assistant, software developer Cameron Berkley, will evaluate available resources and visual search routines, specify data structures according to field-specific best practices, create preliminary wireframes of web-based and mobile interfaces, and develop prototype database digital architecture.

The evaluation of open-source pattern recognition technologies will permit visual searches to be incorporated during stage three of the project. Therefore, a crucial component of the second stage is the Carrasco and Englehardt's proper preparation of the data and digital assets to take advantage of these technologies. These include iconographic data documents that are comprised of layers of high-resolution, color-managed digital photographs collected through fieldwork, historical photographs, and vector line drawings created by the project. Such drawings will segment individual motifs from a composition onto their own layer to facilitate high-speed retrieval of specific iconographic elements. Separating multiple icons that co-occur in a single composition will allow for the comparative search for relationships among signs. This is a critical search ability for understanding an iconographic element's distribution in art and incipient writing systems. These composite images will eventually permit visual input searches—both of entire compositions and single elements within compositions—against images in the database.

Finally, using the technologies described above, and integrating GIS-based interactive maps and excavation data, we will develop a database that will serve as the repository for the digital resources that feed the mobile and web applications to be developed in stage three of the project. We will generate proof of concept prototypes and wireframes of the application interfaces, including: 1) an initial website providing broad access to project data; and 2) wireframes of web-based and mobile applications (e.g. iOS or Android) that will eventually provide access to core digital assets through a high quality, intuitive user interface. Level II Start-Up funding will thus allow us to construct a preliminary digital database of Formative period iconography; evaluate, develop, and test backend software architecture; produce digital assets and prepare data to make full use of new technologies; and create initial designs for the database's user interface. The beta database, initial digital architecture and software development, and creation of



digital assets will form the basis for a proposal for an NEH Digital Implementation Grant. Future funding for stage three will allow for the creation of a mobile application and web-based desktop client, the implementation of visual input searches, and a major expansion of the catalogue of objects and contextualizing information.

### **Work Plan**

<b>Task</b>	<b>Staff</b>	<b>Completion</b>
1. Fieldwork and collections research in Mexico: Examine collections and create high-resolution digital images and videos of selected objects	Englehardt, Carrasco, Lunagómez Reyes, Perales Vela	June–July 2014 and May–July 2015
2. Sort, catalogue, and integrate new and previously gathered data; populate database	Englehardt, Carrasco	In progress–August 2015
3. Iconographic seriation and analysis; produce vector line drawings of selected objects	Carrasco, Englehardt	In progress–August 2015
4. Evaluate and design digital database architecture	Slice, Berkley	By December 2014
5. Evaluate digital software and infrastructure for visual search functionality	Slice, Berkley, Carrasco, Englehardt	By September 2015
6. Conceptualize, refine, and create proof of concept digital wireframes for prototype web and mobile apps ( <i>see appendices 1–2</i> )	Slice, Berkley, Carrasco, Englehardt	By July 2015
7. Preliminary specification and evaluation of database and app design; incorporation of feedback into design ( <i>see appendices 1 and 3</i> )	All project staff	By December 2014
8. Incorporation of iconographic data documents into digital database architecture	Englehardt, Carrasco	March–July 2015
9. Project evaluation and database functionality testing; revise as necessary ( <i>see appendix 3</i> )	All project staff	July–September 2015
10. Draft and publish White Paper documenting project development and summarizing results	All project staff	July–September 2015
11. Draft and submit proposal for NEH Digital Implementation Grant	Carrasco, Englehardt, Slice	By September 2015
12. Preparation of data; production of digital assets and multimedia materials	Englehardt, Carrasco	Ongoing throughout grant period
13. Present project results at conferences	All project staff	Ongoing

### **Project Staff** (*for responsibilities, please refer to Work Plan*)

<b>Title and Name</b>	<b>Time Committed to Project</b>	<b>Funding</b>
1. Co-Director: Michael D. Carrasco, Associate Professor of Art History	25% FTE	FSU/NEH
2. Co-Director: Joshua D. Englehardt, Professor of Archaeology	30% FTE	NEH
3. Co-Director: Dennis Slice, Associate Professor of Scientific Computing	10% FTE	FSU/NEH

<i>Title and Name</i>	<i>Time Committed to Project</i>	<i>Funding</i>
4. Cameron Berkley, Database and Software Developer, Graduate Research Assistant, Scientific Computing Morphometrics Lab	50% FTE (1 semester) <i>See letter of commitment</i>	NEH
5. Project Advisor: Roberto Lunagómez Reyes, Curator of Olmec collections, MAX	<i>See letter of commitment</i>	
6. Project Advisor: Rebecca Perales Vela, Director, Museo Carlos Pellicer Cámara	<i>See letter of commitment</i>	

### ***Final Product and Dissemination***

By the end of the Level II Start–Up Grant, we will have produced a prototype database from open–source software, a project website, and will have determined the appropriate technologies and established the digital architecture necessary for phase three implementation. The project team will prepare the iconographic data documents for approximately 500 objects. These documents will populate the database and ultimately serve the website and mobile application. The preliminary design and proposed functionality of these interfaces will be tested by colleagues and students during the grant period. Their feedback will be incorporated into future design refinements. The project website will allow users to test the beta database, as well as provide additional feedback that will guide the subsequent implementation phase. During stage three of the project, we will incorporate expanded functionalities such as visual input searches based on pattern recognition software into fully operational web-based and mobile applications. In addition, we will explore methods that allow users to input their own material into the database, thus further expanding the corpus while preserving the academic integrity of the product.

We envision the educational reach of *The Mesoamerican Corpus of Formative Period Art and Writing* surpassing the presentation of essays and static visual data to allow for the dynamic search, visualization, and investigation of a corpus of material currently only partially available in scattered sources with restricted access. We see this project as a test run for the presentation of iconographic, contextual, and archaeological data serving many types of users whose structure has the potential to be used in humanities research that focuses on visual materials. By taking advantage of new digital technologies, we will create an innovative resource that will aggregate the various digital assets and tools discussed above. In this way we will move beyond a “website” or a searchable database of materials to produce a set of resources and applications that do not exist purely as a presentational medium, but rather allow for the active manipulation of data that leads to new ways of thinking about that material.

The digital architecture will be based on open–source software and content management systems to be surveyed, extended, and developed as part of the research goals of the Start–Up Grant. Access to raw data, imagery, interpretive materials, and descriptive meta–data will be open and available for download. Project materials will be licensed under a Creative Commons Attribution–Non Commercial 3.0 Unported License, permitting free access, use, and academic exchange of contents. The use, distribution, and modification of computational tools developed for the project will be made publicly available through the project website. The digital database will be housed through the FSU Department of Art History website. FSU Information Technology Services already provides the necessary computational support. Access to digital data will be preserved for the public and future researchers through multiple avenues (see data management plan). Project co–directors will continue post–grant curation of the database and website.

Project staff will co–author a white paper to be distributed through the website documenting development of the platform and lessons learned. The co–directors will present the project at a number of conferences, such as the 2014–2015 annual meetings of the American Anthropological Association and Society for American Archaeology. Further presentations by project staff on aspects of the development process and technologies are also envisioned. Final products will also include a proposal for an NEH Digital Implementation Grant to expand the prototype platforms developed during the Start–Up phase.

# Budget Form

OMB No 3136-0134  
Expires 7/31/2015

Applicant Institution: *Florida State University*

Project Director: *Michael D. Carrasco*

Project Grant Period: *05/01/2014 through 09/30/2015*

[click for Budget Instructions](#)

	<b>Computational Details/Notes</b>	<b>(notes)</b>	<b>Year 1</b>	<b>(notes)</b>	<b>Year 2</b>	<b>(notes)</b>	<b>Year 3</b>	<b>Project Total</b>
			05/01/14- 05/01/15		05/01/15- 09/30/15			
<b>1. Salaries &amp; Wages</b>								
Project Co-Director (Michael D. Carrasco)	Academic Year Salary: \$67,031	summer salary support	\$2,300	summer salary support	\$2,300			\$4,600
Project Co-Director (Joshua D. Englehardt)	Academic Year Salary: \$26,627	30.0%	\$7,988	30.0%	\$3,994			\$11,982
Project Co-Director (Dennis E. Slice)	Academic Year Salary: \$78,250	summer salary support	\$1,200	summer salary support	\$1,200			\$2,400
Cameron Berkley, Database and Software Developer, Graduate Research Assistant, Scientific Computing Morphometrics Lab	.5 FTE (\$10,848/semester) + Tuition subsidy (\$3904)	Fall 2014 ONLY	\$14,752					\$14,752
<b>2. Fringe Benefits</b>								
Project Co-Director (Michael D. Carrasco)	Faculty/A&P/USPS FRS	17.20%	\$396	17.20%	\$396			\$792
Project Co-Director (Joshua D. Englehardt)	Non-student / OPS	2.25%	\$179	2.25%	\$90			\$269
Project Co-Director (Dennis Slice)	Faculty/A&P/USPS FRS	17.20%	\$206	17.20%	\$206			\$412

