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THE ATLANTA PHOENIX PROJECT: APPLICATIONS OF GAMIFICATION FOR

ONLINE CIVIC ENGAGEMENT

By

ROBERT BRYANT

Under the Direction of Jeffrey B. Glover, Ph.D.

ABSTRACT

The MARTA collection, held by Georgia State University, is a large collection of archaeological materials excavated in the late 1970s that documents the heritage of Atlanta. The current Phoenix Project is building on those original efforts and represents an ideal opportunity to explore praxis through civic engagement by making the collection easily accessible and interactive to the public through online community archaeology outreach. Key to this civic engagement is the digitization of artifacts and associated metadata as well as the use of the Heurist online data management system. In particular, I outline a three phase plan of implementing an online website that employs gamification methodologies integrated with existing social media formats to promote a diverse community of self-sustainable interaction with digital material that will benefit both Georgia State University and the community it serves. The main goal of the thesis is to provide a proof-of-concept web interface. I discuss why this is a critical first step to the broader civic engagement goals of the project, and I outline the next two phases of implementation.

INDEX WORDS: Gamification, Civic Engagement, Praxis, Archaeology, Atlanta, History of Atlanta, Digital Archaeology, Databases, Cultural Heritage, Social Media, Web data

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ROBERT BRYANT

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

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THE ATLANTA PHOENIX PROJECT: APPLICATIONS OF GAMIFICATION FOR ONLINE

CIVIC ENGAGEMENT

by

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May 2015

DEDICATION

I dedicate this thesis to Chrissy Hynde for giving me the brass in pocket when I needed it most to work on this project.

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I would like to acknowledge Jeffrey Glover for taking the time to advise me not just through my undergraduate career at Georgia State, but also believing in my potential to succeed at a higher level; Kathryn Kozaitis for opening the world of Praxis to me and teaching me that everything we do can have not only a positive impact on the communities we're a part of, but also on ourselves; Ian Johnson for taking the time to be on my committee and provide the necessary critical feedback to make sure I produced something well thoughtout that I was proud to submit and defend; Hilary Gopnik and Lauren Ristvet for challenging me over the years to develop the technical skillsets that made putting a project like this together possible; to all my fellow graduate students in the Anthropology department that shared my struggle and reminded me it was possible; to the Greater Atlanta Archaeology Society for all their hard work over the years on the MARTA collection; and to Georgia State University for providing me the opportunity. I would finally like to acknowledge my family and friends who supported and encouraged me throughout the entire process—especially my mom and dad, who despite being in the midst of their own dilemmas, always reminded me I was on the right path.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1   INTRODUCTION

A professor once asked me in class, "If your research doesn't help people, then what's the point?" A simple, but enlightening message for me. What is the point of any academic research, if the end goal does not involve furthering the lives of humanity in some measure? Research questions need to be more than just questions of how something works, why something works, when something worked, or where something worked—they should ask how figuring out the answer can positively affect wider agency through all aspects of the research design and more importantly: do something with that information to affect positive change. This is Praxis. How can not only the answers, but the process of finding the answers affect positive change? Suddenly my motivations to digitize a large body of legacy archaeological data took on a new politically motivated meaning, because what was the point of digitizing data for its own sake? I wanted to do something more with it—I wanted to strengthen the Atlanta community's agency over its own history and narrative and encourage it to engage with that new authority. This thesis marks the first step toward that ultimate goal.

1.1   Project Statement

The MARTA collection, held by Georgia State University, is a large collection of archaeological cultural heritage material excavated in the late 1970s that documents Atlanta's history. The current Phoenix Project is building on those original efforts of documentation and represents an ideal opportunity to explore praxis by making the collection both easily accessible and interactive to the public as the first steps toward civic engagement. Key to this civic engagement is the digitization of artifacts and associated metadata as well as the use of the Heurist online data management system. In particular, I outline a three phase plan of

implementing an online website that initially creates a working proof-of-concept that will allow

the second and third phases to employ gamification methodologies that promote civic

engagement with digital material that will benefit both Georgia State University and the

surrounding Atlanta community. I discuss why this is a critical first step to the broader civic

engagement goals of the project, and I outline the next two phases of implementation.

1.2   Summary of Thesis

In order to understand the goals of the Phoenix Project, I explain in Chapter 2 praxis, the

difference between public involvement and civic engagement, and the political archaeological

implications of the project. In Chapter 3, gamification is also thoroughly explained by detailing

the currently circulating marketing definitions and proposing a new simplified definition for the

needs of this project. This simplified definition is discussed through the lens of past and present

applications of gamification and the positive and negative outcomes of those applications in

order to tease out what game design elements are functional, appropriate, and ethically relevant

to this project. In Chapter 4, the relevance of the theoretical frameworks employed is bolstered

by the rich history of the MARTA archaeological collection, the MARTA lines it comprises, the

scope of heritage it represents, and the process of digitization necessary to capture it for the

finished online interface. This explanation stresses how the project's goals can be effectively

utilized to strengthen the relevant Atlanta communities' motivations toward civic political action

that benefit the various stakeholders. I then explain, in technical detail, how Heurist is organized

and the programming languages and structures that run it, namely HTML/CSS, PHP, AJAX, and

MySQL (see Appendix B for a glossary of technical terms).

In Chapter 5, I explain how a simplified WordPress frontend overlays a user interface on top of Heurist through similar programming languages as well as how WordPress facilitates the integration of social media accounts. Chapter 6 discusses the results of the first phase proof-of-concept website. I then discuss the following two stages of software development necessary to fully implement the civic engagement goals of the project, and how each phase can be enacted. This thesis ends with a concluding chapter that reiterates how the initial result sets up a critical cornerstone for future phases of described development to provide a rich resource for future anthropological and archaeological research on civic engagement, as well as serve as a foundation for increased civic engagement that promotes political interest and action within the relevant communities.

1.3   Affected Communities and Stakeholders

A project that directly affects various communities through civic engagement requires an explanation as to what communities are being potentially affected, how those communities are being affected, and what ethical concerns are necessary to promote this engagement. The ethical implications are particularly important when attempting to make a broad database of information open to public interpretation and use. There are avocational archaeology groups whose goals are to promote and encourage interest in archaeology, historical groups who focus on Atlanta's history, government and private organizations whose policy decisions legally require investigation and mitigation of heritage materials, neighborhood commissions cut across by MARTA's construction, the individuals whose homes have been destroyed to make way for urban development like MARTA, private corporate interests like Coca-Cola who have a long ties to the city, and even those groups who practice site destruction through pot-digging. This is a

broad group of interests to take into account, but it is important to discuss those interests and the ethical concerns when engaging with them, and more importantly to show how civic engagement can serve to unite these different communities into a common dialogue.

The Society for Georgia Archaeology (SGA) and its individual chapters, like the Greater Atlanta Archaeological Association (GAAS), are perhaps the easier communities to interact with. They already have an interest in the materials of the MARTA collection and it has already served as a platform for engagement by inviting the GAAS members to assist in updating collection's curation standards. Members already understand the guidelines of ethics determined by professional archaeologist and are open to learning and understanding more about responsible archaeological action. The same applies to local historical societies like the Atlanta History Center or the Atlanta Studies Network that have a pre-existing interest exploring and preserving Atlanta's cultural heritage.

Additionally government organizations like the Atlanta Regional Commission (ARC) and the Georgia Department of Transportation (GDoT) have vested interests in these materials to aid future planning policies. Sometimes these policies legally require mitigation efforts performed by Cultural Resource Management (CRM) firms like Brockington and Associates, or New South, that have to research and understand particulars of Atlanta's history in order to properly mitigate any potential damages to cultural heritage through construction and development. Any further work done by MARTA on expanding rail lines, or work done in areas adjacent to those lines, will require further CRM involvement, which will largely be aided by the pre-existing database of information the MARTA collection contains.

Neighborhood commissions that were split in two and individuals or families who were relocated due to the construction of the lines also hold stakes in this information to better explain

the cultural damages that can occur from large-scale urban planning. Similar to how the Stadiumville project (Stadiumville 2015) showed the damages to the urban landscape through the construction of the interstate corridors and Turner Field, the MARTA collection can provide a voice to any heritage lost by the rail lines. MARTA itself can utilize these materials to better promote its transportation goals for the city and acquire funding through promotional heritage demonstrations—acting as a vibrant mobile exhibit of Atlanta's past. Corporations and local businesses with roots in Atlanta, like the previously mentioned Coca-Cola Company, can be tapped for funding and promotional interest in the collection that contains many old bottles for beverages and tinctures from their original drugstore origins (see Cook 2014). We also have to account for groups whose interest is in private collecting, like pot diggers, who might use the information contained on the public website to locate historical areas for plundering; this means looking at ways to responsibly disseminate information to the public when that information is sensitive.

The material has additionally assisted in interdepartmental research within the Atlanta academic community, namely through Dr. Robin Wharton's Exposition: History, Theory, Practice Class in the GSU English department, where students are learning how to three-dimensionally scan the collection's objects using Structure From Motion (SFM), a method of obtaining three-dimensional models through a series of systematic photographs. They build these models to understand and interpret the physical and temporal realities of these artifacts in order to produce reflexive narrative constructions about their experiences in handling them. These are the sort of collaborations that foster engagement with the materials, made possible through the actual digitization of the material culture and subsequent re-interpretation of that heritage. These objects produced are then being used collaboratively with the GSU Student Innovation

Fellowship and GSU Library Collaborative University Research and Visualization Environment (CURVE) to develop 3D interactive environments that showcase the collection's digital recordings to the university and interested public. This wide range of interrelated communities, albeit concerned with different degrees of access to the same information, can all benefit from the Phoenix Project when seen through the civic engagement lens of "a resource to empower and be empowered by" (Musli 2003:8) or through praxis (Kozaitis 2000).

1.4   Challenges with Stakeholder Communities in Praxis-informed Civic Engagement

The challenge with such a wide scope of communities is in discerning their motivations within the frameworks of inequality that exist. Coca Cola may simply be interested in levering the material for monetary profit through marketing—potentially exacerbating socioeconomic conditions. Quickly gentrifying neighborhoods might be uncomfortable with the racial implications of the materials that connect African-American communities to newly renovated blocks, or simply utilize the collection as a way to increase property value through historic authenticity. These handful of examples are enough to re-emphasize why implementing civic engagement and enacting positive changes toward breaking down sociopolitical oppression and inequality can be incredibly difficult. The question as to how an archaeological project can combat gentrification seems ridiculously out of scope, but only because a project in some capacity is first needed in order to explore that route of politically motivated action.

Whereas CRM firms may be interested in highly detailed datasets of archaeological information to assist their planning and project proposal efforts, local governments, companies, and universities may only be looking for simplified and marketable packages of information to assist their particular agendas like building tourism or strengthening a brand. Local historical

groups or archaeological advocacy groups may want something less mechanical than raw data, but more interactive and open to interpretation than what local governments may want. Even Pot-diggers and fossickers are communities, solely interested in prospecting for artifacts and cultural heritage, (legally on private land and illegally on public land), are looking for assessments of value and hotspots of archaeological heritage. They are still a community that must be recognized and require our help in sensitively illustrating how their activities are destructive towards other communities.

All of this engagement should be informed by the Society for American Archaeologists (SAA) code of ethics. To explore the nuances of that interaction, I briefly introduce the eight principles of the SAA ethical code:

Stewardship, the acknowledgement that all historical material is irreplaceable and it is the responsibility of the archaeologist to protect it as well as advocate on its behalf for the benefit of all;

Accountability, the goal of establishing a mutually beneficial relationship with all parties involved in professional activity;

Commercialization, the goal of standing against practices that promote commercial value for archaeological heritage that inevitably leads to destruction of the archaeological record and the avoidance of any activities that might lead to non-public curation of heritage;

Public Education and Outreach, to make a concerted effort to engage with the public to foster public support for archaeological stewardship, explain archaeological methods and interpretations of the past to as many communities as possible;

Intellectual Property, archaeologists do not own the historical record and all materials and documents must be made available to others;

Public Reporting and Publication, efforts must be made to report all data in a responsible manner in a public forum, taking into consideration that reporting locations and importance of sites may endanger them and reasonable care must be taken in this reporting to protect them;

Records and Preservation, archaeologists should actively work toward and encourage the long-term preservation and access to archaeological collections, records, and reports;

Training and Resources, archaeologists must require adequate training, experience, and other support before any work on the archaeological record can be performed to minimize damage (SAA Principles of Archaeological Ethics 2015).

Different groups' ethics of how to manage cultural heritage vary considerably with regards to these guidelines, but this is not a reason to abandon attempts at civic engagement in the face of seemingly insurmountable difficulties. It is a reason to implement it. This means being weary of archaeological hubris—the idea that only archaeologists can be stewards of cultural heritage, or that our specialized training overrides the concerns or needs of the communities we may be working with. Archaeologists should be stewards of ensuring cultural material is actively used and maintained to break down structures of hegemony and not to reinforce it. The archaeological record may be irreplaceable, but so are human lives. The communities and heritage that archaeological research affects should always be more important than the research produced.

Communities may not always demand or want the same scholarly data the researcher wishes to create. They may solely be interested in seasonal work or feel culturally removed and disinterested from the cultural resources of interest. Regardless of their lack of interest or concern, it is the responsibility of the archaeologist to engage with those communities and foster

that interest in a culturally appropriate framework that shares the capital gained and seeks to eliminate inequality (e.g., Glover et al. 2012). Our goal should not be to force-feed complicated datasets into a diverse set of impacted communities, but to create a foundation of data designed to scale to the needs of the community(ies) that wishes to use it. Archaeologists must also inform that community on how that data can be used and why it should be used; a public forum of interaction and access that creates and sustains interest, and fosters engagement and dialogue between all involved communities.

The idea of public heritage does not mean we all have equal access to the same physical materials and data—it means signing a social contract to give authority to those we collectively deem qualified to handle specific problems, like archaeology and historical resources that are fragile. The real issue is discerning the balance between access and restriction to the general public. Restriction is only hegemonic if it is defined through initial inequity. This is why initial and continual collaboration is so incredibly important. The definitions of what heritage is restricted or accessible should never be static. Ideally, within a framework of civic engagement, it is the archaeologist's job as a steward to find new ways to maximize access and minimize restriction where possible. The Phoenix Project's initial attempts at digitalization are one way to achieve that.

The MARTA collection offers important historical data that challenges archaeologists, historians, and other disciplines to bring Atlanta's history to life. Dr. Jeffrey Glover started this project to accept these challenges and begin the process of making these data accessible to both researchers and the public (Glover et al. 2014). The artifacts and documentation from the MARTA excavations are part of significant moments during the Civil War associated with the Battle of Atlanta and the city's subsequent rebirth as the thriving metropolitan area it has

become. This represents a unique opportunity for scholarly research as well as public outreach to participate and engage with this research (Glover et al. 2014). This collection has already fostered interdisciplinary research and collaborations between student and faculty within Georgia State University and other institutions (Glover et al. 2015). The future phases of the project rely on the public being a part of this process through working with the same data, asking questions, and participating in the research process to offer democratic perspectives on the interpretation of Atlanta's rich history. The goal is to create a collection that the public feels it truly owns with Georgia State University as a facilitator, rather than the university owning the collection and being the gatekeeper for accessing it. Through this ownership, their sense of *communitas* can be strengthened to enact changes that are mutually defined and beneficial.

2   PRAXIS THROUGH CIVIC ENGAGEMENT

Thinking about the purpose behind archaeological research is not only important, it is absolutely necessary. Although this is seemingly obvious for any current archaeologist—the subtleties of what this means may be less clear. This goes beyond simply being reflexive, because the communities we work with need more than our own ideas and self-proclaimed biases. The communities deserve our action and our collaboration to help navigate our biases when we enact positive changes. Taking action is inherently political, and the archaeologists must be aware of this (e.g., Gonzalez et al. 2006; McGuire 2008; Scham 2001; Wilkie et al. 2000). There is no research design that will not be free of political motivation, unconscious or not, so it is futile to pretend to be apolitical. Randall H. McGuire's (2008) work, <u>Archaeology as Political Action,</u> emphasizes the choice will never be whether or not our research should be

political, but whether or not our research uses the political motivations that exist to enact positive, deliberate change.

We are not simply stewards of material culture, idly studying specimens in a laboratory; we are stewards of bridging the gap between past and present cultural consciousness to try and enact positive change for the future. I take this into consideration when building the Phoenix Project's prototype website and actively attempt to take a political stance. The goals are not to simply link obvious stakeholders, like archaeology enthusiast groups, to this collection of heritage, but to inform, engage, and challenge neighborhoods and other civic groups to adapt this heritage as their own to energize the larger community and help build Atlanta's historical consciousness when designing urban planning strategies and civic policy. This can be achieved through praxis informed civic engagement.

2.1 Praxis: Daring to Act

Praxis is defined well by Kathryn Kozaitis (2000:55) as, "[a] synthesis of intellectualism, pragmatism, and compassion in organized efforts to understand and serve humanity." It is a contemporary approach of utilizing the unique faculties of anthropological theory and method to solve social ills that exist in the world around us. As Conrad Kottak (1997:254) argues, it is anthropologists who should make policy affecting people because we are uniquely informed on human problems and social change through understanding and respecting cultural requirements and values. It is no longer acceptable to practice anthropology as simply practice or theory and to define the two as separate of one-another, because that very separation, "[c]ontradicts the substantive domains of convergence between theory and practice" (Kozaitis 2000:46).

Praxis combines elements of being, knowing, and doing in order to positively negotiate social change, and more importantly the will to act or dare to realize them. Being is the respectful acknowledgement of the ties to tradition, no matter how alien, in the communities the researcher intends to aid. Without being, anthropologists run the risk of harming or disrupting the people they intend to aid (e.g., McGuire 2008; Trotter and Schensul 1998:692). Anthropologists' awareness of being in different social contexts is additionally integral to understanding the implications of their own theoretical frameworks as they are used to inform policies in those same contexts (Negengast and Velez-Ibanez 2004:15). Knowing, or daring to know, is a constantly needed self-critique of bias and preconceived notions that are anything but Truth as Foucault was eager to explain to social theorists (McGee and Warms 2008:490; Trotter and Schensul 1998). Finally, anthropologists must dare to act – doing – to aid in the struggle against sociopolitical oppression. If we only discern and describe human suffering and oppression, what is the point of its acknowledgement if we do nothing about it? Anthropologist are incredibly well-equipped to accurately describe human rights violations and abuses within a sociopolitical context, and to act to influence policy to potentially prevent these infringements on humanity in the future (Nagengast and Velez-Ibanez 2004:1; Trotter and Schensul 1998).

2.2   Praxis as Political Archaeology

An ever-present issue within archaeology is the largely Western dominated dialogue over the world's history. Although the discipline is constantly improving through ongoing dialogues, like the World Archaeological Congress (WAC) (World Archaeological Congress 2015), it is still behind in some respects in implementing a full integration or co-theorist approach to research design. Praxis is inherently political in that it aims to do something—to enact change. Archaeology is inevitably tied to this same concept in that it will always be tied to politics; the

politics of academia, the politics of funding, and the politics of the communities tied to the research (McGuire 2008; Scham 2001). The archaeologist must be, know, and act within this framework. When an archaeologist acts without being or knowing, as discussed above, positive, enlightened change cannot occur, or put another way, there can be no doing (McGuire 2008).

An article that reflects this lack of being and knowing is a case for Native American inclusion into North Americans' search for the past discussed by Dorothy Lippert (1996). A Native American bioarchaeologist by profession, she argued that the Western devotion to the understanding of human history has both historically and contemporarily removed Native Americans from that dialogue. The result is a Western understanding of human history rather than a multi-cultural understanding of the past. Lippert mentioned disenfranchisement and lack of communication as major driving factors behind the passage of the Native American Graves Protection and Repatriation Act (NAGPRA) in 1990. She states that "[a] key to presenting archaeology as a profession open to Native American input is communication. This is a very simple thing to say, but it is more complex in its execution" (Lippert 1996:57).

Lippert answered why communication is important by summarizing the historical context of North American archaeology, and how it removed Native Americans from the historical discourse. Early anthropologists, largely in the early 20th century, although initially welcomed by tribes to study and "preserve" their culture, were not always fair or sympathetic (Lippert 1996:58). Native Americans were portrayed as specimens rather than human beings—subjects to be watched for their unspoken differences Lippert 1996:58). Their wants and needs were often ignored when it came time to publish material, and what may have been sacred knowledge to these tribes would be published in a journal for all to read in the name of science (Lippert 1996:58).

Past archaeologists, following suit, would often portray contemporary Native American tribes as remnants of a once glorious past; treating their perspectives on their own history as myth, folklore, and generally irrelevant to Western scientific perspectives. Some argued that the collection and study of skeletal material was imperative and overrode the Native American religious wishes, which only furthered the notion of these peoples as sub-human specimens (Lippert 1996:58). Lippert subtly made the point that NAGPRA was inevitable, because slowly, overtime, Western science removed the only culture relevant to the studied past of North America from the discourse (Lippert 1996:58). This does not imply that archaeologists should end their study of Native American groups. It means we need to have more inclusive dialogues about that heritage.

Similarly, the Phoenix Project seeks to engage the Atlanta communities with the city's archaeological heritage, because their perspective is incredibly relevant. In terms of our changing urban landscape in the last 50 years, where many buildings have been demolished to make way for development (Glover et al. 2015) native Atlanta citizens who lived through that era and their subsequent generations are critical collaborators. They can help provide context for archaeological data that exists. A degree in archaeology does not provide an archaeologist with a mandate to view themselves as paternalistic specialists who always know what's best for research and data within communities. It gives us the training to understand the importance of why certain cultural heritage is absolutely irreplaceable and to politically act on that heritage by reconnecting it with the present.

The Phoenix Project, in this light, acts to reconnect the citizens of the Atlanta community with the knowledge of past disenfranchisement and hegemony that would otherwise be lost under the vast tracts of concrete parking lots and urban reconstruction that covers it. Atlanta's

archaeological and historical sites are not simply specimens for research removed from the present; they were people's homes, people's neighborhoods, people's communities, and are important elements in people's memories and how they self-identify. Action requires a clear plan to be successful however and this thesis proposes that civic engagement is the framework necessary to achieve this praxis. Civic engagement provides a valuable blueprint for the Phoenix Project to not act as just a steward of the material past, but to politically act as steward of reconnecting present Atlanta's communities and cultures with their own heritage to combat sociopolitical oppression (Nagengast and Velez-Ibanez 2004:1).

2.3   Praxis as Civic Engagement

For the Phoenix Project, I define civic engagement as the *goal* of actively working to promote the quality of life in all relevant communities through empowering all current and future communities involved to engage with the cultural heritage contained in the MARTA collection (Little 2007; McGuire 2008). I believe Barbara Little's case for civic engagement presents the most viable approach to tying the entirety of praxis together within an approachable methodology of community interaction and exchange. She strongly suggests there is a role for archaeology, as a discipline, to play in civic engagement and renewal—especially because our projects are increasingly involving the communities and stakeholders who are the subject of study (Little 2007:1). Little (2007) reiterates Thomas Ehrlich's definition of civic engagement as, "[w]orking to make a difference in the civic life of our communities and developing the combination of knowledge, skills, values and motivation to make that difference. It means promoting the quality of life in a community, through both political and non-political processes"(Ehrlich 2000:vi). Incorporating Victor Turner's ideas on *communitas* into a broader context—our shared sense of common humanity and shared experience as a species—Little

challenges archaeologists to think how archaeology can serve the function of promoting

communitas in context with civic engagement (Little 2007:4). She argues that because

archaeology and its research is a ritual itself, more importantly a "little strange" as well, it serves

as a unique mechanism to foster civic engagement and *communitas* (Little 2007:4). Additionally,

the power of knowing one's heritage through archaeological research serves as a source for

defining identity, a critical component of *communitas*.

Unlike public involvement, which Little defines as "[a] legal requirement of the planning

process that is required by environmental law and typically ends when the planning process is

complete," civic engagement is about a long-term plan of sustainable collaboration with

communities (Little 2007:5). In a best-practice guideline, the National Park Service (NPS)

defines this as "[t]he long-term effort to build and sustain relationships with communities of

stakeholders. It includes interpretive and educational programming as well as the planning

process" (Little 2007:4). This method is drastically different than making a resource available—

it is doing something with that resource.

This thesis follows Little's lead in adhering to the framework of civic engagement

constructed by Caryn McTighe Musil (2003). It offers a sensible guide towards framing the

Phoenix Project in different phases of action that can be implemented in stages. Musil (2003) is

arguing for academics, or formal educators, to assist their students in thinking more carefully

about the ways they structure their current and future projects. Although directed towards the

education of students as an implementation of democracy—Musil's framework can be used to

critique and inform archaeological research and projects. The premise is that there are six phases

that lead to 'civic prosperity' or true self-sustainable democratic struggle and cultural

interactivity (Table 1). The purpose is that students suffer from a lack of cultural sympathy and

empathy, which affects their historical perspectives and cultural vantages. There are stages of

disconnect, six in all, with the end goal being reciprocal in exchange of authority. One achieves

the final stage by taking civic engagement to a mode of self-regulating sustainability. Little

(2007:8) purports that civic engagement is the first real step. Once we get to a point where

cultural difference is balanced, and more importantly ENGAGED with, and the exchange of

knowledge and its interpretation is dynamic and equally accessible, we reach the point of

sustainable cultural practice.

Table 1   Caryn Musil's (2003) Paradigm of Civic Stages

Phase	Community Is:	Civic Scope	Levels of Knowledge	Benefits
Exclusionary	only your own	civic disengagement	one vantage point(yours); monocultural	a few and only for awhile
Oblivious	a resource to mine	civic detachment	observational skills; largely monocultural	one party
Naïve	a resource to engage	civic amnesia	no history; no vantage point; acultural	random people
Charitable	a resource that needs assistance	civic altruism	awareness of deprivations; affective kindliness and respect; multicultural but yours is still the norm center	the giver's feelings and the sufferer's immediate needs
Reciprocal	a resource to empower and be empowered by	civic engagement	legacies of inequality; values partnering; intercultural competency; arts of democracy; multiple vantage points; multicultural	society as a whole in the present
Generative	an interdependent resource filled with possibilities	civic prosperity	struggles for democracy; interconnectedness; analysis of interlocking systems; intercultural competencies; arts of democracy; multiple interactive vantage points; multicultural	everyone now and in the future

Following Musil's (2003) rubric through anthropology's history and past practices, the

first iterations of research fell under civic disengagement. Defining past cultures within the

context of white, European male history as a veritable island of interpretation despite the

impossibility of making clean demarcations in culture or history. This singular vantage point of

interpretation takes a completely monocultural perspective of history—that of white, European males for example. The next iterations of anthropological research were oblivious to oppression in that the researcher was interested in studying the other cultures, but from their own vantage point, and the research design took on a largely monocultural perspective—like participant observation studies in early anthropological work where the communities offered no input and the only interpretation was the exclusionary perspective created by the ethnographer. These cultures were resources for the researcher to mine for scholarly capital with little or nothing given back to the community, and did little to affect oppression.

The next stage of civic amnesia, while looking at the communities involved as a resource to engage with, suffered from a lack of relevant cultural perspective. This is why Musil (2003) refers to it as a stage of naïvety; the researcher did not take into account historical or cultural perspective and simply engages with the affected community from an acultural standpoint, or through an assumed objective lens. This disconnection with cultural and historical contexts can negatively affect engagement with the community in question. By not listening to and studying the community, the researchers inevitably made planning errors that affected their projects' positive impact. An example would be holding a day of archaeological education and site-based engagement on Sunday afternoon for a community that is largely Christian and church-going that actively adhere to the Sabbath. With proper cultural context, the archaeologist would hold the event at a more culturally appropriate time.

A more charitable phase of civic interaction, civic altruism, takes a larger step toward understanding the deprivations of the communities worked with and attempts to run the project from a respectful multicultural perspective. Although this phase means to affect positive change, it can serve to buy into current paradigms of disenfranchisement rather than effectively changing

them through empowerment. The community is seen as a resource that needs assistance rather than empowerment. An archaeological project that aims to bring economic capital to a disenfranchised community through seasonal work or building projects would fall under this category. The aim is to fix symptoms of the community's disenfranchisement rather than the core causes. This approach still suffers from treating the researcher's culture as the normative center in that the decisions of what to provide the community are determined from the researcher's perspective. Many current research projects could be framed as part of this phase, typically due to global causes of inequity arguably outside the scope of a small research project, which is why moving out of this phase is such a challenging process.

Civic engagement is when the researcher finally views the community worked with as a resource to empower and, in turn, be empowered by. This is achieved when the researcher properly accounts for legacies of inequality, historical narratives of resistance, and the importance of understanding and integrating multiple vantage points into the research design. It is an active acknowledgement that the researcher has just as much to gain from an equal partnership as the community being served, rather than solely looking for scholarly capital framed from the researcher's own perspective. This phase also begins looking at research as a dynamic process rather than one that results in a static output. When a project ends, the relationship between the community and researcher does not, and research design within the framework of civic engagement should outline a plan of continual negotiation and experimentation. This is how it differs from earlier phases, which, at most, will achieve public involvement, where the community is involved, but once the project ends so does the relationship and any ongoing benefits.

Musil takes civic engagement a step further by defining the last phase as civic prosperity. Although she separates these last phases, which can be helpful, the only difference is that civic prosperity has a goal of moving beyond equal relations between stakeholders and perpetuating those feelings of sustainability for all communities. I find the latter two phases' definitions static and rather see civic engagement and civic prosperity as a united on-going goal. To assume any communities interacting with one-another can ever be truly equal is an unrealistic goal, and it is more practical to view civic engagement itself as the persistent goal of creating civic prosperity through reflexive accountability and mutual decision-making. Although many projects within archaeology may still suffer from civic altruism due to global complexity, this is why civic engagement, seen as a process rather than an end, is so important.

Civic engagement, as described, represents a true paradigm shift in research-design goals. The role of the anthropologically informed archaeologist as a figure of power in the conversation of heritage must change into a softer role of reflexive leadership that aims to guide all communities, including the archaeologist, toward a state of mutual empowerment by defining the interested resources as more than a database of archaeological heritage for publication. These resources must be defined as tools to combat sociopolitical oppression.

The point of this discussion is not to criticize current archaeological work that does not successfully implement *de facto* civic engagement. It is to emphasize the need to incorporate the principles of civic engagement as a goal with the understanding that any project will require continuous re-evaluation and implementation to combat inequality. The Phoenix Project's first phase of implementation covered by this thesis, similarly does not achieve *de facto* civic engagement. It achieves a form of civic altruism that revolves around public involvement by making the cultural heritage within the MARTA collection accessible. This is a critical initial

step towards the broader goal of achieving civic engagement in the future. It is hardly

conceivable that any project can achieve civic engagement without a continuous dialogue

between stakeholders. It takes time and effort to gain the rapport and valuable insights necessary

to understand the complexities of multi-layered sociopolitical oppression that exists in any

community or subset thereof. It is equally difficult to navigate the legacy of that oppression once

understood, but the MARTA collection's cultural resources are well equipped to handle the

challenge in future iterations of the Phoenix Project's online platform.

As Dorothy Lippert (1996) revealed, reaching out to our communities is difficult, but

incredibly necessary. How can the Phoenix Project foster this public access to information and

engagement with the communities to which it belongs? An initial goal should be understanding

the nature of public access to cultural heritage in the context of CRM archaeology. Although it is

easy to espouse recommendations of equal access to information, when related to historical or

cultural preservation this becomes ethically difficult. Laws exist to protect public interest in the

fields of medicine or engineering, (e.g., requiring licenses to perform certain duties to protect the

public interest from complications resulting from untrained practitioners), as they do to protect

our public cultural heritage from the untrained hands that may damage it.