Cameron Berkley, Database and Software Developer, Graduate Research Assistant, Scientific Computing Morphometrics Lab	FSU OPS Graduate Research Assistant Rate (on \$10,848 salary alone)	0.80%	\$87					\$87
<b>3. Consultant Fees</b>								
N/A								
<b>4. Travel</b>								
Project Co-Directors (Michael D. Carrasco and Joshua D. Englehardt)	Fieldwork in Mexico, June-July 2014, March 2015, and May-July 2015	71 days	\$5,565	49 days	\$3,429			\$8,994
Project Co-Director (Michael D. Carrasco)	Travel to Washington, D.C. for grantee meeting	2 days	\$705					\$705
<b>5. Supplies &amp; Materials</b>								
N/A								
<b>6. Services</b>								
N/A								
<b>7. Other Costs</b>								
INAH Institutional Fees	15% of in-country costs for fieldwork		\$976					\$976
Rent	2 months in Xalapa + 2 months in Villahermosa during 2014 and 2015 fieldwork	2 months	\$1,225	2 months	\$1,225			\$2,450
<b>8. Total Direct Costs</b>								
<b>Per Year</b>			<b>\$35,579</b>		<b>\$12,840</b>			<b>\$48,419</b>

<b>9. Total Indirect Costs</b>								
a. Rate: 26% of modified total direct costs; b. Federal Agency: Department of Health and Human Services; c. Date of Agreement: 04/01/2013	<b>Per Year</b>		\$8,236		\$3,338		\$0	<b>\$11,574</b>
<b>10. Total Project Costs</b>	(Direct and Indirect costs for entire project)							<b>\$59,993</b>
<b>11. Project Funding</b>	<b>a. Requested from NEH</b>		Outright:				\$59,993	
			Federal Matching Funds:				\$0	
			<b>TOTAL REQUESTED FROM NEH:</b>				<b>\$59,993</b>	
	<b>b. Cost Sharing</b>		Applicant's Contributions:				\$0	
			Third-Party Contributions:				\$0	
			Project Income:				\$0	
			Other Federal Agencies:				\$0	
			<b>TOTAL COST SHARING:</b>				<b>\$0</b>	
<b>12. Total Project Funding</b>								<b>\$59,993</b>

Total Project Costs must be equal to Total Project Funding ----> ( \$59,993 = \$59,993 ?)  
Third-Party Contributions must be  
greater than or equal to Requested Federal Matching Funds ----> ( \$0 ≥ \$0 ?)

## PROJECT BUDGET

### SEE NEH SPREADSHEET

#### *Budget Addendum*

##### **1. Salaries and Wages**

*Co-Director:* Partial summer salary support of \$2,300 (25% summer FTE) for two summers is requested for Michael Carrasco. FSU fully supports the academic year salary of faculty, but makes no commitment to summer salary replacement or support.

*Co-Director:* A partial salary of \$11,982 for Joshua Englehardt is requested at the rate of 30% FTE for the duration of the project, calculated from a yearly base salary of \$26,627.

*Co-Director:* Partial summer salary support of \$1,200 (10% summer FTE) for two summers is requested for Dennis Slice. FSU fully supports the academic year salary of faculty, but makes no commitment to summer salary replacement or support. Slice will liaise with and supervise the database and software developer.

*Database and Software Developer:* We request \$14,752 (50% FTE) for Cameron Berkley of the FSU Department of Scientific Computing and Morphometrics Lab. This amount includes a salary of \$10,848 and a tuition subsidy of \$3,904. Covering Berkley's fees for an entire semester will free him from additional departmental and lab responsibilities and ensure that his time will be devoted solely to the project. It is hoped that Berkley's participation will result in the development of a dissertation project and/or publications through project work, and that he will continue in phase III project implementation.

##### **2. Fringe Benefits**

*Co-Director:* We request the required 17.20% fringe benefits (\$792) for Faculty/A&P/USPS FRS at FSU for Michael Carrasco, calculated on the basis of the above partial summer salary support.

*Co-Director:* We request the required 2.25% fringe benefits (\$269) for Non-Student/OPS at FSU for Joshua Englehardt, since the grant will be administered through FSU. Fringe benefits calculated on the basis of the salary above.

*Co-Director:* We request the required 17.20% fringe benefits (\$412) for Faculty/A&P/USPS FRS at FSU for Dennis Slice, calculated on the basis of the above partial summer salary support.

*Database and Software Developer:* We request the required 0.8% fringe benefits (\$87) for OPS graduate research assistants at FSU for Cameron Berkley, calculated on the basis of the semester salary above.

##### **3. Consultant Fees**

N/A

##### **4. Travel Costs**

Michael Carrasco has conducted research in Chiapas and Yucatán, Mexico since 1997. Joshua Englehardt has conducted research in Yucatán, Chiapas, Veracruz, and Tabasco since 2002. Estimates are based on their experience in the field and on current price estimates compiled from pricing and inflation information current as of September, 2013.

We request a total of \$9,699 in travel costs. Travel costs include the price of airfare for all US-based participants and the cost of room and board, when appropriate, broken down as follows:

## **1. Travel to Mexico**

- A) Summer 2014 (year 1): Mexico City, Xalapa, Veracruz and Villahermosa Tabasco, Co-Directors Michael Carrasco and Joshua Englehardt, June 2–July 30, 2014 (50 days):

**Airfare:** \$489 (Michael Carrasco, round trip from Tallahassee to Mexico City; quoted on <http://www.kayak.com>, September 1, 2013)

**Per diem M&IE rate:** \$3,000 (\$30/day x 50 days x 2 pax; based on US State Department per diem travel rates for Veracruz and Tabasco; [http://aoprals.state.gov/web920/per\\_diem.asp](http://aoprals.state.gov/web920/per_diem.asp))

**Hotels:** \$420. (\$70/night x 6 nights; based on US State Department lodging rates for Veracruz, Tabasco, and Mexico City; [http://aoprals.state.gov/web920/per\\_diem.asp](http://aoprals.state.gov/web920/per_diem.asp))

*(Additional lodging costs included in rent, below)*

- B) Spring 2015 (year 1): La Piedad, Michoacán and Mexico City, Mexico, Co-Directors Michael Carrasco and Joshua Englehardt, March 1–March 21, 2015 (21 days):

**Airfare:** \$489 (Michael Carrasco, round trip from Tallahassee to Mexico City; quoted on <http://www.kayak.com>, September 1, 2013)

**Per diem M&IE rate:** \$567 (\$27/day x 21 days x 1 pax; based on US State Department per diem travel rates for Michoacán; [http://aoprals.state.gov/web920/per\\_diem.asp](http://aoprals.state.gov/web920/per_diem.asp))

**Hotels:** \$600. (\$30/night x 20 nights; based on US State Department lodging rates for Michoacán; [http://aoprals.state.gov/web920/per\\_diem.asp](http://aoprals.state.gov/web920/per_diem.asp))

- C) Summer 2015 (year 2): Xalapa, Veracruz and Villahermosa Tabasco, Co-Directors Michael Carrasco and Joshua Englehardt, May 3–July 2, 2015 (49 days):

**Airfare:** \$489 (Michael Carrasco, round trip from Tallahassee to Mexico City; quoted on <http://www.kayak.com>, September 1, 2013)

**Per diem M&IE rate:** \$2,940 (\$30/day x 49 days x 2 pax; based on US State Department per diem travel rates for Veracruz and Tabasco; [http://aoprals.state.gov/web920/per\\_diem.asp](http://aoprals.state.gov/web920/per_diem.asp))

*(Additional lodging costs included in rent, below)*

## **2. Travel to grantee meeting in Washington, D.C.**

Co-Director Michael Carrasco, dates TBD, 2 days

**Airfare** \$345. (Michael Carrasco, round trip from Tallahassee to Washington, D.C., quoted on <http://www.kayak.com>, September 1, 2012)

**Per diem M&IE rate:** \$140. (\$70/day x 2 days)

**Hotels:** \$220 (\$110/night x 2 nights)

(M&IE and hotel rates per FSU travel policy: <http://policies.vpfa.fsu.edu/controller/2d-2.html>)

## **5. Supplies and Materials**

N/A

## **6. Services**

N/A

**7. Other Costs**

*Institutional support:* INAH (the National Institute of Anthropology and History), part of the Federal Department of Education in Mexico, charges 15% on all foreign projects for “institutional support.” The fee (\$976) is calculated on the basis of budgeted direct in-country costs and excludes travel and lodging expenses.

*Rent:* \$2,450.

House/Apartment Rental: Estimated based on previous experience and current rental quotes.

Xalapa (1 month @ \$600/month 2014 [year 1], 1 month @ \$600/month 2015 [year 2]) = \$1,200  
(Quoted on <http://rentar-casa.vivastreet.com.mx/rentar-departamento+xalapa>, September 5, 2013)

Villahermosa (1 month @ \$625/month 2014 [year 1], 1 month @ \$625/month 2015 [year 2]) = \$1,250  
(Quoted on [http://www.tabascohoy.com/clasificados/bienesraices/?id\\_tipo=2&operacion=Renta](http://www.tabascohoy.com/clasificados/bienesraices/?id_tipo=2&operacion=Renta), September 5, 2013)

*No funds are requested for transportation costs, as all transportation costs in Mexico will be covered through the use of Englehardt’s personal vehicle.*

**8. Total Direct Costs:** \$48,419.

**9. Indirect Costs**

Florida State University requires payment of 26% of modified total direct costs excluding equipment costing \$5,000 or more, capital expenditures, charges for patient care, student tuition remission, rental costs of off-site facilities, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of \$25,000. Total \$11,574.