The National Park Service (NPS) is a highly relevant example of this limited access. Its

federal policies dictate who can and cannot review this 'public' material connected to federal

parks. Policy 5.1.2 states clearly that "NPS facilities, collections, and assistance will be made

available to qualified scholars conducting NPS-authorized research as long as park operations are

not substantially impeded or park resources are not adversely impacted (NPS Managing Policies

2014). Policy 5.3.5.5.4 further states "Interested persons will be permitted to inspect and study

NPS museum collections and records in accordance with standards for the preservation and use

of collections, and subject to laws and policies regarding the confidentiality of resource data. At-cost copies of documents may be provided" (NPS Managing Policies 2014). Although these collections are, in essence, public, they are restricted to "qualified scholars" who are expected to understand and know "standards for the preservation and use of collections." This may come across as limiting or restrictive to the public, but it is precisely the specialized knowledge of historical specialists that makes the restrictive access ethical. These collections fall under the SAA ethical guidelines' first principle of stewardship—that archaeologists must view them as irreplaceable and make it their responsibility to work towards the long-term conservation and protection of the archaeological record through their specialized training and knowledge on behalf of the entire public (SAA Guidelines 2015). This is why digital technologies can be harnessed to achieve wider public access to these materials without endangering them. Additionally, creating a digital collection further promotes the long-term conservation of cultural heritage through engaging with the public who votes on representatives that decide funding and policy decisions on cultural heritage.

2.3.1   Case Studies of Civic Engagement

I would like to highlight three case studies of civic engagement in an online context and talk about the successes they achieve and where they fall short. There is not a true 'failure' in any project that attempts civic engagement, as each shows strengths and weaknesses and should be seen as a process rather than a finished product. This is the very nature of civic engagement; it is supposed to be an ongoing dialogue where the public and academics or professionals work with one-another to explore this relatively new effort in archaeology (new when considering the long history of the profession).

Although Lippert's (1996) article is a productive "call-to-arms" for civic engagement through its collaborative dialogue with various stakeholders, it lacks the technological edge to address a wider audience. This is due, in part, to being dated to 1996 when the internet was still infantile as well as the limited access to various digital technologies. The ability to communicate with stakeholders has exponentially grown with the rise of social media and the ubiquity of the internet. To not utilize these resources will limit a project's civic engagement in the contemporary era, and this is precisely why the Phoenix Project aims to use these online digital resources, and why I looked into these three online case studies: MicroPasts, Remixing Çatalhöyük, and the Colonial Williamsburg Digital History Center.

2.3.2   MicroPasts.org

The MicroPasts project is a website that drives an online community to engage with archaeological materials through crowd-sourcing. Rather than attempt to create a new community, it engages communities that already exist, like archaeological or historical societies, and connects them through the online project. Additionally they collect data on their users' interactions and engagement with the website that is used to create better implementations of the project. It was launched on April 16th, 2014 after six months of development utilizing a few different online frameworks like Discourse (a discussion software) and others for the crowd-sourcing components. MicroPasts allows the community members to participate in three different activities: 1) co-producing archaeological and historical data, 2) designing new research agendas, and 3) crowd-funding newly created research agendas on the website (Bonacchi et al. 2014).

Members are invited to co-produce data through two different applications that focus on the British Prehistory and British Museum collections that entail Bronze Age artifacts. The first activity is transcribing 30,000 object cards into a digital database. This involves typing the information from the card into a simplified form and geo-referencing the objects' locations through a small map interface. The project hopes to have one of the largest digital archives on metal objects in the world to expand existing knowledge of the era. The second activity offered is photo-masking metal artifact photos (**Error! Reference source not found.**). Volunteers login and trace the outline of objects in sets of over 50 photos. This is done to implement Structure-from-Motion software, or SFM, in order to produce a textured, 3-dimensional model of the object. SFM works by identifying similar points of structure in different overlapping digital photographs and calculating physical dimensions. The masking allows the calculations to ignore background noise and only model the parts of the photo that directly relate to the object (Bonacchi et al. 2014).

These interactions with the community are also evaluated through web-based analytical logging tools. MicroPasts uses both non-intrusive online form surveys and background data logging to better serve the community by evaluating ways in which each of the project's design elements are increasing or decreasing engagement. Initial findings show that most of the volunteer crowd-sourcing work is done by a small sub-set of the membership, while most members only perform a handful of tasks before retiring. They hope to continue looking at ways to widen engagement with these statistical data in future studies (Bonacchi et al. 2014).

MicroPasts is an example of civic engagement that seeks to quantify that engagement through initial stages of member activity tracking. It has 938 members as of April 2014 participating in transcription and photo-masking to varying degrees (MicroPasts 2015). Nearly

1000 people engaging in a website is a large number for an initial attempt and will hopefully

provide robust data to evaluate at a later date to discern better ways of engaging the public with

professional and academic research. The importance of this case lies in directly inviting the

public to engage in research rather than involving them after it has been accomplished. It is one

thing to put a collection of data online and make it available to the public, and quite another

thing to allow the public to actively interpret it and participate in the knowledge production

process. Furthermore, the public can actively choose to support mutually defined research

projects through a crowd-funding platform provided.

The project also uses elements of gamification discussed below to help promote

engagement through leaderboards and membership badges. There is little to complain about

when viewing the project, but engagement does seem to be limited to a small subset of the

membership. What motivational affordances are necessary to intrigue and engage more

members? Offering the ability to engage does not seem to be strong enough alone to perpetuate a

sustainable online community. MicroPasts represents a limited, cohesive example of how civic

engagement can operate through an online platform, but may lack sustainable member interest in

the project. It is rarely fun to transcribe catalog cards of information and finding how to make

mundane tasks fun would be incredibly useful.

2.3.3   *Remixing Çatalhöyük*

Remixing Çatalhöyük, is an experiment in civic engagement that works to achieve open

construction and dissemination of knowledge about the past (Remixing Çatalhöyük 2015). It

focuses on the 9000 year old UNESCO World Heritage site of Çatalhöyük in Turkey, and its

goal is to support a multi-vocal interpretation of history through a global, online community that

is invited to contribute to the dialogue of Çatalhöyük's past with the local community and

archaeologists that work there. The project believes this process can foster public engagement

through open access to data interpretation and digital remediation (Remixing Çatalhöyük 2015).

This project offers incredible access to the excavation process through 3d visualizations

of excavations, interactive 2d excavations as well through open interpretation of the project's

Figure 1 Remixing Çatalhöyük website
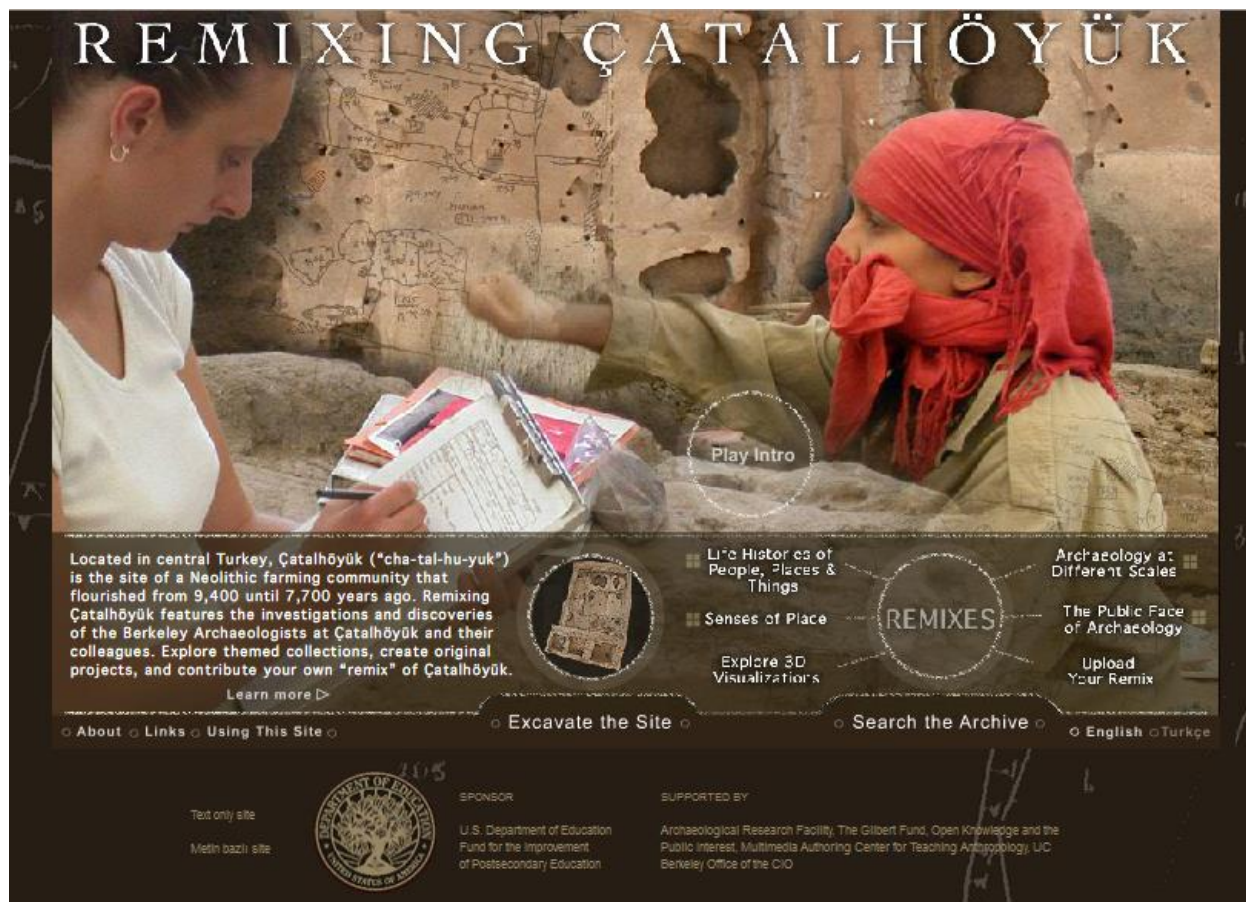
data and artifacts uploaded to their database (Remixing Çatalhöyük 2015). The site is a great

start but suffers from some very problematic issues that inhibit its goals. The biggest hurdle is

the interface. In my opinion the website has confusing, non-intuitive design mechanics (Figure

1). Although it looks visually appealing, the information presented is not clearly organized, and

although they claim to be W3C compliant[1], (the site should work across all browsers), actual

functionality is limited. It takes a great deal of time to figure out what is going on, what one can

do with the site, and how to even access it. It also uses Shockwave Flash extensively, a

proprietary Adobe web animation language, that tends to break at times, especially the links that

do nothing when clicked, ruining an initial user experience. If a user does manage to get to the

section that allows for data re-interpretation, they are met with further hurdles of downloading

and learning the project's own database software to view and reinterpret the data before

uploading it back to the website. Their 3d reconstructed environments, while visually appealing,

are in some cases limited to downloading another program, Second Life or its own proprietary

viewers, to interact with them.

The website interface also suffers in that the text and information, implemented through

Shockwave Flash, cannot easily be found and queried by web crawler bots from search engines

which need HTML and its associated metadata in order to work. Any text written through

Shockwave Flash is treated as an image—preventing browser-based accessibility tools from

manipulating it. Adobe, as of 2008, made attempts to solve this problem by offering Google and

Yahoo webcrawlers a server-side framework to crawl Flash data (Siglin 2008), but the process is

not guaranteed according to Google and still suffers from limitations (Google 2015).

Furthermore, the use of Shockwave Flash breaks all browser back and forward button

functionality—a core intuitive feature to web browser users. HTML5, a growing standard, would

be a better sustainable framework to implement their goals. Although a great project in theory, in

my opinion it suffers from its initial user experience through the web interface, the learning

curve associated with uploading re-interpreted data, and its lack of audience awareness by not

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[1] W3C Compliance: To ensure interoperability a standards-compliant web site does not use proprietary software, methods or features of a browser.

making the data accessible in different ways that are intuitive to contemporary outlets of interaction and discussion.

2.3.4   Digital History Center for Colonial Williamsburg

The last case study to discuss is the Digital History Center website for Colonial Williamsburg. It aims to engage the public in an ongoing conversation about the American Revolution, citizenship, and democracy, alongside the archaeologists and historians who work at Colonial Williamsburg (Colonial Williamsburg 2015). Although not directly an online repository of artifacts and raw data, it offers other features that are very appealing for civic engagement and public education. There are currently six online resources to interact with on the website that are clearly labeled and link to their respective sites.

The American Revolution Web Project is a rich online museum featuring artifacts, documents, narratives, and scholarly discussion through media.

Virtual Williamsburg is a true-to-detail 3d rendering of Williamsburg that has been reduced in 3d complexity to run quickly in the Unity3D integrated browser plugin. It provides seamless access to a virtual environment with no complicated steps involved.

The Armoury Reconstruction Project followed a multi-year reconstruction of a blacksmith shop and public armoury that involved the public in both the reconstruction efforts and through live webcam feeds for the public to watch who could not physically attend the work. The blog ran parallel to these interactions, allowing discussion by those watching the webcams to take place with the archaeologists and builders who were on the live feed.

The CW Digital Library is closer to an online database of historical documents tied to Colonial Williamsburg and includes, historical manuscripts, research reports from various scholars, historical newspapers, and probate inventories.

The eWilliamsburg project is an interactive map that displays geospatial historical data beyond a simple street map. It allows the user to view history from a bird's eye view and look at specific information about different buildings and associated documentation of owners, and related research.

For me, the most intriguing aspect to the Digital History Center website is **RevQuest: The Old Enemy project** (Figure 2). On the surface it is a simple mystery game using HTML5
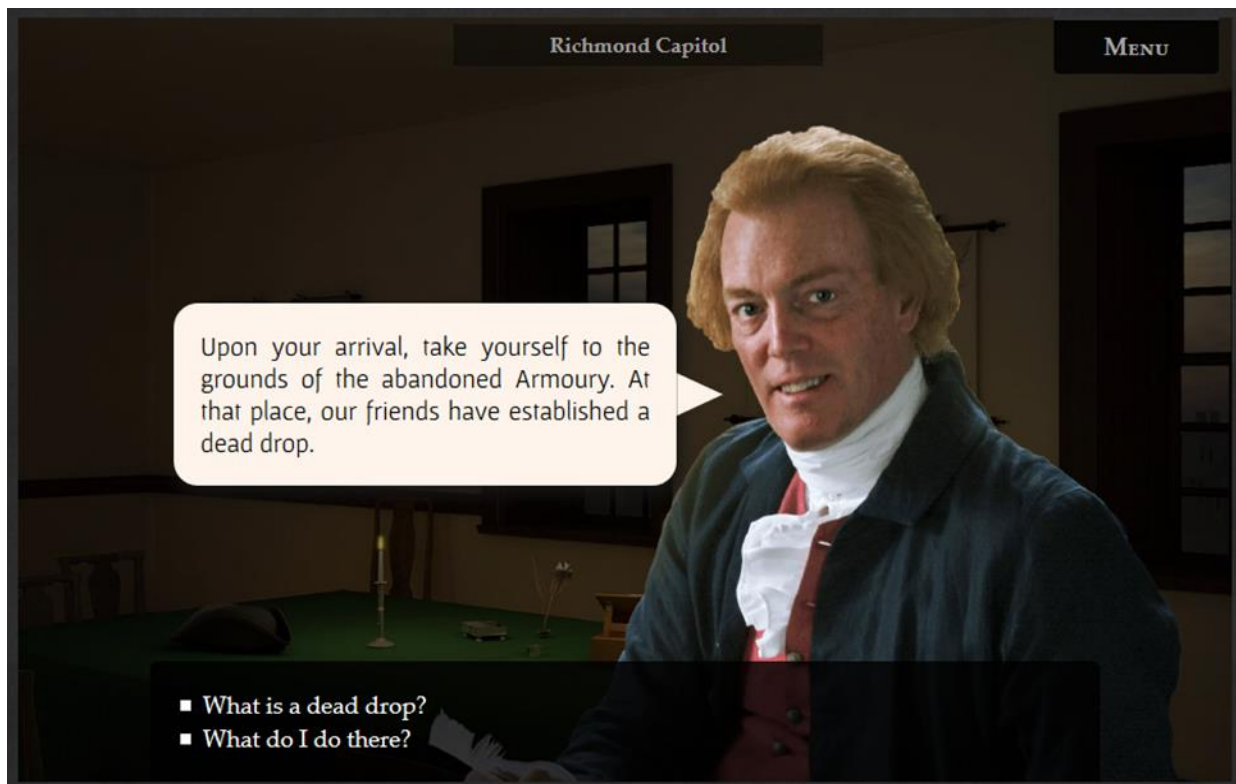

Figure 2 Screen Capture from RevQuest

rather than Shockwave Flash to take the player through an interactive narrative where asking questions by spying on the townsfolk has two very distinct engaging aspects: 1) the player learns

the history, and 2) the player receives an award if the quest is continued at the physical location

of Colonial Williamsburg. Combining the game with real-world consequences offers incentive to

engage with the history directly after learning from a convenient distance.