**10. Total Project Costs:** \$59,993.

**11. Cost Sharing**

N/A



## COLLEGES AND UNIVERSITIES RATE AGREEMENT

EIN: 1591961248A3

DATE: 04/01/2013

**ORGANIZATION:**

Florida State University  
Office - Sr. V.P. for Fin. & Admin.  
214 Westcott Building  
Tallahassee, FL 32306-1320

FILING REF.: The preceding agreement was dated 08/15/2012

The rates approved in this agreement are for use on grants, contracts and other agreements with the Federal Government, subject to the conditions in Section III.

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**SECTION I: INDIRECT COST RATES**

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RATE TYPES:	FIXED	FINAL	PROV. (PROVISIONAL)	PRED. (PREDETERMINED)	
<u>EFFECTIVE PERIOD</u>					
<u>TYPE</u>	<u>FROM</u>	<u>TO</u>	<u>RATE (%)</u>	<u>LOCATION</u>	<u>APPLICABLE TO</u>
FINAL	07/01/2010	06/30/2012	47.00	On-Campus	Organized Research (1)
PRED.	07/01/2012	06/30/2014	51.30	On-Campus	Organized Research (1)
PRED.	07/01/2014	06/30/2016	52.00	On-Campus	Organized Research (1)
PRED.	07/01/2010	06/30/2016	26.00	Off-Campus	Organized Research (1)
FINAL	07/01/2010	06/30/2012	54.50	On-Campus	Instruction (1)
PRED.	07/01/2012	06/30/2016	55.40	On-Campus	Instruction (1)
PRED.	07/01/2010	06/30/2016	26.00	Off-Campus	Instruction (1)
FINAL	07/01/2010	06/30/2012	32.50	On-Campus	Other Spons Activity (1)
PRED.	07/01/2012	06/30/2016	51.80	On-Campus	Other Spons Activity (1)
PRED.	07/01/2010	06/30/2016	26.00	Off-Campus	Other Spons Activity (1)
FINAL	07/01/2010	06/30/2012	67.00	On-Campus	NHMFL (2)
PRED.	07/01/2012	06/30/2016	70.00	On-Campus	NHMFL (2)
FINAL	07/01/2010	06/30/2012	24.50	Off-Campus	NHMFL (2)
PRED.	07/01/2012	06/30/2016	26.00	Off-Campus	NHMFL (2)

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ORGANIZATION: Florida State University

AGREEMENT DATE: 4/1/2013

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<u>TYPE</u>	<u>FROM</u>	<u>TO</u>	<u>RATE (%)</u>	<u>LOCATION</u>	<u>APPLICABLE TO</u>
PROV.	07/01/2016	Until Amended			Use same rates and conditions as those used for fiscal year ending June 30, 2016.

\*BASE

Modified total direct costs, consisting of all salaries and wages, fringe benefits, materials, supplies, services, travel and subgrants and subcontracts up to the first \$25,000 of each subgrant or subcontract (regardless of the period covered by the subgrant or subcontract). Modified total direct costs shall exclude equipment, capital expenditures, charges for patient care, student tuition remission, rental costs of off-site facilities, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of \$25,000.

(1) These rates apply to activities other than those conducted at NHMFL.

(2) These rates apply to all functions (Organized Research, Instruction and Other Sponsored Activity) conducted at NHMFL (National High Magnetic Field Laboratory).

ORGANIZATION: Florida State University

AGREEMENT DATE: 4/1/2013

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**SECTION I: FRINGE BENEFIT RATES\*\***

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<u>TYPE</u>	<u>FROM</u>	<u>TO</u>	<u>RATE(%)</u>	<u>LOCATION</u>	<u>APPLICABLE TO</u>
FIXED	7/1/2011	6/30/2012	1.30	All	All Staff (1)
FIXED	7/1/2012	6/30/2013	1.30	All	All Staff (1)
FIXED	7/1/2013	6/30/2014	1.80	All	All Staff (1)
FIXED	7/1/2013	6/30/2014	0.80	All	All Staff (2)
PROV.	7/1/2014	Until amended			Use same rates and conditions as those cited for fiscal year ending June 30, 2014.

\*\* DESCRIPTION OF FRINGE BENEFITS RATE BASE:

Salaries and wages.

- (1) Applicable to all faculty and staff excluding temporary employees.
- (2) Applicable to all faculty and staff including temporary employees.

ORGANIZATION: Florida State University

AGREEMENT DATE: 4/1/2013

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**SECTION II: SPECIAL REMARKS**

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TREATMENT OF FRINGE BENEFITS:

For cash claims and final reporting purposes, the following benefits are specifically identified to each employee and charged individually as direct costs: FICA, Retirement, Unemployment Insurance and Health Insurance.

Employee Terminal Leave costs are charged using the rate(s) listed in Section I of this Rate Agreement.

Up to June 30, 2014, Worker's Compensation was specifically identified to each employee and charged individually as a direct cost. Effective July 1, 2014, Worker's Compensation is charged using the rate(s) in Section I of this Rate Agreement.

TREATMENT OF PAID ABSENCES

Vacation, holiday, sick leave pay and other paid absences are included in salaries and wages and are claimed on grants, contracts and other agreements as part of the normal cost for salaries and wages. Separate claims are not made for the cost of these paid absences.

OFF-CAMPUS DEFINITION: For all activities performed in facilities not owned by the institution and to which rent is directly allocated to the project(s) the off-campus rate will apply. Grants or contracts will not be subject to more than one F&A cost rate. If more than 50% of a project is performed off-campus, the off-campus rate will apply to the entire project.

Equipment means an article of nonexpendable tangible personal property having a useful life of more than one year, and an acquisition cost of \$5,000 or more per unit.

NOTE: This agreement updates the Fringe Benefits rate section and Treatment of Fringe Benefits definition only. All other terms and conditions cited in the July 17, 2012 Rate Agreement remain in effect.

ORGANIZATION: Florida State University

AGREEMENT DATE: 4/1/2013

**SECTION III: GENERAL**

**A. LIMITATIONS:**

The rates in this Agreement are subject to any statutory or administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the organization were included in its facilities and administrative cost pools as finally accepted: such costs are legal obligations of the organization and are allowable under the governing cost principles; (2) The same costs that have been treated as facilities and administrative costs are not claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the organization which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.

**B. ACCOUNTING CHANGES:**

This Agreement is based on the accounting system purported by the organization to be in effect during the Agreement period. Changes to the method of accounting for costs which affect the amount of reimbursement resulting from the use of this Agreement require prior approval of the authorized representative of the cognizant agency. Such changes include, but are not limited to, changes in the charging of a particular type of cost from facilities and administrative to direct. Failure to obtain approval may result in cost disallowances.

**C. FIXED RATES:**

If a fixed rate is in this Agreement, it is based on an estimate of the costs for the period covered by the rate. When the actual costs for this period are determined, an adjustment will be made to a rate of a future year(s) to compensate for the difference between the costs used to establish the fixed rate and actual costs.

**D. USE BY OTHER FEDERAL AGENCIES:**

The rates in this Agreement were approved in accordance with the authority in Office of Management and Budget Circular A-21, and should be applied to grants, contracts and other agreements covered by this Circular, subject to any limitations in A above. The organization may provide copies of the Agreement to other Federal Agencies to give them early notification of the Agreement.

**E. OTHER:**

If any Federal contract, grant or other agreement is reimbursing facilities and administrative costs by a means other than the approved rate(s) in this Agreement, the organization should (1) credit such costs to the affected programs, and (2) apply the approved rate(s) to the appropriate base to identify the proper amount of facilities and administrative costs allocable to these programs.

BY THE INSTITUTION:

Florida State University

(INSTITUTION)

(SIGNATURE)

Gary Ostrander / David Coburn

(NAME)

VP for Research / Interim VP for  
Finance & Administration

(TITLE)

(DATE)

4/23/13

ON BEHALF OF THE FEDERAL GOVERNMENT:

DEPARTMENT OF HEALTH AND HUMAN SERVICES

(AGENCY)

(SIGNATURE)

Darryl W. Mayes

(NAME)

Regional Director, Division of Cost Allocation

(TITLE)

4/1/2013

(DATE) 0106

HHS REPRESENTATIVE:

Steven Zuraf

Telephone:

(301) 492-4855

## BIOGRAPHIES

**Michael D. Carrasco** is an Associate Professor of Art History and founder of the MA in Museum and Cultural Heritage Studies and the Visual Cultures of the Americas field of study in the Department of Art History at Florida State University. From 2003–2006 he was the Luther Gregg Sullivan Visiting Scholar in Art History at Wesleyan University where he developed the award-winning *Unaahil B'aak: Temples of Palenque* website with the Learning Objects Development Team. He specializes in the visual culture, literature, and writing systems of the indigenous peoples of Latin America, with a specific focus on Mesoamerica. He is the co–editor and a contributor to the volumes *Pre–Columbian Foodways: Interdisciplinary Approaches to Food, Culture, and Markets in Ancient Mesoamerica* (2010) and *Parallel Worlds: Genre, Discourse, and Poetics in Contemporary, Colonial, and Classic Maya Literature* (2012). He received his BA in archaeology from Wesleyan University and earned a MA and PhD in Art History from the University of Texas at Austin.

**Joshua D. Englehardt** is a Profesor-Investigador of Archaeology at the Centro de Estudios Arqueológicos of the Colegio de Michoacán. He has recently been named a Level I National Investigator by the Mexican National Commission of Science and Technology (CONACYT). He specializes in Mesoamerican archaeology and writing systems, specifically Maya epigraphy and the development of the Mayan script. His current research focuses on the development of Mesoamerican writing systems in the Formative period and the correlation of emerging scripts with interregional interaction and diachronic changes in iconography and material culture. His most recent publication is *Agency in Ancient Writing* (2012), for which he was both editor and contributor. He obtained a BA from the University of Michigan, received his MA in anthropological sciences at the Universidad Autónoma de Yucatán, and earned his PhD in anthropology from Florida State University. He has lived, worked, or studied in a variety of countries, including Nepal, India, Thailand, England, Kenya, and Mexico.

**Dennis E. Slice** is an Associate Professor in the Department of Scientific Computing. He is one of the leading figures in the field of biological shape analysis and has developed numerous and widely-used software packages for the management and analysis of large collections of complex multi-dimensional data. Past projects include analysis of facial variation of U.S. respirator users for the National Institute of Occupational Health and Safety and the development of software for the assessment of race and sex of unknown human crania for the National Institute of Justice. Current work, sponsored by the U.S. Army, seeks to develop methods and software to estimate the shape of the human cranium obscured by hair in tens of thousands of three-dimensional head surface scans. These projects have close parallels and direct relevance to the management, manipulation, and analysis of the image, iconographic, surface scans, and other data types in this proposal.

**Cameron J. Berkley** is a graduate student at Florida State University in the Department of Scientific Computing. He specializes in geometric morphometrics and software development. Before coming to FSU, he worked for three years as a web designer and copy writer for Web.com, where he created numerous small business websites. His software development and scientific computing accomplishments include writing a parts of speech tagger with hidden Markov models, correcting non-linear lens distortion in photographs with thin plate splines, efficiently solving systems of partial differential equations via a predictor-corrector method, and parsing and manipulating binary and ASCII file formats for the United States Army. He has professional experience authoring software in several programming languages including Java, C/C++, Python, MATLAB, and ANSI Common Lisp, for Linux, Windows, Mac, and Android platforms. He received his B.Sc. in Scientific Computing from Florida State University.

**Roberto Lunagómez Reyes** is curator of the Acervo Olmeca at the Museo de Antropología de Xalapa, Universidad Veracruzana. Lunagómez Reyes has focused his research on San Lorenzo Tenochtitlán as well as Medias Aguas. Among his published works are *Asentamiento prehispánico en San Lorenzo Tenochtitlán* (with Stacy Symonds and Ann Cyphers) and *Olmec to Aztec: Settlement Patterns in the Ancient Gulf Lowlands* (edited by Barbara L. Stark and Philip J. Arnold III).

**Rebeca Perales Vela** is Director of the Museo Regional de Antropología Carlos Pellicer Cámara and Directora de Patrimonio Cultural at the Instituto Estatal de la Cultura del Estado de Tabasco. She is trained as an archaeologist and received her MA from the Universidad Veracruzana. Her primary research interests include Maya archaeology and iconography, as well as settlement patterns and exchange in the northwest Maya lowlands.

## DATA MANAGEMENT PLAN

### *Data Generated through Project*

<i>Data Type</i>	<i>Sharing Timeline</i>	<i>Conditions</i>
Raw image data and video files (e.g., digital photographs, vector line drawings, 3-D laser scans)	On completion of Start – Up phase and as assets are added thereafter	Free and open public access via project website and, ultimately, user interfaces*
Descriptive meta-data in database	On completion of Start – Up phase and as data is added thereafter	Free and open public access via project website and, ultimately, user interfaces
Digital assets and interpretive materials (e.g., academic papers, interactive maps, architectural reconstructions)	On completion of Start – Up phase and as assets are added thereafter	Free and open public access via project website and, ultimately, user interfaces*
Analytic and methodological data (e.g., iconographic seriation, chronological analyses, methodological outlines)	On completion of Start – Up phase and as added thereafter	Free and open public access via project website and, ultimately, user interfaces
Open-source computer code associated with database, tool, interface, and server-side components development	Following Start-Up phase testing and as developed thereafter	Free and open public access via project website and open-source code repository (e.g., GitHub)
Assessment and evaluation data generated during the testing phase and through feedback	Aggregated data will be shared via the white paper and final report	No personally identifiable information will be shared
White Paper	On completion of Start-Up phase	Free and open public access via project website
Final report to NEH	On completion of Start-Up phase	Dissemination to be responsibility of NEH

\* *Where applicable, copyrighted data will be dynamically excluded from publicly available collections and documents and made available at the discretion of the creator.*

### ***Period of Data Retention***

We anticipate making all data generated by project staff available immediately on completion of the start-up project. As data are added in subsequent project phases, they will become immediately available, except in those cases where copyright restrictions may apply (e.g., user-generated data or materials).

### ***Data Formats and Dissemination***

Access to all raw data, imagery, descriptive meta-data, interpretive materials, and digital assets related to our project will be available for download through the project website as they are added and ultimately accessible through the interfaces linked to the centralized database. We will follow the recommended best practices of the Text Encoding Initiative (TEI) and the Digital Antiquity/Archaeology Data Service Guides to Good Practice, adhering to established protocols for long-term storage of digital data files. Data files will employ accepted archiving standards and non-proprietary formats to ensure accessibility, such as the use of archival PDFs (pdf/a), JPEG/PNG image files, AVI media files, and geoTiff imagery. All project materials will be licensed under a Creative Commons Attribution-NonCommercial 3.0 Unported License, thus permitting free, noncommercial access, use, and academic exchange of contents. We reserve the right to control the commercial use of the database and interfaces we develop, primarily to ensure that any commercial use benefits the long-term viability of the project. Structured meta-data will employ Data Documentation Initiative (DDI) standard XML formatting, offering flexibility in display and preservation-ready, machine-actionable quality. Database materials will also be tagged with actionable, persistent, globally unique ARK (Archival Resource Key) data identifiers, ensuring stable long term



access to distinct versions of datasets or their individual components. ARK identifier schemes allow users to query both descriptive and archival meta-data and to recognize relationships between identifiers.

The use, distribution, and modification of any computational tools, techniques, or methodologies developed for the project will be open. Source codes and software will be made publicly available through the project website and through public repositories such as GitHub (<https://github.com>).

### ***Data Storage, Management, and Maintenance***

Data will be archived and disseminated through a dedicated website that project staff will create and maintain, to be housed through the institutional repository hosted by the Florida State University's Department of Art History and Information Technology Services (ITS) and managed through WebDAV protocol. This storage is provided through an enterprise class network and includes automatic mainframe and cloud-based backup. FSU ITS also provides data stewards and custodians, as well as database and security administrators to manage archives following ultimate project completion. Project co-directors will continue post-grant curation of the database and website.

Project data will be stored in a NoSQL database for long-term archival storage. NoSQL databases provide the ability to grow and change through time with minimal system interruption. For instance, if a better algorithm replaced the initial set of icon matching algorithms, the addition of required data would be less disruptive of the system, thus providing important flexibility to application stacks. Since the data model is not rigidly defined, individual records can be different without disturbing the system as a whole. By spreading the backend database among several physical and geographically remote servers, NoSQL systems also offer extraordinary resiliency and fault tolerance, providing uninterrupted uptime and continuous user access to cloud data with no single point of failure, a crucial consideration for interactive, digital publications where the user simply expects the cloud data to be available when they are connected. Such systems also support off-line access to the database through synchronization. During the grant we will evaluate the NoSQL technologies that are appropriate for our mobile interface.

Database architecture and content management technology will utilize an open-source application such as MongoDB, PostgreSQL-based HadoopDB, or CouchDB that makes use of NoSQL technologies. Another possibility under evaluation is the Apache Cassandra database with geoware Solr as a data and document store, which permit location-aware searching and carry the added benefit of a query language (CQL) that is similar to the SQL used in relational databases. These technologies combine maximal fault tolerance, the speed and flexibility of key-based storage, and the ability to move data and specialized data structures between client apps and our distributed, centralized database. Data would be stored as JSON "documents." The latter point is critical for the development of non-web-based applications. The functionality we envision will be best supported by a system that can update and sustain a database built into the application, providing access to enhanced information when online, but allowing for continued use when off-line. Traditional relational databases are less well suited to the powerful opportunities these new technologies present. Available Application Programming Interfaces (including C, Objective C, Java, PHP, and Ruby bindings) support both web server and other client-server models. These open-source systems and software will ensure accessibility and allow for the future expansion of core database assets during and beyond the duration of the project. Our open database will allow for the creation of other novel applications by developers and users other than ourselves. These data management technologies also enable an efficient workflow, as content contributors and editors can have direct access to editable areas of the site through an administrative backend. Thus, elements can easily be added through time.