Overall, the Digital History Center website has a strong web-presence that is organized

and filled with engaging content. The reconstruction blog offered direct interaction and

engagement with the excavations and archaeological reconstructions of various buildings

through live webcam feeds. Web discussion is a very useful endeavor in civic engagement and

further democratizes not only information but the experiences themselves. The negative to the

web site is the lack of direct engagement in the process of interpreting history. There is no option

to engage with the material outside of the interpretation provided for the public. The bulk of the

engagement is tied to the physical site of Colonial Williamsburg and pre-determined narratives.

2.3.5   *Achievements and Failures of These Civic Engagement Case Studies*

Each project addresses civic engagement in different but productive ways. The common

thread between them is communication with the public. This is seemingly obvious but not

always addressed consistently across many projects. Dorothy Lippert (1996), McGuire (2008),

and Colwell-Chanthaphonh et al. (2010) argue for direct collaboration with the communities

with whom we work and that our research questions should be informed through that

collaboration. Remixing Çatalhöyük addresses the need for this collaboration in the

interpretation process that can be accomplished with Çatalhöyük's digitized database. Access to

these data is normally limited to scholars and professionals once the artifacts find a home in a

box. The concept of allowing the public to retrospectively offer their own interpretations of the

same data is a very important element in keeping with contemporary efforts towards civic

engagement. The Phoenix Project draws heavily on this influence and attempts to take it a step further by significantly reducing the learning curve of the interpretation process through a streamlined user-interface and the ability for the public to share and publish their findings on sites outside of our own through social media, giving them control over their own decision making in their interpretations.

The Colonial Williamsburg Digital History Center efforts are important in offering resources that communicate with the public as research is happening, as seen in the reconstruction project. The project also uses game-like interaction (gamification) for many of their applications, which I argue later helps promote engagement. It is also a project much like MicroPasts that is not a poof-of-concept. It is a working, live example with rich content that has finished products that seek to engage the public with the physical resources at Colonial Williamsburg.

MicroPasts also represents a stable platform rather than an idea or concept. I think it contains many of the characteristics from which the Phoenix Project can draw inspiration. The site allows multi-vocal interpretations of the past, allows public funding to determine which projects are important to interested public participants, and directly engages them through education and stewardship and allows them to assist in the process of recording the archaeological record, which makes a piece of the past the volunteers' own in a sense. Through two simple gamification techniques, MicroPasts also has a good starting attempt at gamifying this interaction through leaderboards and badge rewards. The Phoenix Project attempts to take this a step further by breaking down the definitions of gameplay and gamification in order to form a testable framework for game design elements that encourage rather than discourage engagement.

Although there are arguments for stronger communication (e.g., Colwell-Chanthaphonh et al. 2010; Lippert 1996; McGuire 2008), that engagement is still limited to those who have the resources to attend those consultations. By making these consultations available online in a widely accessible format, the public has greater access to ongoing discussions over our shared histories. This engagement can take place in real time as people access data and interact with others through the online Heurist website. Furthermore, it could offer short mini games attached to the database to spark interest and engagement by offering digital rewards, like badges or leaderboard points. These games could be anything from daily randomly generated competitions to find objects in the database based on contextual clues and weekly team-based trivia competitions, to more involved, and less frequent, quests constructed by the database managers.

These examples of websites attempting civic engagement, albeit not perfect, break tremendous ground in their attempts to offer different perspectives on civic engagement. In the same vein, the Phoenix Project will also attempt to aid in this effort by pulling all the perspectives together under one cohesive format that can potentially serve as a new template to test out hypotheses in civic engagement that other researchers, educators, and the public can critique, and to further the discipline as a whole. With this framework in mind, a discussion of gamification, games, and play can illustrate one possible implementation of civic engagement that dovetails with the rapidly expanding information age.

3   EXPLORING GAMIFICATION

Gamification can potentially provide a very effective method for archaeologists to foster public interest in heritage and that heritage's ability to combat sociopolitical oppression. I define gamification as the use of selected game design elements in any context with the intent to further

behavioral outcomes. The Phoenix Project's first phase of implementation covered in this thesis does not yet take advantage of this capability, nor prove its effectiveness, but it builds an initial controlled structure in which ideas of Gamification can be tested and disseminated to other researchers and the public. This is particularly important because Gamification grew from the private sector of marketing and advertising. Most research done on this topic is proprietary and subject to licensing for access to privately owned research data. The initial goal of the Phoenix Project is to distill the current circulating notions on the topic into a simple concept to promote a useful definition of Gamification for public dissemination. Later phases of the Phoenix Project will then actively begin applying Gamification techniques in a controlled environment for other researchers to learn from and critique with the goal of creating a publicly accessible body of data to aid in the struggle against disenfranchising agendas utilizing the same concepts. Before discussing my potential applications of Gamification, it is necessary to establish what constitutes a game, how to define these game design elements, and then compare and contrast existing definitions of Gamification with the goal being the development of a working definition for the purposes of the Phoenix Project.

3.1   Defining a Game, Its Intersections with Play, and Game Design Elements

The idea of a game seems intuitive and self-explanatory, but unpacking the definition reveals specific motivational responses that inform how Gamification operates. Games are a formalized kind of play. Eric Zimmerman (2004) helps distinguish between different categories of play to arrive at a useful definition. Although game play is a particular kind of ludic activity (ludic activities being informal expressions of playful states of mind like playing chase or kicking a soccer ball around), game play differs from other ludic activities through its rigid structure. When using the term play, it should be defined as the free movement of choice or

action in the context of structure (Zimmerman 2004:155-163). Although all forms of play operate within a structure of choice and action, game play operates within a predefined set of rules.

3.1.1   Refining Three definitions of Game Design Elements

Having defined the specific idea of play in the context of a game, it is necessary to unpack how a game is defined. Simply labeling a game as a formalized system of play does not provide the context needed to understand Gamification. The formality of play has to be broken down into its separate, albeit overlapping, categories. There are four definitions for game design elements that I discuss. First, Rasmusen (2007) broadly defines game design elements, which are then further focused by Zimmerman's (2004) ideas. Deterding et al. (2011) provide the first testable set of focused game design elements that I further simplify. The goal is not to define game design elements broadly, but rather see them as highly specific implementations of broader ideas so that they can be directly tested.

Rasmusen (2007) defines game design elements from the perspective of a mathematical game theorist who views games as corresponding to the most basic levels of decision-making and logic. He sets up four necessary elements in a game: players, information, payoffs, and actions. Players are those involved in the game; information is the set of rules and meaning of the game; payoffs are the rewards for navigating the information successfully; and actions are the players' decisions of strategy based on the information to attain the payoffs (Rasmusen 2007:11-12). Although this structure is straightforward, Rasmusen's (2007) elements lack the more nuanced and fluid framework of the overlapping principles Zimmerman (2004) describes in the context of play. These elements serve as a better platform to understand the ludic qualities invoked in Gamification. I further refine and reorganize Zimmerman's own elements as

Voluntary Participation, Interactivity with Rules, Conflict, Quantifiable Outcomes, and Artificiality (Zimmerman 2004:158-163). These can be labeled as game design elements.

Games must be voluntary experiences (Zimmerman 2004:158-163). If they are involuntary, they no longer reflect play, because play is the freedom to express action. For example, although a child might be forced to play a game of dodgeball, if the child never commits to wanting to actually play, it is not technically a ludic or playful activity. If a voluntary decision to actively participate in the game of dodgeball is made, then it is considered playful or ludic. This formality is particularly important when later discussing Gamification, because the goal is to inspire this voluntary participation.

Interactivity itself could be unpacked further, but for the purposes of game play, it is more practical to define it as the explicit voluntary interaction with the designed rules or design elements of the game. Rules are what constrain behavior to a structure from which play can emerge. Games also require some form of conflict (Zimmerman 2004:158-163). It might be the contest between two opponents in chess, two teams in any number of competitive sports, or even a single player betting against probability and skill in solitary games. Conflict provides the motivation to voluntarily interact with the game and is embedded in the framework of rules. It is the invitation to express creative playfulness within a specific structure.

A quantifiable outcome is the end result of the provided conflict; some form of measured reward for the participating player. This is usually expressed through ideas of winning or losing, and although Zimmerman (2004) argues that to win or lose is a necessary component of the quantifiable outcome of a game, I contend that this is not always the case and that success or failure outcomes are often, but not always, used. A player playing a simple game of solitaire, where conflict between winning or losing a particular deal of cards is part of the structure, may

not mean that the quantifiable outcome is the success or failure. The quantifiable outcome may simply be the intrinsic reward of the playful experience itself, regardless of the win or lose. A more recent example would be online incremental games such as Candy Box or Cookie Clicker,
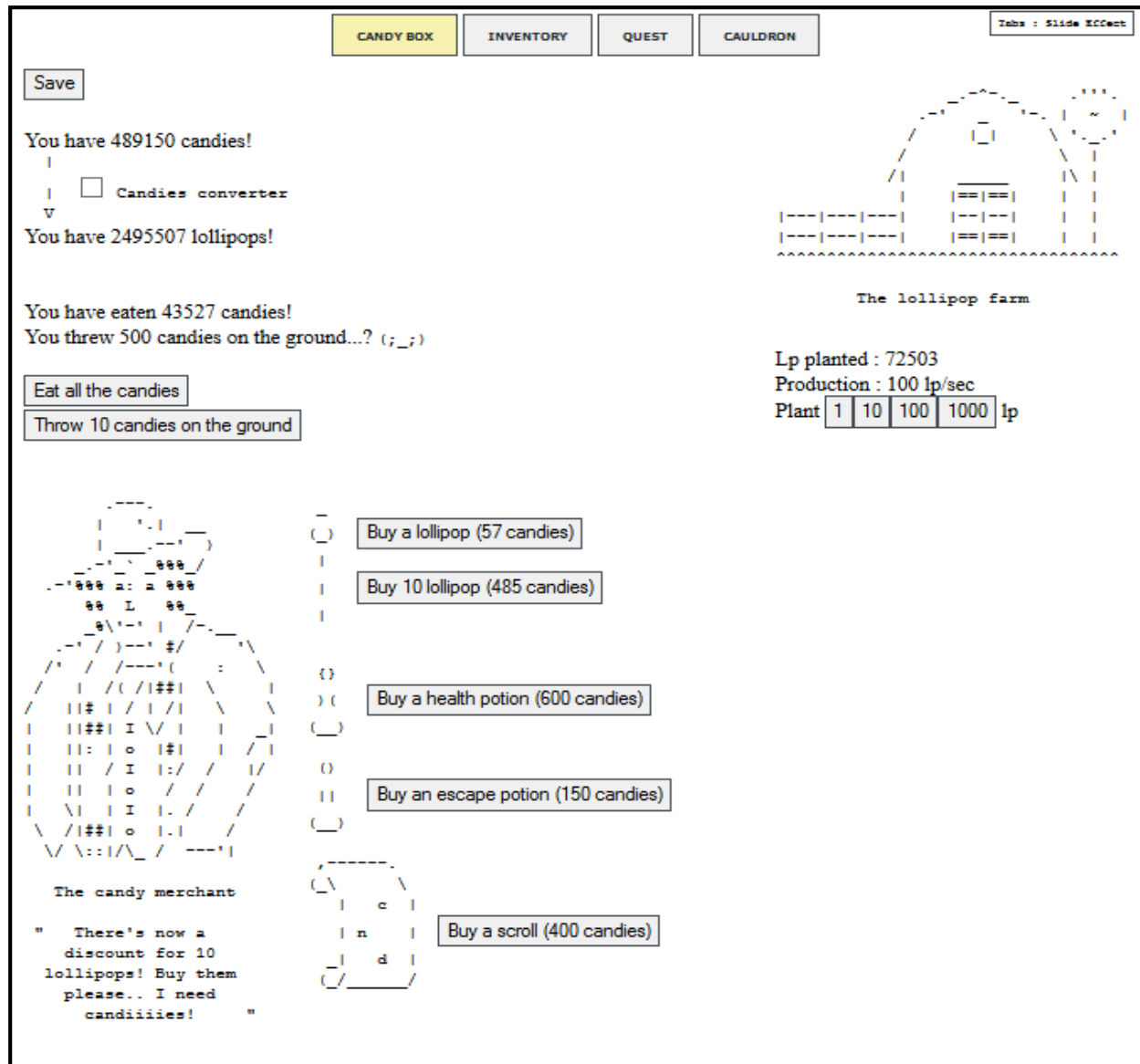
Figure 3 Web-based incremental game: Candy Box *http://candies.aniwey.net/*

where the player accrues arbitrary currency over time, like cookies or candies, which can be spent on a variety of different actions such as buying swords to go on quests, building farms to grow lollipops or throwing it on the ground (Figure 3). The game begins with nothing but a

candy counter that increases by 1 per second. As the number of candies grows, new options become available until the player's screen looks like Figure 3. There is no initially defined conclusion to these games and therefore the player's goal is not necessarily to win or lose, but rather to simply experience a ludic activity in a defined artificial reality. Candy Box, at a certain point when a loose goal is created, may provide a reward for the player as an additional motivator to continue the engagement. In some instances, the social aspects of these games (communicated through social media or wiki encyclopedia pages) can act as a form of numerical score, in that people compete to figure out the secrets, how much currency they have accumulated, and if anyone has discovered the end of the game. However, the quantifiable outcome is often just to see what comes next and explore the artificiality of the game.

Artificiality is the structured boundary that separates the reality of the game from the physical reality of the player (Zimmerman 2004:158-163). Although games take place in the physical reality of the player, like a game of chess with a board, several pieces, and perhaps a time clock, the play within the game takes place in an artificially determined reality of rules. A bishop can only move diagonally in two dimensions, whereas in the player's physical reality the bishop could move anywhere in three-dimensional space. In terms of Candy Box (Figure 3), the entire experience is an artificial text-based simulation, the boundary being the computer's display and input device. Although the player may not be throwing candy on the ground in physical reality, in the structured artificiality of Candy Box, this is possible.

The five elements, as argued by Zimmerman (2004), serve to inform what constitutes a game. They offer motivational incentives to express playfulness in a specified setting. These motivations are what drive Gamification, the process of using structures of games in non-traditional arenas such as education or marketing. The goal is to invoke, in some capacity, the

same voluntary playfulness and interaction in a context that lacks ludic qualities. Looking back

at the dodgeball example mentioned previously, where the student is involuntarily required to

play the game, the goal of Gamification would be utilizing specific elements of game play that

drive the student to voluntarily participate. These elements, however nuanced, are too wide in

breadth for design testing. Zimmerman's (2004) categories of what constitutes game play is

productive, but clearer guidelines are needed to begin testing hypotheses of what are and are not

successful implementations of game play that invoke voluntary playful interaction, and why they

are or are not successful.

Deterding et al. (2011) offer five elements of game design that attempt to be more

semantically useful for a discussion of modern Gamification: 1) game interface design patterns;

2) game design patterns and mechanics; 3) game design principles and heuristics; 4) game

models; and 5) game design methods. Game interface design patterns, the first element, are the

common, successful, interaction design components and design solutions for a known problem in

a particular context, including prototypical implementation. Examples of this element would be

badges, leaderboards, or levels of achievement and progress. The second element is game design

patterns and mechanics: common parts of the design related to gameplay. Examples would be

time-constraints, limited resources, and turns of play. The third element is game design

principles and heuristics: evaluative guidelines to approach a design problem or analyze a given

design solution. Examples would be enduring play, clear goals, or game style variety. The fourth

element is game models: conceptual models of the components of games or game experience.