The long-term development of the digital product demands the highest standards of scholarship, editing, and software design. We plan to partner with an academic press to ensure peak production values and consistency. We also plan to incorporate the participation of the Florida State University Facility for Arts Research, which is dedicated to the integration of traditional print and electronic media. Since *The Mesoamerican Corpus of Formative Period Art and Writing* will be a digital publication in conjunction with traditional media, it will be cataloged as a resource via such research hubs as the Foundation for the Advancement of Mesoamerican Studies, Inc. ([www.famsi.org](http://www.famsi.org)) and Mesoweb ([www.mesoweb.org](http://www.mesoweb.org)).

## LETTERS OF COMMITMENT AND SUPPORT



DEPARTMENT OF ANTHROPOLOGY  
THE UNIVERSITY OF TEXAS AT AUSTIN

Austin, Texas 78712-1086 • (512) 471-4206 • FAX (512) 471-6535

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September 4, 2013

Office of Digital Humanities  
National Endowment for the Humanities  
1100 Pennsylvania Avenue, NW  
Washington, DC 20506

To Whom It May Concern:

Dr. Michael Carrasco and Dr. Joshua Englehardt have requested that I write a letter of support for their NEH Digital Humanities Start-Up Grant proposal to develop *The Corpus of Mesoamerican Formative Period Art and Writing*. I am very pleased to offer this proposal my firm endorsement.

As a scholar of the languages, cultures, and writing systems of indigenous Mesoamerica, I will be closely following this project. I admire and support the premises and aims of *The Corpus of Mesoamerican Formative Period Art and Writing*, as well as the means by which they intend to carry them out. It will centralize and make available a broad range of iconographic, archaeological, and contextual data that are crucial to our understanding of the processes behind the emergence of Mesoamerican writing. The digital technologies and methods employed in the project hold out the promise of greatly facilitating research on Mesoamerican scripts as well as democratizing the data. Since decipherments of other scripts and iconographic systems—in Mesoamerica and elsewhere—have relied on a comprehensive corpus of signs analyzed by many scholars, the absence of such a catalogue in this case limits the possibility for a similar understanding of Formative period iconography and Olmec writing. This project provides such a corpus to a broad audience in ways that enable the visualization of complex relationships between multiple datasets. Expressing these relationships would simply not be possible in conventional print media. Therefore this project could potentially speed up the acquisition of knowledge about writing and its origins in Mesoamerica considerably, and the methods and new datasets could easily be adapted to all Mesoamerican writing, and thinking big, could be usefully employed in researching Mediterranean scripts as well.

This project is impressive in that it not only permits easy access to tools and resources that will inspire students and benefit research but also opens to scholars innovative ways to visualize how art and script evolved and interacted in Mesoamerican visual cultures. I am excited to support this project and I have indicated to Dr. Carrasco that I would be very pleased to participate in the evaluation phases planned for the project..

Sincerely,  
*Brian Stross*  
Brian M. Stross, Ph.D.  
Professor  
Department of Anthropology

**From:** Joyce Marcus [joymar@umich.edu]  
**Sent:** Thursday, August 29, 2013 9:51 PM  
**To:** Englehardt, Joshua  
**Subject:** Re: NEH grant support letter

Office of Digital Humanities  
National Endowment for the Humanities  
1100 Pennsylvania Avenue. NW  
Washington, DC 20506

30 August 2013

I write this letter in support of Dr. Michael Carrasco and Dr. Joshua Englehardt for their National Endowment for the Humanities Digital Start-Up Grant proposal to develop The Corpus of Mesoamerican Formative Period Art and Writing.

A complete corpus of motifs has never been assembled. Having such a corpus, however, would accelerate the study of Formative art and writing in one format expediting the research of future generations. Thus I am very pleased to offer my support.

I think their work will bring to light, organized in one place, a lot of unpublished data and unpublished items.

The digital methods that the applicants propose will facilitate future research, particularly

- (1) in the quantification – i.e. determining the frequency of motifs; and
- (2) the distribution and patterning of motifs in time and space.

The interpretation of art and iconography requires a very large, well-documented corpus of motifs and individual elements. We have been handicapped by not having a full corpus and by not having detailed data on their context. This project is a welcome application and makes full use of state-of-the art technology and databases.

This project could accelerate the research of all kinds of scholars –from anthropologists to art historians to Latin Americanists. This means that its impact could be very high.

Please take a close look at this proposal by two fine scholars.

Joyce Marcus  
Professor of Anthropology  
Curator of Latin American Archaeology  
University of Michigan  
1109 Geddes Avenue  
Ann Arbor, Michigan 48109-1079



# CALIFORNIA STATE UNIVERSITY, FULLERTON

Humanities and Social Sciences

*Anthropology Department, MH-426*

800 N. State College Blvd., Fullerton, CA 92831-3547 / T 657-278-3626 / F 657-278-5001

September 6, 2013

Office of Digital Humanities  
National Endowment of the Humanities  
1100 Pennsylvania Ave. NW  
Washington, DC 20506

To Whom It May Concern:

Please accept this letter of support of Drs. Michael Carrasco and Joshua Englehardt's proposal to develop *The Corpus of Mesoamerican Formative Period Art and Writing*. I strongly support this project and would recommend that it be funded.

The co-PIs plan to create a database, a supporting website, and a mobile device application that will be populated with Olmec iconographic data. Carrasco and Englehardt correctly point out that a broad corpus of early Mesoamerican art and iconographic elements exist, but are only partially documented, often in diverse and obscure publications. The plan to create a widely accessible and easily searchable database is not only important for data access and management, but also for research of early Mesoamerican iconography and script.

The co-PIs have already completed the pilot stage of this multi-year project where they developed a database structure – a structure from which they will build upon if NEH funding is received. This project is feasible because the researcher possesses the technological knowhow to undertake the work and because they have received institutional permission from two important regional museums that house a large number and wide array of Olmec objects decorated with iconographic elements.

Carrasco and Englehardt's research is well designed to achieve their stated outcomes. And once data are inputted into their database, they (and other students and scholars) will be able to search, compile, compare, and analyze Olmec iconographic data to identify patterns that will lead to a better understanding of Olmec iconography and possibly the components of an incipient writing system.

In sum, I wholeheartedly support this work, and deem it worthy of funding.

Sincerely,

Carl J. Wendt, Ph.D.  
Associate Professor  
Archaeology Coordinator  
Department of Anthropology  
California State University, Fullerton  
[cwendt@fullerton.edu](mailto:cwendt@fullerton.edu)



September 4, 2013

Dear Drs. Carrasco and Englehardt,

I am writing to express the enthusiastic support of myself and the Morphometrics Lab for the project, *The Mesoamerican Corpus of Formative Period Art and Writing*. As you know, the Morphometrics Lab has an outstanding reputation and proven track record for interdisciplinary projects involving the analysis and manipulation of large and complex data sets and types. Our experience ranges from the handling and analysis of large data sets including data types from simple numeric and text types to three-dimensional coordinate data and surfaces scans. Besides simply managing and analyzing such data, we are an important source of new analytical methods and software and have brought our talents to bear in collaborative projects in an impressively broad range of interdisciplinary projects.

As I made clear in our initial discussions of the project, my foremost concern is that everyone involved receive mutual, maximal benefit from any collaboration. First, this means having the needs of your research met. To do this, though, we must have appropriate personnel available. Then, the work on the project must be of direct relevance to the advancement and training of that personnel.

I believe this all comes together quite nicely in the person of Mr. Cameron Berkley. Mr. Berkley first came to my attention as an undergraduate when he developed a parts-of-speech tagger for his project in my scientific computing class. This was so much more ambitious, sophisticated, and professional than any other project in the class that I offered to involve Mr. Berkley in my own research. Since that time, he has proven himself an outstanding and talented student always going well beyond minimal requirements for a task in a truly exemplary fashion. His undergraduate work on non-linear image correction is of professional quality that will no doubt find its way into a top peer-reviewed journal. I frequently rely on his experience in all manner of web management and software development in the Morphometrics Lab, and could not be more delighted that he has chosen to stay at Florida State University as my student for his graduate work.

Of course, two quality components must also be compatible, and recalling Mr. Berkley's earlier work and apparent interest in computational linguistics and proven abilities in the areas of complex data analysis and management, I approached him about work on this project. I was pleased to find him to be just as enthusiastic about the project as I am, and I would fully support his work as dedicated RA on this project. In our program, this means Mr. Berkley will enroll in a normal semester of coursework and be able to dedicate twenty hours of work per week for the sponsored research. Given Mr. Berkley's enthusiasm and abilities, I believe this to be sufficient to meet the requirements of the current proposal, provide a solid foundation for future work, and be a valuable experience that could directly contribute to his doctoral research.

Sincerely,

A handwritten signature in blue ink that reads 'd. slice'.

Dennis E. Slice

400 Dirac Science Library, Florida State University, P. O. Box 3064120, Tallahassee, FL 32306-4120  
Telephone 850.644.1010 Fax 850.644.0098



Universidad Veracruzana  
Museo de Antropología de Xalapa

Oficio No. 167/2012.

## CONSEJO DE ARQUEOLOGÍA P R E S E N T E .

Por este medio me permito informarles que conocemos el proyecto de investigación "The Corpus of Formative Period Iconography and Writing" presentado por los Doctores: Joshua D. Englehardt, Ph.D. del Departament of Antropology, Florida State University y de Michael D. Carrasco, Ph.D del Departament of Art History, Florida State University, consideramos que no existe inconveniente para apoyarlo permitiéndoles revisar los materiales arqueológicos que forman parte de nuestro acervo.