Examples would be challenge games, roleplaying, or curiosity-based. The final element is game

design methods: game design-specific practices and processes. Examples would be play testing,

play-centric design, or value-conscious design (Deterding et al. 2011:4).

These definitions are used because Deterding et al. (2011) argue for limiting elements to specific types of games or genres, e.g. strategy or roleplaying, would either produce an empty set of elements or a small set with limited applicability. Avatar creation in a game that focuses on roleplaying might not apply to an airline company attempting to expand its sky miles club membership. Broadening the set of elements to include all games, as in the case with Rasmusen (2007) or the ones I previously outlined, creates a boundless list with equally limited applicability despite its usefulness in understanding the overall principles. Deterding et al. (2011) argue it is best to use their moderately limited set of design elements as a foundation to explore Gamification and its successes based on these criteria, rather than continuously debate the heuristics behind defining characteristics of game design (Deterding et al. 2011:4).

However, even Deterding et al.'s (2011) selected game design elements are far-reaching in scope, lacking focus on objective variables necessary for testing hypotheses about Gamification. The specific examples of game design elements they provide, like leaderboards, are more functionally relevant than their parent groups because of their specificity. It is much easier to run a focus group to test whether or not leaderboards are specifically attractive for a particular implementation than running a focus group on "Game Interface Design Patterns." Badges, Leaderboards, and Levels will elicit different responses, regardless of being under the umbrella of "Game Interface Design Patterns."

Although I agree that genre-specific game elements, like using an avatar in a roleplaying game, can be problematic when applied too broadly, selecting specific game design elements from across genres can provide a feasible, testable framework. In terms of building an engaging community online, researching a wide array of games allows a customized toolset of design elements that can be used to gamify the online community. Game design elements that might be

more useful to test in this endeavor would be: leaderboards, badges, levels, competition, and cooperative mechanics.

This complicated semantic battle over what defines a game design element can be further simplified, but only after having understood the necessary context of what is meant by a game. For this thesis, game design elements are defined as specific examples of game design choices that may or may not be exclusive to games, but tend to appear in game contexts rather than non-game contexts. These game design choices are the specific decisions on how to organize a game's voluntary incentives, rules, interactivity, conflict, quantifiable outcomes, and artificiality. The debate is not that game play experience must utilize these over-arching elements, but what specific sub-elements can be tested for their feasibility and success in specific situations.

3.2   Defining Gamification

I define Gamification as the use of selected game design elements in any context with the intent to further behavioral outcomes. This definition allows the researcher to ignore subjective arguments over whether or not specific design elements are typically used by games to invoke value-creation and intrinsic motivation, or what defines a game over a gamified non-game context. Instead I focus on explaining Gamification as a goal to produce a desired behavior, such as civic engagement, through design elements. With this framework in place, it is easier to begin exploring and testing which game-design elements are more productive in furthering behavioral outcomes. With later phases of the Phoenix Project, the targeted behavioral outcome is the sustained engagement with an online community revolving around a web-based digitized collection of historical and archaeological material.

I arrive at this conception of Gamification using the definition proposed by Deterding et al. (2011) rather than the one proposed by Huotari and Hamari (2011, 2012). Deterding et al. (2011) define Gamification simply as "the use of game design elements in a non-game context". This definition provides a broad scope that is useful when discussing aspects of Gamification across different applications, like marketing, while retaining enough specificity to ignore the issues of Huotari and Hamari's (2011) definition that ultimately covers any rules-based system of interaction.

Huotari and Hamari (2011) define Gamification as a "rules-based service system that provides feedback and interaction mechanisms with an aim to facilitate and support the users' overall value creation." Their rules-based approach problematically applies beyond games or gamified services. A qualifying example would include automated touchpad-based point-of-sale systems (users interacting with a system that provides feedback and value creation through the ordering and receiving of a product, like rail line tickets or food). Huotari and Hamari (2012) later refine their definition of Gamification as "a process of enhancing a service with affordances for gameful experiences in order to support the users' overall value creation." They then add that their definition explicitly highlights Gamification as a goal, an attempt at creating gamified experiences, rather than simply being based on using game elements (Huotari and Hamari 2012:3).

The importance of this later distinction is that no unique set of defined game elements reliably produces a game experience, the end goal of producing a game in the first place. They then define the success of gameful experiences based on the player's voluntary engagement inspired by intrinsic motivation (Huotari and Hamari 2012:3). Hamari et al. (2014) further revise the definition of Gamification, with this previous study in mind, to present it within a context

that is useful for the Phoenix Project: "A process of enhancing services with (motivational) affordances in order to invoke gameful experiences and further behavioral outcomes" (Hamari et al. 2014:1).

When all definitions of Gamification are united, an important process can be identified that is ultimately more useful than classifying a service or classifying a general use of game design elements in any non-game contexts, which can apply to other arenas of interest like public health, or education. Deterding et al.'s (2011) definition provides a basic framework, but lacks function. There is no inherent goal other than the act of using game design elements. Combining their framework with Huotari and Hamari's later definitions (Huotari and Hamari 2012, Hamari et al. 2014) provides the motivation, or function, of this process. To reiterate, I wish to define Gamification as the use of selected game design elements in any context with the intent to further behavioral outcomes. Changing a player's behavior also touches on ethical concerns and necessitates a discussion of black hat and white hat game design to help clarify these issues.

3.2.1   *Gamification's Transformation of Online Interaction: Black Hat vs. White Hat*

The terms white hat and black hat originate from the hacker community. White hat hacking refers to those who break cyber security barriers for non-malicious reasons such as testing internal security for vulnerabilities (Douglas 2010:503; Knight 2009), and the term is sometimes extended into civil activism like leaking documents to the press. Black hat hacking refers to the violation of computer security systems for maliciousness or personal gain (Moore 2005:258). The dichotomy is in the intention behind one's actions. The terms were applied by Yu-Kai Chou (2014) in his ideas of Gamification to mirror the intention behind its application. White hat elements of design promote engagement by letting the user express creativity, feel success through mastering the gamified application, and promote a higher sense of meaning—

they foster positive emotions. Black hat elements are those that demand user action from unpredictability of rules, fear of loss, or from the need for things given arbitrary value. The motivations to engage are still evident with black hat elements, but the end-user experience elicits negative emotions.

Although Chou (2014) draws this distinction of good and bad motivating game design elements, black hat motivators are not inherently malicious; they are simply different sets of motivators. Black hat motivators play off negative emotions to "force" engagement and can be used in applications like phone apps that make the user feel anxiety over personal health, for example applications done within an irregular time-frame that help with smoking cessation, or improve diet through reminders that trigger guilt, or things the user cannot have unless rules are followed. Chou argues for a balance between both white hat and black hat game design for a healthy and sustainable game or application of Gamification. Black hat techniques might drive an initially large user-base, but sustained negative emotions will eventually drive users away, because they will become exhausted at the feeling of having no control over their actions within the game. White hat elements help sustain user interaction by giving them control over their actions once initially engaged with the application. These two differences of intention behind Gamification's goal of behavioral outcome change provide the framework necessary to look at case-examples of gamified applications.

3.2.2 Gamification Case Studies

Tolmie et al. (2014) recently published two parallel Gamification focus studies that reflect these concepts of black hat versus white hat intentions. Their goal was to test the feasibility of encouraging engagement across a broad spectrum of potentially interested parties and stakeholders in the realm of e-government or e-democracy, which serve as online platforms

of civic engagement. They recognized that information and communication technology is increasingly the platform where information about political issues and its debate are disseminated. By fostering wider democratic participation and greater transparency and accountability in government policy and processes, a benefit to democracy and society is achieved (Tolmie et al. 2014:1763). This is clearly in line with a praxis approach to politically informed action and why their case studies are an important base line for understanding Gamification in this context.

They add an important caveat to this idea; the importance in considering how well the systems of online communication function to promote the more vital components of civic engagement, which are debate and dialogue (Tolmie et al. 2014:1763). They explain that newer techniques are necessary to harness this newer technology. The reality is that people have moved away from consuming media through a single point of contact, e.g., news reports created centrally that are then sent homogenously to an entire population at specified times. Media outlets have moved towards distributing information to individuals through some form of personal computing device, allowing the consumption of information simultaneously and heterogeneously, or from varying sources (Tolmie et al. 2014:1764). Debate has moved from sitting around the television and discussing with small groups to discussing in large-scale public forums, like social media.

They looked at two different gamified applications to explore user engagement with different sets of elements. Bicker Manor was an interactive game centered around scheduled debate between a hypothetical family that users interacted with, both through a web interface and through SMS messages to their phones. It expressly sought to discover ways in which web technology could be used to promote mass participation in an event (Tolmie et al. 2014:1764).

Their second case-example was a gamified application called Day of the Figurines, played by sending and receiving messages on a mobile phone, with strict limits on delay in response, that interacted with an ongoing twenty-four hour a day small virtual town (Tolmie et al. 2014:1765). The aim was to discern the difference in debate and interaction between the two games resulting from the game design elements used in their production.

Day of the Figurines was designed to interrupt users' daily routines, whereas Bicker Manor allowed users to easily manage their interaction with the game so it would not hinder their daily lives. Day of the Figurines used black hat elements of negative emotions and stress through temporally-unpredictable messages that required immediate responses to succeed, forcing the users to manage their interactions with the game as they came about. This often led to more interactions with others not playing the game who demanded explanations for the interruptions. Bicker Manor took a white hat approach where the rules were ordered and predictable, allowing people to integrate the game into existing routines of their choosing that did not disrupt their daily routines and demand explanation from others not playing the game (Tolmie et al. 2014:1768).

The core black hat strategy used by Day of the Figurines is its structure and engagement mechanisms of unpredictability and sense of loss that enabled users to develop a rationale to prioritize the game's interactions over the daily required routines of their personal lives. This was successfully achieved through competition and that the user would suffer negative consequences if a response was delayed by a set length of time (Tolmie et al. 2014:1769). Bicker Manor was not designed to elicit those motivations; it was designed to replace the same daily routines through intrinsic motivation of the user's own perceived value of interacting with the

game. Bicker Manor was largely unsuccessful in comparison to Day of the Figurines, especially with regards to engagement with, not only the game, but with the real world around the players.

In Day of the Figurines, users felt more engaged with the game because, not only were they randomly interrupted by its requests for action, they were required to explain those interruptions in their daily routines to those around them who did not understand, disseminating information further and promoting the game and its engagement to others, by simply engaging with them. When no-one was forced to explain their limited engagement in Bicker Manor, because those interactions largely took place privately and non-obtrusively with little intrinsic motivation outside of an arbitrary points system, players became bored, one complaining "it was more like filling in a questionnaire" (Tolmie et al. 2014:1769). The overall success of either example is hard to measure due to the short time span of the study (where most games are meant to be played several times or indefinitely), but they serve as an easy to grasp study of the strong initial engagement created through black hat elements over white hat elements. Although players complained that the content in both games was not motivating or memorable, due to arguably poor game design, they still engaged more with the black hat designed game (Tolmie et al. 2014:1770). This being said, there are limits to the levels of disruption a gamified project should implement. Some unpredictability is good, in that it forces interaction and engagement, but this is still an indirect form of engagement. How can engagement be intrinsic and direct? A balance between black hat and white hat design elements seems to be the answer.

Chou (2014) offers several examples of recent games that interact with other users online, that he has mapped between black and white hat game design element usage, identifying the issues associated with a game being out of balance. Zynga games, the company behind Farmville, a popular Facebook game where one plays a farmer, largely works with black hat

techniques, where a user's motivation stems from the anxiety of real social pressure and perceived personal pressure to maintain one's farm and acquire in-game currency, only achieved through unpredictable or highly-specific times of required interaction. The cost of not interacting is a sense of being left behind and seeing one's farm deteriorate. The engagement follows the same patterns as Day of the Figurines, but takes it a step further in not only interrupting the user's daily routines, but also interrupting the routines of their social circle. It promotes this by offering incentives to directly solicit others through social media in a pyramid scheme of in-game currency accumulation.

To echo Chou's point about the temporal instability of games focusing entirely on black hat game design elements, Farmville and its developer, Zynga, has been in steady decline since Farmville's release in 2009. As of 2013, the decline was obvious, after numerous employee cuts and their public share value dropped 70 percent (Bachman and Brustein 2013). Games and applications that have utilized a better balance between black and white hat design elements, Chou argues, have had longer success cycles, including Facebook, Twitter, World of Warcraft, and Candy Crush. These applications provide a framework of controlled structure, using negative emotions of social pressure to start engagement, but also allow the users a large degree of control within this context to create their own content and make their own decisions.

3.2.3   Achievements and Failures of These Gamification Case Studies

When utilizing game design elements to further behavioral outcomes, it is important to understand the mechanisms of these elements and whether or not they promote positive and healthy emotional engagement. In the context of the Phoenix Project's goal to apply Gamification to the online database of archaeological and historical material to promote civic engagement, it is not only an ethical requirement to responsibly use a balance of white and black

design elements to promote engagement and not short-lived addiction, but also a requirement to use a balance to achieve a long-term sustainable community of users. Civic engagement cannot be achieved without sustainability and a framework that allows the users to exercise their own agency. Black hat elements that promote accountability and interaction through social pressure are integral, but should never be used to control a player beyond initial interaction and occasional motivation. These negative responses should task the user to implement autonomous control and provide the white hat elements of ownership, accomplishment, meaning, and empowerment.

3.2.4   *Game Design Elements Used for the Phoenix Project*

Similar to civic engagement, Gamification is a goal that utilizes a varied toolset. Not every project can use every tool at its disposal, nor can a project be successful if the right tools aren't selected. Figuring out what tools are necessary is a dynamic, problem-solving venture. The chosen game design elements for the Phoenix Project's future phases are selected from MicroPasts and from Tolmie et al's (2014) study with the intent that future iterations of the Phoenix Project can remove, modify, or add elements based on their determined strengths and weaknesses in conjunction with an assessment of future data and potential new stakeholders.

The second phase of the Phoenix Project (see below) will largely focus on implementing these selected game design elements as the next step to actively engage communities. The following black hat elements will be explored: the utilization of social media to create social pressure, e.g., sending messages through social media to inactive users to remind them of their inactivity and the use of leaderboards to drive competitiveness. These black hat elements provide a framework of negative emotional responses like guilt, pride, or a sense of 'missing out' on something important to trigger users into engaging with the content. The following white hat elements will be explored in the second phase: giving users access to a large set of content;

allowing users the ability to create their own content; allowing users to share their own content; and providing badges of accomplishment as rewards for activity. These elements give users a sense of control in an effort to balance out the negative responses. While users may be pulled to initially engage with the project through negative reinforcement, white hat elements may give them space to determine their actions once they are engaged, much like a game is the freedom of play within a rigid structure. This ability to create meaningful content may be how MicroPasts too can overcome its initial problems with low sustained engagement.

3.2.5   *Concluding Remarks on Gamification*

Marketing and games provide a framework of Gamification to integrate into a stream-lined web interface. Gamification can foster self-sustainable civic engagement through game design elements that draw users into the project like players at a game table. By responsibly using the same tactics as larger marketing firms and video game developers to create self-sustainable persistent online communities, a working prototype of the online Phoenix Project might be created that allows users to create accounts through existing social media outlets and seamlessly integrate their online experience with the goals of the project. Rather than create a new community, the later phases of the Phoenix Project would service the communities that already exist and act as a central hub to connect them with one-another through archaeological interests. Furthermore it will engage new communities through Gamification to engage with the praxis motivations of the project under careful stewardship to bring sociopolitical oppression to the forefront of discussion.