Si requieren de mayor información no duden en contactarme.

Sin más que agregar a la presente, aprovecho para enviarles cordiales saludos.

**Atentamente**

Xalapa, Ver., a 6 de agosto del 2012.

**Dra. Sara Ladrón de Guevara**  
Directora

C.c.p. archivo  
minutario

**Translation**

[SEAL OF UNIVERSIDAD VERACRUZANA]

Official document No. 167/2012

COUNCIL OF ARCHAEOLOGY  
PRESENT

Permit me to inform you through this letter that we are familiar with the investigative project “The Corpus of Formative Period Iconography and Writing” presented by Doctors: Joshua D. Englehardt, Ph.D. of the Department of Antropology [sic], Florida State University and Michael D. Carrasco, Ph.D. of the Department of Art History, Florida State University, we are happy to support [the project] allowing access to the archaeological materials that form part of our collections.

If you require further information, do not hesitate to contact me.

With nothing more to add, I send my cordial salutations.

Sincerely  
Xalapa, Ver. August 6, 2012

[illegible signature]

Dr. Sara Ladrón de Guevara  
Director

c.c.p archive  
minute book

*Note: address and contact information for the Museo de Antropología de Xalapa appears along the left hand margin of the page.*

Dependencia Instituto Estatal de Cultura  
Dirección: De Patrimonio Cultural  
Oficio No. DPC/ 580 / 2012.

Villahermosa, Tabasco a 31 de Julio del 2012

**ARQLGO. PEDRO FRANCISCO SANCHEZ NAVA.**  
**PRESIDENTE DEL CONSEJO DE ARQUEOLOGIA**  
**P R E S E N T E:**

**CARTA DE NO OBJECION.**

La que suscribe Rebeca Perales Vela, Directora de Patrimonio Cultural y Coordinadora del Museo Regional de Antropología Carlos Pellicer Cámara, no tengo ninguna objeción y apruebo que los Doctores JOSHUA ENGLEHARDT y MICHAEL CARRASCO, siga realizando su propuesta de investigación **“El Corpus de la Iconografía y Escritura del Periodo Formativo,”** con los materiales que pertenecen a la colección de éste Museo y los materiales que se encuentren en otros museos del Estado de Tabasco, bajo mi supervisión.

Sin otro particular se extiende la presente, para los fines que al interesado convenga.

**ATENTAMENTE**

  
**ARQUEOLOGA REBECA PERALES VELA**  
**DIRECTORA DE PATRIMONIO CULTURAL.**



c.c.p.- Archivo/minutario

Av. Carlos Pellicer Cámara s/n, Zona CICOM.  
Villahermosa, Tabasco. C.P. 86000  
Tel.: (01 993)312 63 44  
museoarqueologicopellicer@hotmail.com



Translation

[LOGO OF TABASCO STATE]

INSTITUTO ESTATAL DE CULTURA

[IEC LOGO]

Dependency: State Institute of Culture  
Directorate: of Cultural Heritage  
Official document No.: DPC / 580 / 2012

Villahermosa, Tabasco July 31, 2012

ARCHAEOLOGIST PEDRO FRANCISCO SANCHEZ NAVA  
PRESIDENT OF THE COUNCIL OF ARCHAEOLOGY  
PRESENT:

LETTER OF NO OBJECTION

The undersigned Rebeca Perales Vela, Director of Cultural Heritage and Coordinator of the Regional Museum of Anthropology Carlos Pellicer Cámara, has no objection and approves that the Doctors JOSHUA ENGLEHARDT and MICHAEL CARRASCO continue performing their investigative proposal “The Corpus of Formative Period Iconography and Writing,” with the materials in the collection of this Museum and materials that may be encountered on other museums in the State of Tabasco, under my supervision.

With no other particular to add, I send this letter, for whatever ends the interested parties may see fit.

SINCERELY

[signature]

ARCHAEOLOGIST REBECA PERALES VELA  
DIRECTOR OF CULTURAL HERITAGE

[Seal of the State Cultural Institute Directorate of Cultural Heritage]

c.c.p. Archive/minute book

*Note: address and contact information for the Museo Regional de Antropología Carlos Pellicer Cámara appears at the bottom of the page.*



Oficio Núm.401.B(4)19.2012/36/1819

México, D.F., a 07 de septiembre de 2012

**DR. JOSHUA ENGLEHARDT**  
**DR. MICHAEL CARRASCO**  
**INVESTIGADORES DE LA UNIVERSIDAD ESTATAL DE FLORIDA**  
**P R E S E N T E S.**

Estimados Investigadores:

En seguimiento al Oficio Núm. **401.B(4)19.2012/36/1787**, relacionado con la **Propuesta de Proyecto "El Corpus de la Iconografía y la Escritura del Periodo Formativo"**, me permito agradecer el envío de la información solicitada por este Consejo de Arqueología, con lo cual la propuesta ha sido aprobada. No omito solicitarles la carta de aval financiero en cuanto cuenten con ella.

Sin otro particular aprovecho la ocasión para enviarles un cordial saludo.

**A T E N T A M E N T E**

  
**DR. PEDRO FRANCISCO SÁNCHEZ NAVA**  
**PRESIDENTE DEL CONSEJO DE ARQUEOLOGÍA**

C.c.p. Lic. Alfonso de María y Campos.- Director General del I.N.A.H.  
Lic. Miguel Ángel Echegaray Zúñiga.- Secretario Técnico del I.N.A.H.  
Dra. Nelly Margarita Robles García.- Coordinadora Nacional de Arqueología.  
Archivo Técnico.  
PFSN/csf.

Translation

[INAH LOGO                      CONACULTA LOGO]

[SEAL OF UNITED MEXICAN STATES]

Official document No. 401.B(4)19.2012/36/1819

Mexico City, D.F., September 7, 2012

DR. JOSHUA ENGLEHARDT  
DR. MICHAEL CARRASCO  
INVESTIGATORS OF THE FLORIDA STATE UNIVERSITY  
PRESENT

Esteemed Investigators:

Following the Official Document No. **401.B(4)19.2012/36/1787**, in relation to the **Proposal of the Project “The Corpus of Formative Period Iconography and Writing”**, permit me to thank you for sending the information requested by the Council of Archaeology, with which your proposal has been approved. Please request a letter of financial guarantee once you have received funding.

With no other particular I take the opportunity to send you cordial salutations.

SINCERELY

[illegible signature]

DR. PEDRO FRANCISCO SÁNCHEZ NAVA  
PRESIDENT OF THE COUNCIL OF ARCHAEOLOGY

C.c.p. Alfonso de Maria y Campos, INAH Director General  
Miguel Ángel Etchegaray Zúñiga, INAH Technical Secretary  
Dr. Nelly Margarita Robles Garcia, National Coordinator of Archaeology  
Technical Archive  
PFSN/csf.

*Note: address and contact information for the Consejo de Arqueología appears at the bottom right of the page. The words “Instituto Nacional de Antropología e Historia” appear directly to the right of the INAH logo at the top of the page. The words “Consejo Nacional para la Cultura y las Artes” appear directly to the right of the CONACULTA logo at the top of the page.*

## APPENDICES

### *Appendix I: Development Tasks*

#### **Development Tasks**

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##### **1. Planning**

---

- Identify long-term archival needs and technology solutions (e.g., text encoding initiative)
  - Evaluate available open-source resources
  - Survey state-of-the-art visual search technologies
  - Define documentation strategy
  - Technology literature review: Recognition technologies, database technologies (RDBMS, NoSQL), web technologies (HTML5, Ruby, CSS), on-line GIS technologies and options, appropriate web-server technologies
  - Define and prioritize user interface expectations, define tool needs to enable efficient workflow
  - Select web design targets, identify likely software stack elements, define security expectations and general strategies
  - Review and select appropriate open source license governing code and project data
- 

##### **2. Design<sup>1</sup>**

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- Create database and web server(s) design and implementation document
  - Create database and web server security solution design documents
  - Define data collection strategy and cataloging methods
  - Choose or create interface guidelines document
- 

##### *Database Modeling and Prototype Development*

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- Define BSON document elements to support web and mobile app user interfaces
  - Specify and design prototype data structures according to field-specific best practices
  - Evaluation and initial development of visual search algorithm
  - Define data document elements related to code internationalization
  - Identify database indices to support user and administrative searches
  - Define data documents related to on- and off-line help functions
  - Evaluate and select data model objects and methods for user and administrative interfaces
  - Classify additional objects and methods for catalog search-retrieval via standard archival codes
  - Define additional libraries, objects, and methods required to facilitate GIS views
  - Identify standard and external libraries and software tools required
  - Define objects and methods for a) data loading module; b) required to maintain and verify database consistency and integrity; and c) for color management of new imagery
  - Implement an initial database model for the compilation of test data and imagery
- 

##### *Wireframe User Interface View Design*

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- Create view design specification document, including object, image, video, and map views
  - Preliminary specification and evaluation of web-based interface and mobile device support
  - Evaluation and initial development of visual search algorithm
- 

<sup>1</sup> Software design documents can be composed of text descriptions, as well as graphical design documents such as UML diagrams.