4   BACKGROUND INFORMATION

The Phoenix Project, a collection of over 100,000 artifacts (Dickens 1980:43) and

accompanying documentation housed in the Georgia State University Anthropology Department,

is a comprehensive collection of Atlanta's history, mostly dating back to the nineteenth and early

twentieth centuries. Georgia State University archaeologists under the leadership of Dr. Roy

Dickens originally acquired this collection as a result of the construction of the Metro Atlanta

Rapid Transit Authority (MARTA) rail lines in the late 1970s (Figure 4). This project was part of

the first generation of urban archaeology projects attached to the young field of cultural resource

Figure 4 Current MARTA Rail Line Map (http://www.itsmarta.com)
management (CRM) (Dickens and Crimmins 1982). This large-scale urban archaeology project

in Georgia was vital in raising awareness about the Southeast's urban archaeology, and

furthermore, changing the discipline's mindset that previously considered modern urban

landscapes as too disturbed for useful archaeological investigation and cultural resource

identification (Joseph et al. 2004).

While the City of Atlanta began construction plans in 1962 for the 52 mile rail network

that quadrisected the metropolitan area within the boundary of the city's Interstate 285 highway

loop (Dickens and Bowen 1980:43), construction did not start for over a decade. The MARTA

CRM project originally began as a fast-paced salvage operation. The salvage work was a

function of construction being underway before any archaeological assessments had been made

(Dickens and Crimmins 1982). By the end, the project had developed CRM research design that

helped define a standard for large-scale contract urban archaeology projects (Dickens and Bowen

1980; Futch et al. 1980:ii).

The construction maps of the MARTA lines (**Error! Reference source not found.**)

contain unique terms designating area divisions. The larger areas are termed Construction

Contract Units (CCUs). These CCUs range from 50,000 to 100,000m^2 and follow the MARTA

corridors of construction (Bowen and Carnes 1977:24, Dickens and Bowen 1980:46). A CCU is

then divided into historically-documented parcels of property that are roughly 1000 to 2000 m^2

(Dickens and Bowen 1980:46; Bowen and Carnes 1977:24). All collected material is assigned to

both parcel and CCU. After the survey, sites were determined based on the stratigraphic integrity

of the deposits. A site can consist of a single feature, groups of related features, or artifact

concentrations. The size of a site might cover a small portion of a single parcel like a well, or

overlap multiple parcels like a municipal dumpsite. When there are no distinct localized

concentrations that designate a site, the materials retain their original contextual labeling based

on CCU and parcel (Dickens and Bowen 1980:46). The MARTA authorities originally
determined the CCU and parcel structure, and Dickens' team decided to quickly co-opt it to
facilitate communications with construction crews and to provide relevant controls for data
acquisition (Dickens and Bowen 1980:46, Bowen and Carnes 1977:24).

When cataloging data in the laboratory, the artifacts were labeled and given an accession
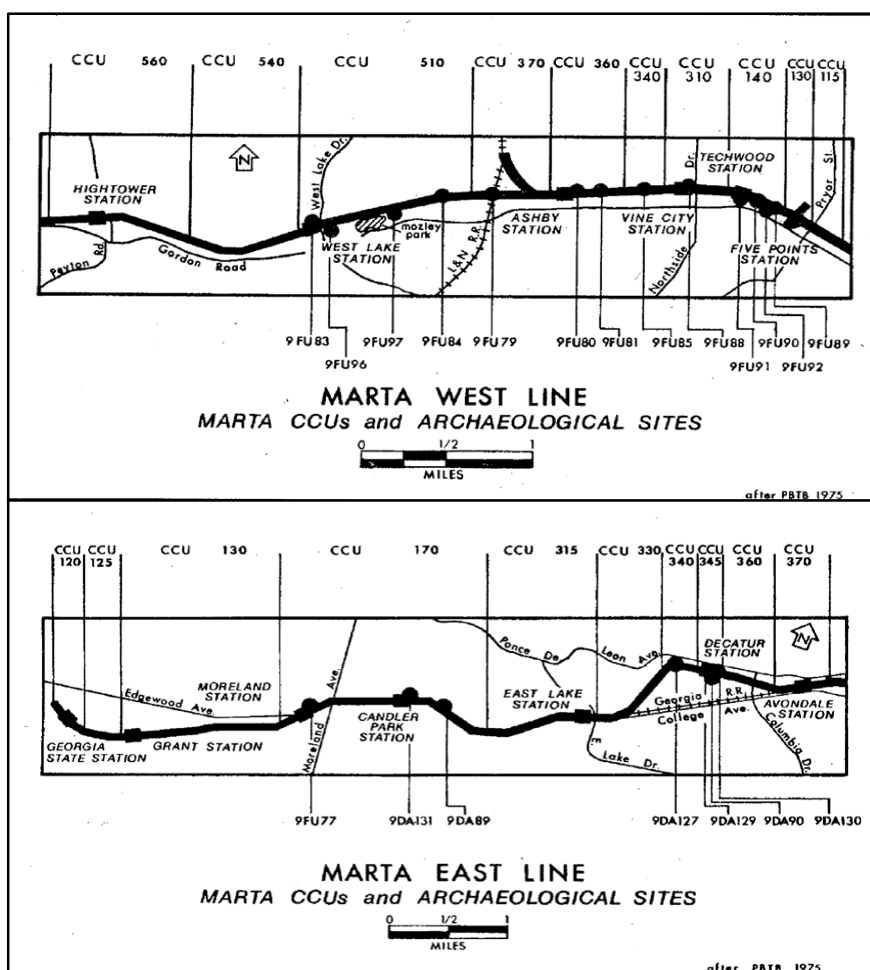

Figure 5 Proposed MARTA Rail Lines: East & West Shown

number. This number, while not the same as the CCU number, often corresponded to all of the
artifacts collected within a CCU or a site (Bowen and Carnes 1977:44). Dickens and his team
adopted the GDoT artifact labeling system that used the prefix "p", "a", "m", "ez", or "eb"

followed by a number (for example p1, a204, etc…). These letters correspond to different types

of artifacts. The "p" artifacts are associated with pottery and glass vessels. The "a" label

corresponds to more general artifacts (a broad category). The letter "m" is used to describe

materials associated with construction. The final labels of "ez" and "eb" respond to faunal and

botanical samples, respectively. The artifacts were labeled sequentially within each accession

number, so there is a chance of having two artifacts labeled p134 but there will only be one

p134/170 or p134/160, with 170 and 160 representing the accession numbers.

Although the artifacts were extensively treated and preserved dependent upon their

material, e.g. leather being stored in air-tight plastic bags, not all artifacts were given the same

contemporary archival storage (Bowen and Carnes 1977:38-45; Singley 2015). Most were stored

in a series of labeled paper bags bound by rubber bands and stored in boxes (Figure 6). Some

artifacts, by the time they arrived at GSU in 2011, were no longer in air-tight plastic bags and all

seemed to be utilizing brown paper bags. It is not clear when this happened in the collection's

history.

The collection moved with Dr. Roy Dickens to the University of North Carolina, Chapel

Hill in the 1980s. After Dr. Dickens untimely death in 1985, the collection remained at UNC

until Dr. Mark Williams, manager of the archaeological site files at the University of Georgia,

Athens (UGA) brought the collection to UGA in the late 1990s (Glover et al. 2014). In 2011, the

Phoenix Project was born and the collection came home to GSU under the direction of Dr.

Jeffrey Glover. The first materials brought back to GSU were from the sites of 9Fu91 and 9Fu89,

and then the following year the rest of the collection was brought back to Atlanta (Glover et al.

2014). Since the collection's arrival at GSU, faculty, students, and other stakeholder

communities have been re-bagging the over 100,000 artifacts into air-tight archival plastic bags

and digitizing the artifacts and associated cross-referenced paper catalog information. GSU

students have also been writing new reports for class projects and structuring MA theses (Cook

Figure 6 Archival method example at time of GSU's re-acquisition.

2014) out of the large body of data in a revitalized effort to educate and publish information for

the Atlanta public that Roy Dickens noted at the time was "anxious to learn about the project and

about archaeology in general" (Dickens and Bowen 1980:55).

4.1   How are Digital Technologies Transforming Public Archaeology?

With the exponential rise of analog to digital capturing technology, the democratization

of that information and public distribution and engagement is not only all the more viable, it is a

venue for praxis. It is easy for archaeologists to ignore praxis under the argument that the field is

more of an objective science, but just like postmodern critiques of archaeology showed field

bias, global studies taught the discipline the same lesson all anthropologists have to consider;

that "We do not have the luxury to pretend that global dynamics do not affect the local projects with which we work" (Carson et al. 2012:9). The lesson is that everything is socially connected on some level and there is no place where research can ever take place in a vacuum.

The Phoenix Project aims to enhance its stewardship of the MARTA collection through current technological developments by giving direct and open access of robust digital data to its communities and stakeholders, without endangering artifacts and carefully organized datasets. With the advent of high-speed internet data transfer rates, data digitalization technologies, and the widespread availability of computing devices capable of processing these large datasets, including smart phones, tablets and traditional computers, previous sets of analog data can be converted into digital formats that synergize with the open-access of the internet. As of 2012, 78.9 percent of all US households own some form of computing device and 74.8 percent of all US households had home internet access (US Census Data 2014). Bearing these numbers in mind, it seems highly relevant to digitize an entire database of archaeological information for open, public access in context with community archaeology in a framework of civic engagement.

Additionally relevant is the advent of 3d scanning technology through laser measurement or photogrammetry. Not only can tabular data be made accessible, but so can realistic representations of material objects beyond the limitations of a photograph. Through laser scanning and SFM, there is a degree of digital transfer not previously possible for collections. This allows the ability to freely distribute 3d data, which enables open-source 3d visualization software, such as Blender, and current and future 3d printing technologies, access to the entire collection's materials for independent or institutional research. This could be critiqued as irrelevant toward research that requires hands-on interaction with materials, like sherd clippings for chemical analysis, but this digitization of data is integral to promote ethical stewardship of

the archaeological record through providing the public with a means of accessing public data that would otherwise be inaccessible. New advances in digital technologies provide archaeological stewards of data the responsibility to make digital versions of this data available to the public it belongs to. Historical preservationists and curators no longer need to worry about controlled access to public collections to limit their damage once they are digitally curated and distributed freely through an online user interface, and can actually assist curation efforts of fragile objects by not needing them continuously taken out of controlled preservation contexts for most forms of study. Additionally, a digitized collection would promote ideals of ethical stewardship on behalf of the public by keeping a useful record of the materials in the case of a disaster, like a fire or flood, where the physical data might be lost or permanently damaged.

4.2   Digital Potential of the Phoenix Project

The Phoenix Project contains a wide array of material that is highly conducive to digitization. The artifacts themselves can be objectively and consistently described in a tabular database. Querying over 100,000 artifacts by hand through a paper catalog registry (Figure 7) is not only time-consuming, it can suffer from difficult-to-trace human error, and the results gleaned may contain inaccuracies. If the entire collection can be put into a flexible database, querying takes as long as typing a few keywords, and although human error in the transfer of data into the digital database may still apply, this potential error can be tracked through quick digital reorganizations of data; for example, looking for missing data, inconsistencies in nomenclature or description, duplicate entries with differing descriptions, skipped sequential data, and irrational numeric data (e.g., any object weighing less than a milligram or more than 5 pounds would be a red flag, or testing the material type codes in the digital database for

discrepancies that facilitates faster physical checking in the paper catalogs). Human error will

always be a problem, but the main advantage to digitization is the easier troubleshooting of

Figure 7 Example of MARTA Collection Analog Specimen Catalog

inconsistencies.

These artifacts lend themselves to further digitization through 3d scanning and

photography. Each artifact has the potential to be scanned, photographed and uploaded into

Heurist using any number of open-source 3d mesh formats with varying levels of resolution

depending on the user's need. In addition, the WordPress front-end can be programmed through

HTML5 or WebGL to display 3d data in-browser rather than requiring the additional download

of 3d viewing software. The minimum implementation will be the attachment of 3d Adobe

PDFs. It is important to emphasize that each artifact has the potential to be modeled rather than

each artifact should be modeled. Scanning all objects could be considered too much data, and

there are rightfully more pressing curation tasks for collections, (especially ours), than obtaining

3d scans of a handful of body sherds. The idea that there may be too much data is hard to assess

beyond the technical limitations of storing that quantity of high-resolution data since no large

collection has achieved that complete level of digitization where the benefits might be more

readily apparent, such as in the unfortunate cases of heritage destruction through natural or

human-caused disaster. Additionally, although SFM or laser scanning objects to provide 3d

models is a newer way to catalog physical artifacts, archaeologists should not view it as a new

standard of data collection, but rather as a new way to share data. Three-dimensional models are

inherently surfaces and lack both tactile subjective feeling and the objective physical

characteristics of the original object that are often critical for a specialist working with a

particular type of artifact class. It is also difficult to model transparent, translucent and glossy or

refractive surfaces with any degree of accuracy using either SFM or laser scanning, limiting the

objects that can be scanned. This should not be a deterrence from capturing this important

surface data, but nevertheless should put its importance in perspective.

The assortment of photographs can also dovetail nicely with queried data, and offer

immediate visual descriptions of data not previously available, with the same speed and access,

for physical databases of material. There are also thousands of pages of notes, site descriptions,

field reports, maps, and catalog information that are in the process of being scanned and

uploaded to Heurist. Transcription is the ideal for it allows for the rapid querying of information

that is harder to locate through analog viewing of written documents or scans of handwritten

material, but it is not always practical given current technologies (Figure 8). Regardless, aside

from transcribing a few highly important documents, digitizing these documents as standardized

scanned PDFas (Appendix B) with rich metadata serves the Phoenix Project more pragmatically
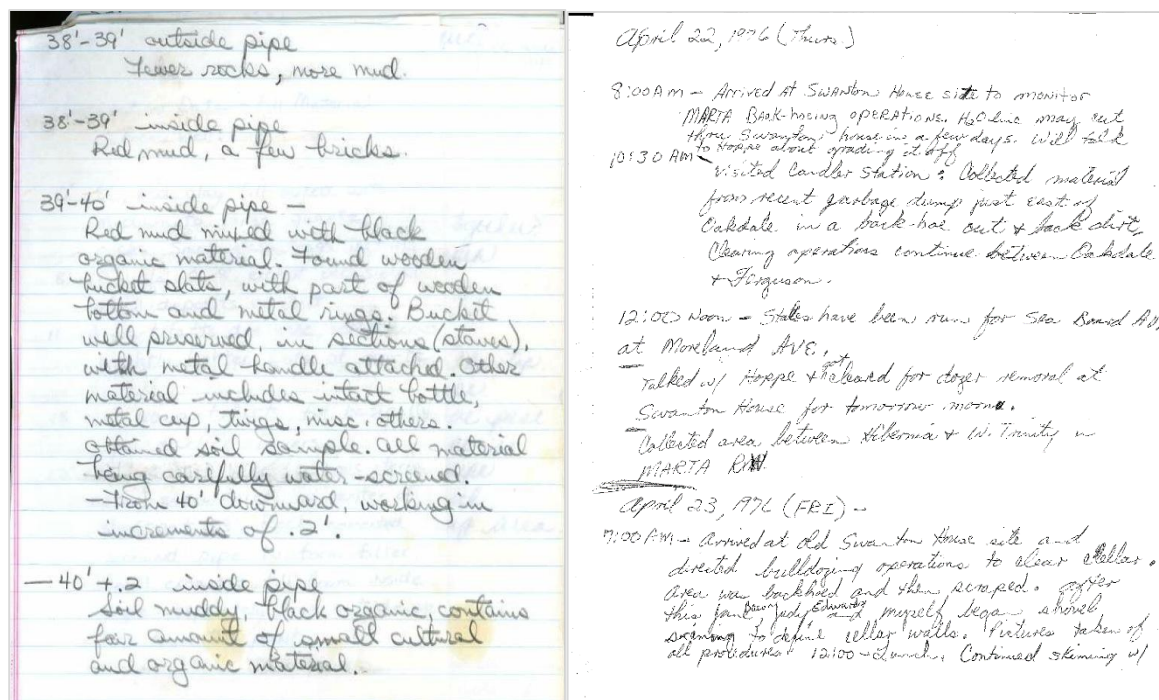
Figure 8 Example of handwritten notes from the MARTA collection.

given available resources and still allows these forms to be linked to other forms of digitized

data, like artifacts or maps. The maps can be georeferenced and overlaid on Heurists' built in

Google Maps functionality as JPG, GeoTIFF or tiled image files (Appendix B), incorporating

geospatial links to the same artifact database and digitized documentation.