- Identify required mobile frameworks (libraries), external frameworks, and custom objects/methods
- Create view mockups in X-code/DDMS and identify standard and external frameworks (libraries), and custom objects required to construct mobile app views
- Identify visual objects, text, and database elements requiring internationalization and design internationalization controls
- Wireframe settings design and user help function design documents
- Create user web and administrative interfaces design document
- Identify standard and external libraries and software tools required
- Define CSS requirements for the web user interface(s)
- Create HTML and CSS mockup code for views

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#### *Controller Logic and Process Design*

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- Create process design document for internal database processes
- Create process design document specifying expected application behaviors and functions
- Define objects and methods required to accomplish functionality; identify required frameworks, libraries and external software
- Create issue handling system document
- Conduct design review for selected interface guidelines

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### **3. Construction<sup>2</sup>**

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- Develop required art
- Install and configure server virtualization support as required
- Install and configure data and web server(s), database systems, and security systems
- Initialize and test database access and web server(s); verify mirroring between servers and server backup solution
- Evaluate and implement and evaluate most useful routines
- Extend and develop new routines to meet task-specific goals as standalone software and using database prototype
- Code command line-based data loading and management tools if required
- Code data layer and data access components of database system (views and associated tools)
- Conduct initial tests and debugging of database command line database management tools
- Implement the initial database model and load test prototype database
- Conduct simulator and device tests through coding cycle (test on development web client[s])

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### **4. Testing**

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- Design testing documentation and tracking system
- Conduct initial tests and debugging of database command line and database management tools
- Fix bugs and other issues that emerge from testing
- Prepare web product for migration to production server
- Send wireframes to Apple iOS/Google Android developer forums for review
- Install database prototype system and cycle through design, coding, and testing sequence; address any issues identified

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<sup>2</sup> There will be a strict separation between development data and web servers and production data and web servers. Nothing will be tested on production systems until bugs have been identified and eliminated.

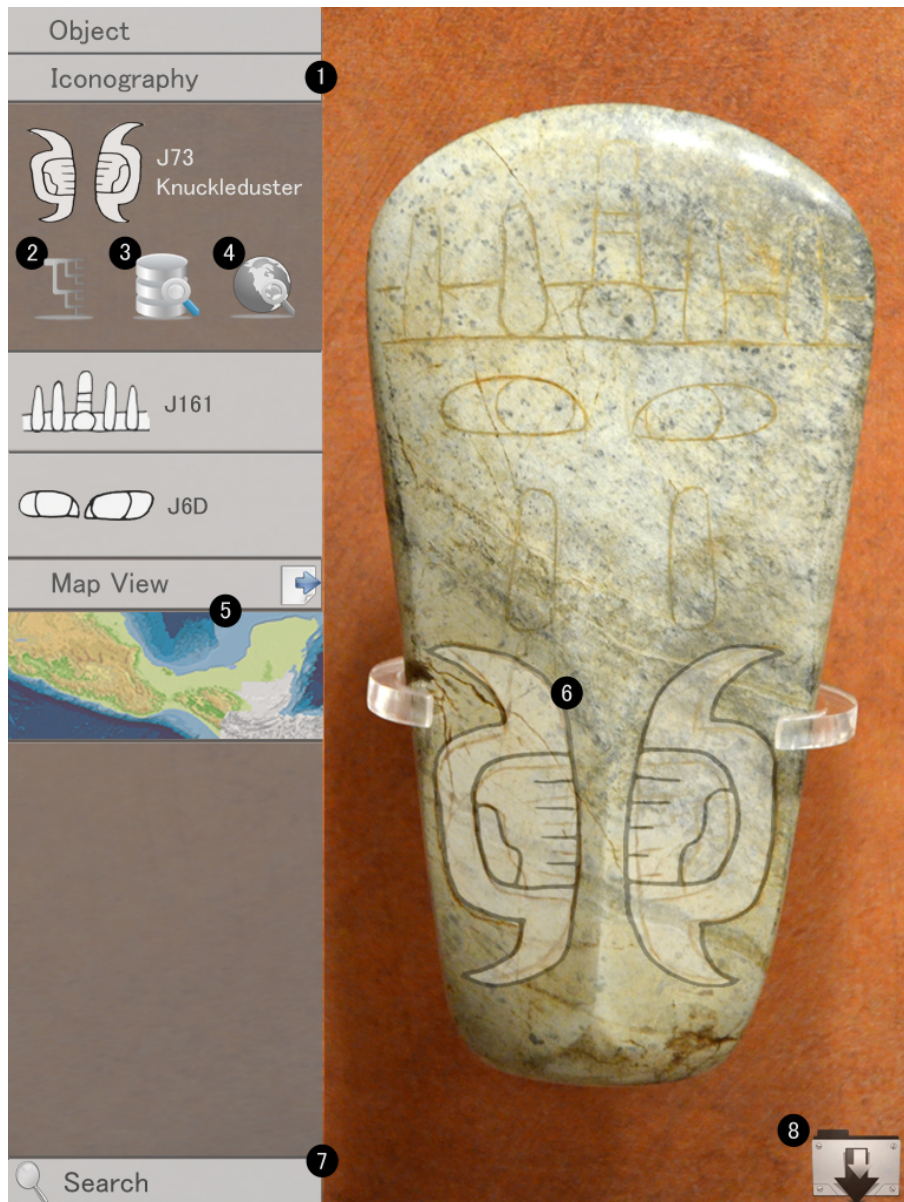
## ***Appendix 2: Preliminary Conceptualized Screenshots of Website Interface and Mobile Application Detailing Proposed Functionality***

*These screenshot mockups detail selected functions of the web-based and mobile applications. We anticipate that design and specific functions may change based on feedback received during evaluations and software development. Figure 1 displays a web-based view, Figures 2–4 display a tablet view.*



**Figure 1: Home Screen**

From the home screen, users have three primary points of entry: Objects, Iconography and Writing, and Sites. Selecting Objects (1) will call up a list of specific objects in the database with thumbnail photos of each object. Selecting one of those photos will take the user to the Object View screen, which displays information about the object and additional options in a pop-up menu to the left of the screen (as in Figure 3) and a high-resolution image of the object to the right (as in Figure 2). Selecting Iconography and Writing (2) calls up a list of iconographic motifs and script elements found on objects in the database. Selecting an individual motif, users will have the option of either accessing a list of objects on which the motif appears or bringing up a map view that displays all sites at which the selected motif has been found. Users may then click on sites or objects to call up additional options and views. Selecting Sites (3) calls up a scalable, interactive map that displays all sites at which objects in the database have been found. Selecting a particular site opens the Site View (as in Figure 4), from which objects or iconography can be selected. Additional options appear at the bottom of the screen (4), including an introduction to the website or mobile application and a brief tutorial, direct access to the database itself, direct access to multimedia contextualizing and interpretive materials, and the option to search the database for objects, iconographic elements or specific signs, or particular archaeological sites. Users also have the option of toggling languages between English and Spanish (5). By creating a bilingual database, the project seeks to ensure the involvement of the broad community of Latin American scholars.



**Figure 2: Iconography View with Object**

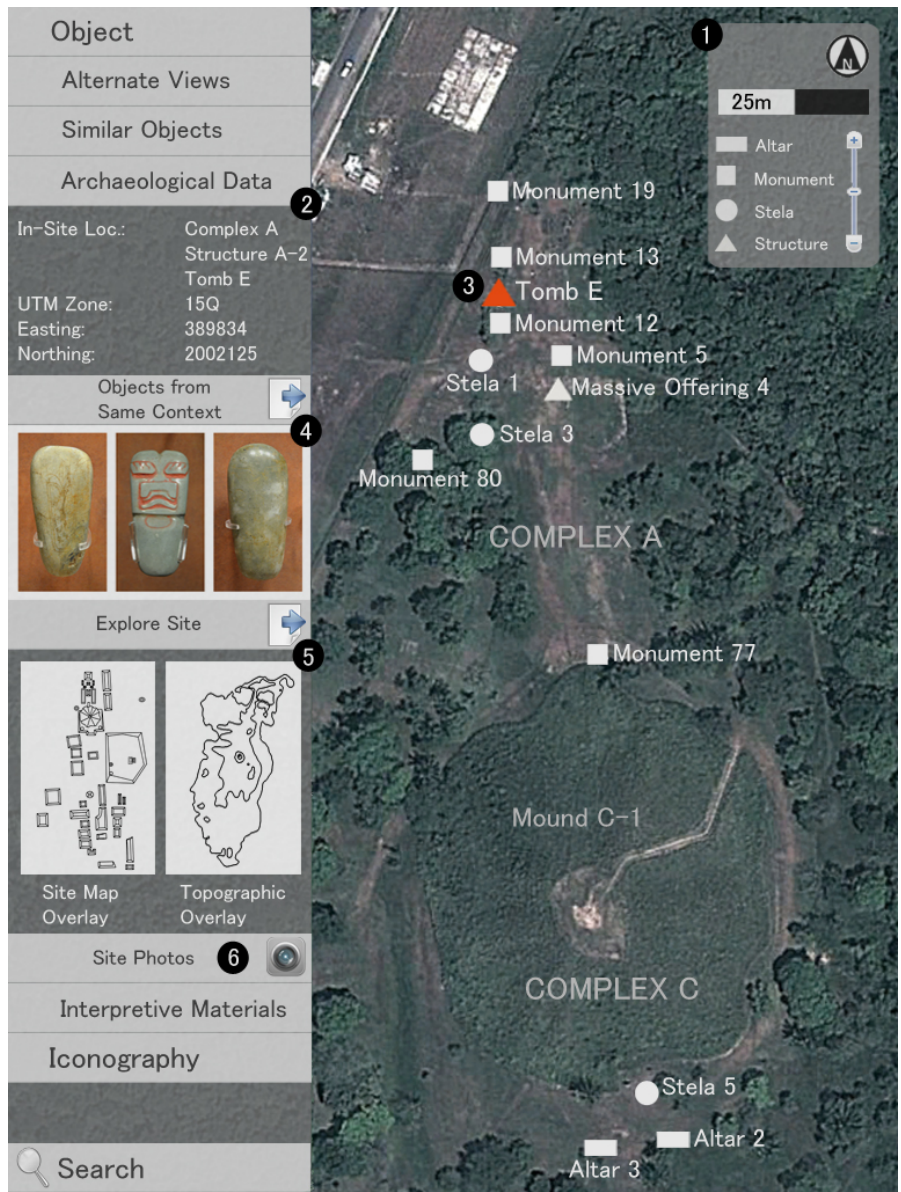
In the Iconography View (1), a high-resolution, scalable, color-managed image of the selected object appears on the right of the screen and a list of motifs found on the object appears on a menu to the left, accessed by swiping from left of touch screen on mobile device application or expanding a pop-up menu by hovering mouse on the left of the website. Selecting specific motifs, an expandable submenu appears, offering the following functions: (2) Genealogically track the motif through space and time; (3) Database search for objects on which the same motif appears; (4) Map search for sites at which objects on which the motif appears have been found. Selecting Map View (5) calls up an interactive, scalable map that replaces the image of the object and details the site at which the object was found (see Figure 3). When a specific motif is selected, a transparent vector line drawing of the motif overlays the image to provide clarity (6); segmenting these motifs onto their own layer facilitates the high-speed retrieval of specific iconographic elements. This overlay can be hidden by clicking or tapping it. At any time and in any view, users can search the database for sites, motifs, or objects (7). The image—with or without motif overlays—can be downloaded by the user (8).