4.3   What is Heurist?

Heurist was originally designed by Dr. Ian Johnson in 2005 and developed by the Arts

eResearch unit at the University of Sydney (Heurist 2015). It is an open-source online database

system designed for qualitative and quantitative research objects—more specifically

heterogeneous datasets that include highly varied datasets that can be linked and organized in

ways that strictly quantitative databases cannot (Heurist 2015). The goal behind this project was
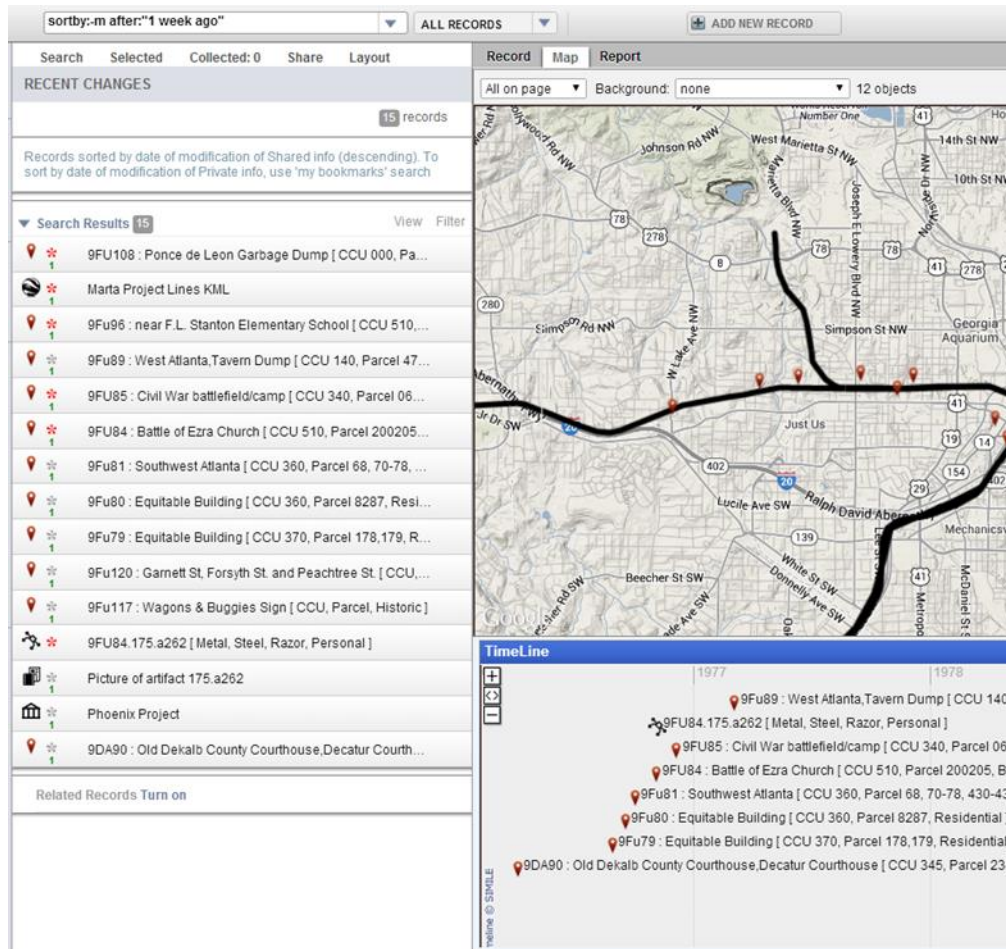
Figure 9 Sample of the Heurist v3.0 interface

to solve two problems in data organization for researchers in qualitative disciplines like the

Humanities: the requirement for advanced technical knowledge to setup a database for exploring

links between heterogeneous datasets, and the integration of data in a single web-based system

that allows the combining of datasets that would otherwise be stored in incompatible systems

(Heurist 2015). Heurist attempts to solve these two problems by offering a simple-to-use web

interface that allows for on-demand creation and database configuration, and it allows rich

linkage between datasets like notes, annotations, and digital attachments (Heurist 2015, Figure

9).

4.3.1   Heurist's Methodology, Code Logic, and Structure

Heurist is coded in PHP and Javascript, utilizing a MySQL[2] database architecture. All of these elements are open-source, as is the code of Heurist itself. PHP is a server side programming language embedded within HTML documents. This means that when accessing a PHP-powered website, the server is processing PHP coded data and then sending it to the user's client browser. When a user connects to a website, before receiving the HTML document, the server reads through the file and processes any PHP code. This processed data is then sent to the user's client browser, and from the user's perspective, they are receiving pure HTML (PHP 2015). Javascript is a dynamic client-side scripting language. In contrast to PHP, Javascript functions are processed by the user's browser after the server has sent the user data. Javascript processing is performed client-side through the user's browser (Mozilla Developer Network 2015, Appendix B).

When combined, Javascript and PHP can be used to create dynamic webpages, also known as web applications. The strategy that allows this is commonly labeled Ajax—an asynchronous process that allows a Javascript to continue running in a webpage, while also requesting information from a server without interrupting the user. When a Javascript Ajax listener receives the requested data, it will seamlessly update the webpage it is running with the new data (GFX MONK 2010). Although HTML is a static XML formatting language, Javascript allows the webpage to dynamically request information from a server, triggering a PHP function to process data server-side and return that data to the waiting Javascript function client-side. The HTML can then be dynamically changed according to user-input (Appendix B).

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[2] Heurist may move from MySQL in later versions due to Oracle's recent 2008 purchase of the open-source framework.

MySQL is a database framework a server can manipulate through PHP, and the user can manipulate through Javascript calls to the server. MySQL is a specific SQL (Structured Query Language) server developed to add, access, and process data stored in a database. It provides an interface to interact with a database relationally; this means that data is stored in organized and optimized separate tables, rather than storing the data as a single large file, and that data can be organized through relational pointers or connections between the data (MySQL 2015). A simplified way to think of this relational approach is to think of the limitations when storing a large spreadsheet into a single comma delimited text file. To access or change the data, one would have to read the entire text file in order to make a single change. Additionally, several redundancies would be needed to handle any complicated relationships between data. If one were to store the data in separate, organized files, it would only be necessary to access smaller subsets of data when making changes, and updating the connections between data would be optimized through less redundancies (Appendix B).

Heurist's MySQL database has soft-coded entity types, record types, and terms. This means that although different users have the ability to customize their databases' appearances and organization through PHP and Javascript, the core structures are preserved across projects, facilitating seamless sharing between them. It uses key-value pairs to implement the relationships that are linked to the primary data-table. In terms of Heurist, key-value pairs can be thought of as a sort of dictionary, where one stores terms, or keys, to define data, or a value that the key describes. Keys can be thought of as a labels that the user attaches to items of data, e.g., length of an artifact or CCU number, to label what that data describes (its value). Key-value pairs allow for open-ended data structures that can be extended and modified without changing core code or data. This means that Heurist can dynamically add variant data types without changing

the underlying database structure. Without this flexibility, in order to add a new field or attribute, one would have to redesign the database, and all other users running the old database would have to update their database before the two could communicate. With the key-value pair system, Heurist can implement new entity types, fields, and attributes as necessary, as all data types are, in very simplified terms, the same data type with special behaviors attached to each.

4.4   What are the Requirements for a Good Digital Database?

There are two important factors necessary for a good digital database: sustainability and flexibility. When committing any data to a digital format, the sustainability of those digitized resources is important. Heurist differs from other digital database services that are often proprietary and whose database structures are tied to the data model and application used to format, interpret, and use the content (Heurist 2015). Heurist uses an open-source relational database where the structure of the data is written into the database itself and not the application that is used to interpret and use the data. This results in the Heurist database being accessible by any independent application through a standardized set of queries to use or export the data in a coherent and usable format. Without sustainability, a digital database can become obsolete and difficult to access in later years in the same way that reading EBCDIC tapes or early spreadsheets, albeit possible, is difficult, and the older the technology becomes, the harder it is to access data in that format. This is why Heurist's open-source model is preferable. Although open-source software can suffer from issues of longevity, typically the formats they base their data formats on are highly standardized, e.g., XML or HTML (Appendix B), which allows the transfer of standardized data to new software when necessary.

Flexibility for change allows a digital database to evolve and meet the unforeseen needs and demands of the database owner. Although Heurist can quickly create a relational database

for the owner, setting up fields and relationships without any programming, it also offers several features that can be added, if needed, at any time through custom code. These features include, blogging, annotating, external file linking, streamed feeds, varied data format importing and exporting, and the ability to add new modules for analysis and engagement (Heurist 2015). Not only does Heurist provide its own modules, it is also open-source and therefore any database owner has the ability to code their own custom modules that are tailored to meet their own needs, all with the same sustainable database. If an owner, for example, wanted to set up a custom module to log and analyze user data, that possibility exists.

5   METHODOLOGY

The methodology of creating an online interface for civic engagement is inevitably tied to the results that follow, but it is essential to describe the general ideas behind the finished and future products to frame these results. The methodology of building an online website of digital heritage should focus on two layers of application: describing the ways a frontend interface should connect with a digital heritage database, and describing how that frontend can connect to the public through interface design. Once these methods are established to introduce the ideas that went into designing the project, the results of how these ideas are implemented can be discussed in greater detail in Chapter 6.

5.1   How to Connect Ideas to a Digital Database

The Heurist system allows for both the customization of the data import interface and the front-end user interface for interacting and querying the data. The latter is incredibly important, because different communities interact with technology differently. How can the user-interface be designed to accommodate these differences? Does an individual interact with data visually,

geographically, statistically, or through qualitative questions? In order for the database to truly be open-access, it must take into account how stakeholders access information. During the second phase (see below for details) of the Phoenix Project's implementation, this will be achieved through a series of informal focus-group interviews done with different stakeholder groups (local archaeological and historical societies, CRM firms, university academics, local governments, and local communities interested in preserving heritage and land-based claims of heritage) in order to construct an accessible user-interface (UX) that speaks to different needs and expectations of these groups.

There are current systems that utilize different singular means of accessing information, e.g., Google Earth for accessing geospatial data, but the Phoenix Project's goal is to utilize various means of data interaction based on the results of the qualitative surveying. This is achieved is through an interactive front-end homepage that allows the public user to choose how to interact with the data. Does the user want to look for information geospatially by looking at a map or simply perform a query lookup for Refined Earthenware (a general type of historical pottery)? While this sort of access is easy to accommodate for working professionals or academics, in order to potentially accommodate wider access through content creation, other avenues need to be explores. One method is to design a "Question and Answer" based commenting system as an innovative way of accessing the data. The user will be given a drop down menu of query words, e.g., what, when, or where, and fill in the applicable terms. The WordPress frontend will then query the Heurist database for the relevant information and display generated graphical content that can be saved for the user and turned into their own style of public article or blog post. An example output would be a graphical chart showing the percentages of known beverages found in the area of Decatur in the 1920s, like Coca Cola (an

easy to identify beverage bottle), with a short description explaining the information. Furthermore, the result will yield links to any associated metadata with the topic, such as reports on bottle identification, previous academic studies, associated maps showing the geospatial connections, and other user inquiries related to the same information.

By storing all questions asked in a separate (separate to ensure no cross data corruption) searchable SQL database, a question can be saved for further public access, and all relevant questions asked previously will also be given with every new question asked as well as the ability to share any information gleaned through social media outlets such as, Facebook, Imgur, Instagram, and Twitter. Every question should be treated similar to a blog post where discussions surrounding the found data can take place in a streamlined commentary section, which automatically links accounts from existing social media outlets. Utilizing pre-existing discussion and forum formats benefit from widely used and known outlets of digital interaction.

Another key implementation of giving users control of their own value creation in context with the collection is the ability to redefine objects and documents in the collection and further vote on user submitted interpretations of the data as a comparison to existing scholarly assumptions and interpretations. An example of this process could be that of a stoneware whiskey jug from the 1920s. This object will have a predefined set of information attached to it from academic research when importing the collection into the online database, like typology, date, functional use, and other key descriptive elements. Any user will have the ability to offer their own interpretation of this data and this information will be attached to this object and will show up alongside the academic interpretation as well as with any other user-offered interpretations. All users will have the option to vote for these alternative interpretations and each assessment will show its own ratings. There will obviously be a need for administration to

filter out inappropriate material, which falls in line with the archaeologists who act as stewards in this regard. This can be a strong democratic and engaging component of the project that gives all users access to the same power of interpretation academics and scholars have access to further engagement with the politics of heritage with the greater Atlanta community at large.

To help foster the community, all users will be able to sign up in later phases using existing social media accounts—Facebook, Google+, and Twitter for example—negating the need for users to sign up for yet another account. This creates a seamless experience when joining the community and allows them to quickly share their actions with the database with their associated account as well as others. Having their accounts linked to social media also allows the project to directly engage with them through their social media feeds—reminders of inaction, alerting to other users comments on their work, or simply updating them to new information that has been added to the database. There are multiple open-source WordPress plugins that allow this automated integration with social media.

An incentive-based system of interaction can also further the interaction between academia and the public by offering quantifiable incentives to academics through system generated interaction ratings or statistics that can easily be attached to a curriculum vitae to show public interaction and outreach. These ratings might be achieved by overseeing discussions and quantifying the frequency at which public questions are answered and the publicly voted ratings of their interaction. This forces a degree of accountability and responsible interaction with the public that includes them within discussion frameworks, rather than excludes them and benefits both parties involved equally. In essence—the academic is paying for quantifiable scholarly capital by interacting with interested communities on the communities' own terms. These ratings will apply to all users in the project—not just academic users. It is another essential element to

the project's future goals. Game design elements like badges, leaderboards, and other user activity ratings can help fill a niche for users that enjoy competition and measuring value based on others in the community.

Although users should be able to create their own content by the last phase, the Phoenix Project must also regularly inject new information into the database to keep the community alive. This can be achieved through both public outreach and CRM outreach. Inviting users in the community to submit their own data from personal collections is not only engaging, but also the digital nature of the database can encourage privately owned collections to submit their material and optionally offer an anonymous submission process for individuals concerned about privacy. These anonymous donations of data will have to be clearly labeled as such, because the nature of that process will limit its ability to be verified and the need to query out that data is just as important. The database must also be setup to accept wide forms of data. Although the Phoenix Project solely contains the MARTA collection at this time, the option to expand into older Southeastern archaeology of the area that covers Native American history exists. This has the ability to increase the size of the project's community and involve a great diversity of stakeholder groups interacting with one-another to interpret the past and additionally serve as a template for future projects to either join or mimic.

5.2   Interface Functionality

Although a more in-depth understanding of interface design mechanics will be studied in Phase B of the project, it is still necessary to discuss my choices in the current implementation of the design, and how I arrived at them. The typeface and color scheme is derived largely from Georgia State University's communication toolkit standards. This is done to help support and advertise the institution that hosts this project. The default typeface for the website is Gill Sans.

If the user's browser does not have Gill Sans, then Helvetica is substituted followed by Times New Roman according to the type and color use guidelines (GSU Communications Toolkit 2014).

There are three borrowed colors: red, blue, and grey. The official Georgia State University color values are, in hexadecimal format, #CC0000 for red, #0039A6 for blue, and #666666 for grey. I find these color saturations intense and distracting from the actual content of the website and alternatively decided for lighter saturations of the same hues. I use, in hexadecimal format, #c20000 for red, #4b5ca7 for blue, and #2b2b2b for grey. White and black—also supported by the Georgia State University type and color guidelines, are additionally used and provide the bulk of the interface's visual real-estate. The design uses common web-design elements rather than unique elements to invoke familiarity with the user, until focus groups can be run in Phase B to assess the success or failures of different interface design decisions. The front-end features: a left-handed sidebar menu system, a header title and main menu, a central content area, and a sitemap footer with redundant links and site legal information such as a copyright.