**Figure 3: Object View with Map**

In the Object View (1), raw data regarding the specific object is provided in the swipe menu to the left. In this example, the map view has been toggled, bringing up a GIS-based interactive scalable map. This example shows a shaded terrain view; we anticipate adding satellite, topographical, and hybrid map views as well. A floating map key (2) can be toggled that provides scale, direction, and map information (and zoom option for web-based application; mobile application zoom will utilize finger gestures). The map can be replaced by clicking on the image of the object, which would bring up the object photo to the right (as in Figure 2). Alternate views of the object can also be selected (3) to appear on the right of the screen, including color-managed digital photographs collected through fieldwork, historical photographs, existing drawings, and vector line drawings. On the map, the site at which the object was found is highlighted (4). Clicking on the site will bring up the Site View screen (Figure 4). Selecting other sites on the map will call up a list of objects or motifs found at that site, from which Object or Iconography Views can be selected. High-resolution digital photographs of similar objects can also be called up (5), displaying an object image and automatically displaying the object view for that image. Archaeological Data (6; see Figure 4) and Interpretive Materials (7) for the selected object can also be accessed through the Object View. Interpretive materials will include pdf documents of outside sources, as well as contextualizing essays, video narrations, and pedagogical materials produced through the project. Where possible, 3-D laser scans of monuments or artifacts will be included with the interpretive materials.





**Figure 4: Site View with Archaeological Data**

The Site View displays a GIS-based interactive map of the site, in a default satellite image view. A map key (1) with can also be toggled in this view. Archaeological excavation data and GIS locational information on the selected object is displayed on the left (2). On the map, the object's in-site provenience is highlighted (3). For cases in which multiple objects were found in a single context (Tomb E in this example), clicking on the icon will display a list of objects found in that context (also accessible through the menu; 4); selecting one of those objects will bring up its Object View and display a high-resolution image of the object to the right (as in Figure 2). Objects found in other in-site contexts (e.g., Complex A, Mound C-1) can be accessed by clicking on those labels. Clicking single objects on the map (e.g., Stela 3, Monument 80) calls up the Object View and a high-resolution image of the selected object. Map labels can be hidden by double-clicking on them; single classes of object (e.g., Altar, Monument) can be hidden by clicking the icon for that object class in the map key. Users can overlay transparent site and topographical maps on the satellite image of the site by selecting those options in the menu (5). Selecting Site Photos (6) will call up a drop-down submenu of available site photos and the option to call up a site "fly-through" or archaeological reconstructions that can be selected for display to the right.

### ***Appendix 3: Project Evaluation Plans:***

There are two specific evaluation plans built into the project:

- A preliminary evaluation of conceptualized mobile and web-based application design (Work Plan Task 7)
- An overall assessment of project progress and preliminary functionality testing of resources, database access, digital architecture, and wireframes (Work Plan Task 9)

The preliminary project evaluation activity will occur in November–December 2014, following the final conceptualization of preliminary interface and application design, features, and functions. We will conduct a short-term (two to three week) evaluation consisting of formal and informal surveys and interviews to solicit feedback from groups of potential users (students and colleagues from the home institutions of project staff). The feedback and suggestions we receive over the course of this initial evaluation will be incorporated into the final interface application design and wireframes to be developed during the implementation phase.

Since the refined conceptualization and proof of concept wireframes for the mobile and web-based user interfaces will also be completed by this time, the database and software developer will evaluate potential software logic in relation to the proposed design features and functions to ensure the integrity of the database architecture and the viability of the digital code.

The preliminary evaluation activity is designed to answer the following questions:

1. How did prospective users who evaluated the design of the database and web-based and mobile interfaces rate their potential ease of use, both overall and by specific function?
2. Which design features do prospective users consider most and least valuable? Which proposed functions do potential users envision finding most helpful for their own research?
3. What improvements or additions to the design did prospective users suggest? How can such improvements or additions be integrated into planning for the implementation phase?
4. Is the draft database architecture and software code viable? If not, what specific issues should be addressed to ensure optimal performance and sustainability over time?

The second project evaluation activity will take place following the population of the completed database and the incorporation of digital assets and iconographic data documents into the proof of concept wireframe interfaces (July–September 2015). Since database digital architecture will be complete at this time, we will conduct preliminary functionality testing, revising as necessary. A slightly longer-term testing cycle is envisioned, with groups of students and colleagues at Florida State University, El Colegio de Michoacán, and the Universidad Veracruzana testing the system and prototype applications over a period of two to three months to provide feedback on usability, utility, connectivity, functionality, and ease of use.

These evaluation groups will assist in the identification of bugs in the database software and/or any potential problems with the extension and implementation of visual search functionality in the digital infrastructure, which will allow us to address these issues before moving forward with project implementation and incorporate user feedback into future planning, programming, and design tasks. Our database and software developer will revise software code to ensure database integrity as necessary, as well as address any issues with wireframe design that are identified during the testing cycle to ensure a seamless transition to the eventual construction of the mobile and web-based user interfaces that will occur in stage three implementation.

Since we envision developing a mobile application during the implementation phase, we will use the Apple iOS and Google Android developer programs and their technical resources as an evaluative tool to assess the feasibility of proposed features and functions in the wireframe mobile app design (<https://developer.apple.com/programs/ios/>; <http://developer.android.com/index.html>). The iOS Dev Center community and Android Developer forums can be used to solicit feedback on design and necessary programming tasks and troubleshoot any potential software issues that arise during testing. Technical support engineers can also supply code-level evaluation of preliminary software design, and the Xcode and Google Dalvik Debug Monitor Server (DDMS) debuggers will provide real-time feedback on graphical performance during the design, wireframing, and testing of the user interface.

The final project evaluation activity is designed to answer the following questions:

1. Does the database have all elements of the proposed functionality by the end of the Start-Up Grant period? If not, what progress has been made?
2. What unanticipated difficulties arose during the development process? Were they resolved? If not, why not, and what plans have been made to address these issues during stage three implementation?
3. How did prospective users who evaluated the prototype wireframes rate its potential ease of use and utility, both overall and by specific function?
4. Which functions and features did prospective users find most and least valuable? Which features would be used most? What specific functionalities did users find most and least helpful? Which digital assets were most frequently accessed in the database?
5. Did prospective users enjoy using the database? How do they rate the proposed graphical interfaces of the wireframes? What problems did users encounter while using the database?
6. What improvements or additions to the database and wireframe user interfaces did testers suggest?
7. To what extent did database and wireframes use have the effect the developers intended? What evidence supports this conclusion?
8. To what length has the digital architecture been extended to allow for visual search functionality? What tasks remain for stage three to fully implement this capability? How can this function best be integrated into mobile and web-based app design in conjunction with other proposed functionalities?

To answer both sets of questions, we will employ the following tools:

1. Structured and unstructured in-person interviews with students and colleagues
2. Formal and informal surveys of colleagues
3. Student focus groups
4. Ethnographic observation of users testing the prototype
5. Real-time testing through Apple iOS/Google Android development programs and forums

Data will be gathered by all project staff and analyzed by the co-directors, supported by the database and software developer. Findings will be incorporated into the final report and white paper.

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