It is important that a website can be re-sized depending on the device used by the user. Making a website that follows a strict 1024 pixel width guideline may be useful for most modern laptop or desktop monitor resolutions, and even some tablet resolutions, but on smaller smart devices—this can be a limiting factor in ease of use. Offering no alternative sizing is one method; the user will be required to zoom in and out on the interested portions of the website. Another alternative is allowing the design to collapse based on the user's screen resolution. WordPress has some initial automation in the PHP and CSS of the base templates. The current Phoenix Project website takes advantage of this feature, although with limited functionality.

Phase B will feature an initial mobile-friendly interface that will require focus groups to test functionality.

The first phase's design requires a spartan approach where everything on the page serves a specific purpose. This will make it easier to test very specific features or design choices with later focus-groups. A simple design also offers less to confuse or distract a user from the intention behind the front-end. Ling's Cars is an example of a non-utilitarian website design that contains and incredible amount of color, movement, and confusing pseudo-advertisements and information (Figure 10). Although this website's design is arguably successful based on internet

Figure 10 LingsCars.com. Screen capture from http://www.lingscars.com.

traffic and forwarded business—a focus group determining its successful functions would be far harder to organize because of its complicated arrangement and possible irony. The goal of Ling's Cars is not dissimilar to the Phoenix Project—to drive web traffic and usage, but whereas a design exhibiting playfulness can be useful with certain projects, the nature of a large database of archaeological and historical information might benefit better from a simpler, less adventurous design. The extent the Phoenix Project can utilize a playful design can be tested in Phase B focus

groups and can be further refined in Phase C. It is towards those future phases and what I accomplished in Phase A, that I know turn.

6   RESULTS

The previously discussed feature-set is understandably large-scale and therefore needs to be divided into three distinct phases of implementation. Internal Review Board (IRB) approval will be necessary for certain features to be implemented in Phases B and C due to gathering data-usage statistics, implicitly attempting to affect behavior in individuals accessing the site, and running focus groups on the interface's usability and appearance. A working prototype that exhibits basic functionality and the attainable promise of features for such feasibility studies is the first step, and the goal of this thesis. This is mandatory before moving on to later phases that require more robust implementation.

Phase A, is the focus of this thesis. It will provide a basic framework of interactivity with the Heurist database, allowing the public to query data, but not share or deeply interact with the data. Phase B will fully implement the social media framework that allows users to connect with the data as well as to each other and the first stage of Gamification features are included in this phase. The final build of the online Atlanta Phoenix Project, Phase C, will implement all Gamification features and provide a true example of civic engagement, by allowing users to control the interpretation of the data and create their own narratives of interaction. Additionally, its final form will allow for easy and sustainable additions and updates to keep pace with technology and community demand (Table 2).

Table 2 Atlanta Phoenix Project Feature List Implemented by Phase

ATLANTA PHOENIX PROJECT FEATURE LIST	Phase A	Phase B	Phase C
Search by Key Term	X	X	X
Search Geospatially	X	X	X
Search by Image	X	X	X
Search by Date	X	X	X
Share Information Through Social Media	X	X	X
Search by Question	X	X	X
Random Photo Montage	X	X	X
Random Record	X	X	X
Random Article	X	X	X
Web Content Phoenix Project Information	X	X	X
Stored Membership		X	X
Community Discussion Forum		X	X
Member Rankings and Leaderboard for Activity		X	X
Member Badges of Accomplishment		X	X
Ability to Rank Questions asked to the Database		X	X
Ability to Comment on Questions and Rank Answers or Discussions		X	X
Remind Users of Inactivity through Social Media		X	X
Search by Question and Generate User Article		X	X
Advanced Mobile-Friendly Design		X	X
Update Twitter & Facebook Member Feeds on New Data Uploads		X	X
Minigame: Image Guessing Game			X
Minigame: Online Quizzes			X
Minigame: Scheduled Challenge Competitions			X
Random Question Article Montage			X
Quantified Public Archaeology Reports for Academic CVs			X
Submit Alternative Interpretations of Data			X
Submit New Data to the Database			X

6.1   Phase A's Implementation

This phase seeks to create the initial steps towards civic engagement, by first creating an online web application that puts the necessary foundations in place. This implements Public Involvement, or a form of Civic Altruism, where the goal is to provide open-access to the database for the public. There will largely be no implementation of Gamification features, nor social media interactivity beyond the basic ability to share and post links to a user's Facebook

feed. The purpose will be to provide a working front-end with a base-line intuitive user-interface that makes accessing the Phoenix Project data easier through customizing a WordPress default theme with CSS and built-in WordPress page management tools to create relevant menus and links. This base-line UX can then be formally and informally tested in a series of initial focus groups for the second phase of implementation. It is a functioning link between a more accessible and user-friendly front-end and the more powerful but less accessible Heurist back-end. The Phoenix Project is currently operating on a local LAMP web server stack. Both database management systems, WordPress and Heurist, are running and WordPress can successfully query and modify the Heurist back-end MySQL database. The GUI is at a level of testing for further accessibility and intuitive design (**Error! Reference source not found.**).
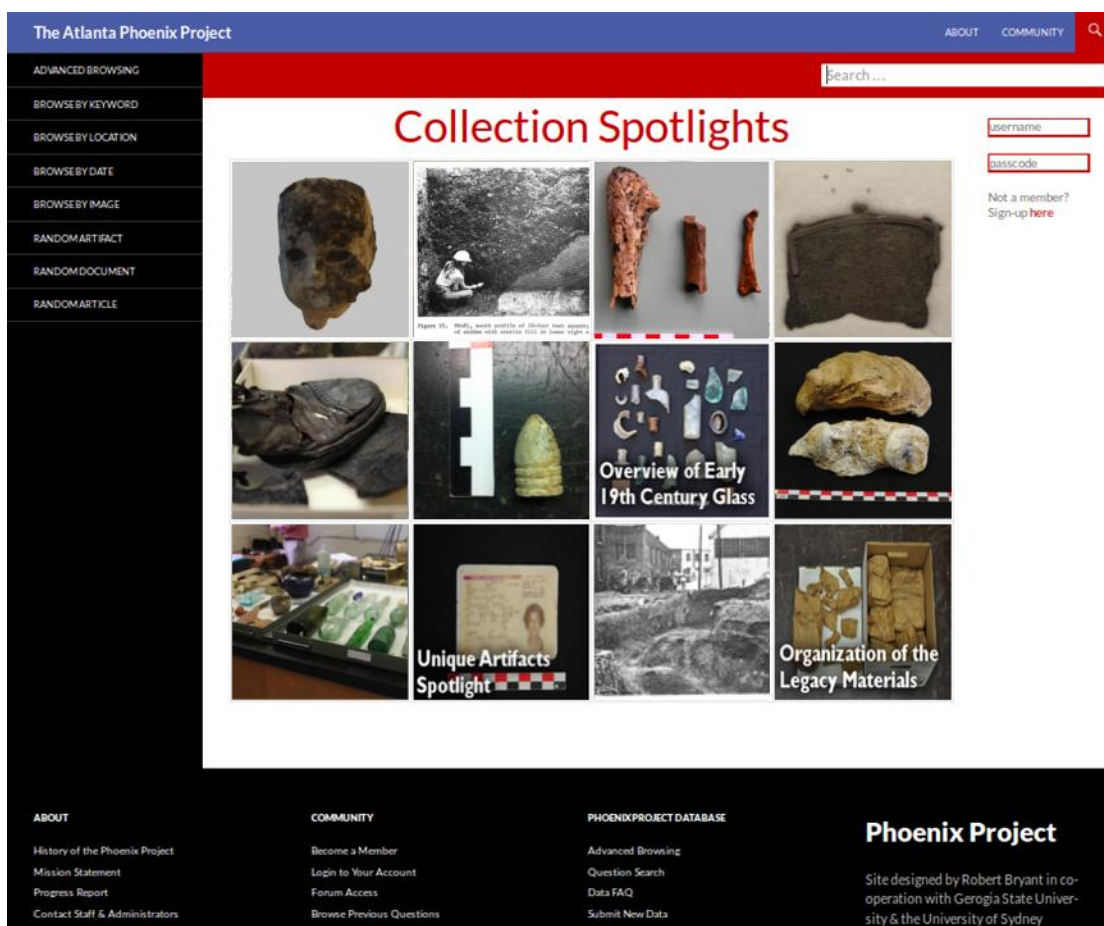

Figure 11 The Phoenix Project Graphical User Interface

6.1.1   WordPress Front-End

The WordPress front-end focuses on a simplified feature set in this first phase of the

Phoenix Project. Although WordPress has powerful built-in comment and discussion tools for all

created content, these features have been disabled until the next phase of development. Storing

and connecting the comment and discussion threads associated with posted content cannot

currently link with the Heurist data management system until an appropriate MySQL relationship

can be established between the historical data's generated query content and WordPress user

discussions. WordPress can manage both blog-style post content and webpage content, but the

Phoenix Project does not require utilizing the built-in WordPress blog feature-set, because all

generated user content will be managed and stored within the Heurist relational database

structure and accessed through appropriate WordPress pages serving that content through custom

PHP functionality.

WordPress will only be managing static pages of information about the Phoenix Project

(Figure 12). These pages include those shown in the footer sitemap of the interface. The

ABOUT

History of the Phoenix Project
Mission Statement
Progress Report
Contact Staff & Administrators

COMMUNITY

Become a Member
Login to Your Account
Forum Access
Browse Previous Questions

PHOENIX PROJECT DATABASE

Advanced Browsing
Question Search
Data FAQ
Submit New Data

Figure 12 WordPress Static Page Content

"About" section contains: a page detailing the history of the Phoenix Project to introduce users

to the data currently available and acknowledging those who are a part of the project; a page

detailing the Phoenix Project's mission of civic engagement and openly detailing the purpose

behind Gamification and its explicit use and function in the project; a page describing the current iteration of the Phoenix Project and feature-sets; and a page detailing administrative staff and how to contact the project with any concerns or thoughts.

The "Community" and "Phoenix Project Database" Sections contain largely disabled pages that will not be active until Phase B of the project. At that point it will serve as a way to quickly access member functions, such as logging into the user's account, creating a new account, accessing the discussion forums, and browsing the most recent user questions to answer or comment on. The "Phoenix Project Database" Section contains a direct link to the Heurist Database for advanced querying needed by researchers, a stronger question search page, a FAQ on the data formats used by Heurist, how that data is organized, and the choices behind the formats and organization chosen, and finally a data submission form that will not be active until Phase C.

6.1.2   Linking it to Heurist

The bulk of the historical, archaeological, and user-generated data will be stored in the Heurist database structure. Although Heurist has its own robust front-end to handle querying this data, it is not user-friendly enough to reach a wider audience outside the scholarly and professional community. This requires linking the simpler WordPress front-end to this complex dataset through embedded PHP access to the Heurist MySQL database. Each PHP script performs a specific query on the relational Heurist database determined by the user's selection at the left query panel (**Error! Reference source not found.**).

"Advanced Browsing" simply takes the user to the Heurist front-end to perform more robust queries of data. Browsing by a keyword will allow the user to search the database using a

single search term. This term may be a single word, like 'stoneware,' or more than one word, like 'stoneware bowl.' The PHP script will perform a blunt query through all records, listing all that have data matching the provided term in alphabetical order (Appendix A). "Browsing by Location" brings up small google map window that allows the user to specify a location by
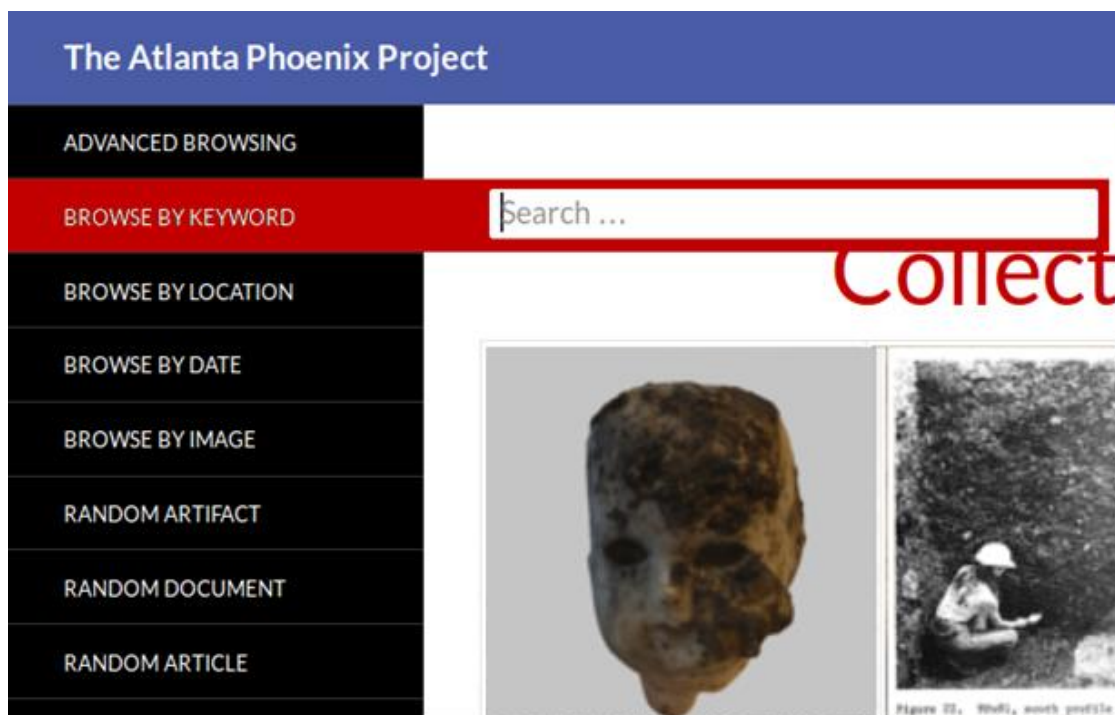
Figure 13 Phoenix Project Browsing Functions

clicking on the map to generate the geographic coordinate or manually typing in the geographic coordinate, and entering the search radius (in meters or feet) to query all records, e.g. an excavated well located in downtown Decatur, Georgia might produce hundreds of records if the user's selection area overlaps the area. Projecting spherical coordinates as needed to the WGS 1984 Web Mercator projection for a Euclidean distance calculation will be fast enough for Phase A, however, as more records are added, the speed of this query would be increased by additionally storing a WGS 1984 Web Mercator coordinate as part of each record with an existing spherical latitude and longitude coordinate so that each individual calculation does not require complicated radial math. The WGS 1984 Web Mercator projection is chosen for the

wider familiarity with Latitude and Longitude coordinates through online public mapping engines, like the GoogleMaps Engine, and also because the Google API automatically outputs locational point data in geographic coordinates rather than projected Euclidean coordinates. All records will be listed from closest to furthest from the coordinate of interest (Appendix A).

"Browsing by Date" lets the user provide a range of time, in years, to query all records in the database for any datable information, e.g., searching for 1920-1930 will provide results for all records that contain date values for that year. Users can also search a single year by simply inputting the same year twice for the range. All records will be listed from earliest to latest. Browsing by image generates a page with a grid of random records that have image data associated with them for the user to browse through. The final three search functions provide quick and simple game-like activity of chance that offer a random artifact, document, or article to explore (Appendix A). "Browsing by Image" takes a single keyword and queries the entire database for image records that have metadata matching the search. The results will be displayed in a grid similar to the landing page.

6.1.3   Other Phase A Features

"Share Information Through Social Media" is automatically implemented in Facebook, Google+, and LinkedIn to display a website or URL as part of their respective interfaces. This is accomplished through Open Graph Protocol (OGP), a standardized metadata schema for social media web applications to access any web page as a rich object in their own API (Open Graph Protocol 2015). Although there are many metadata tags available to describe different forms of online content, the web page format is sufficient for the Phoenix Project, which requires five tags: Title, Type, Image, Description, and URL. Figure 14 shows a Facebook rendering of the actual Open Graph Protocol website as a native Facebook link. This information can be

Figure 14 Example of Facebook's Presentation of Open Graph Protocol

automatically generated by the major social media platforms, but setting these tags in the header

of a web page's header gives control over what thumbnail shows in the link (the blue box in

Figure 14), what title is shown (the green box in Figure 14), and the description of the web page

content (the red box in Figure 14). Control over this information is incredibly important, because

the nature of social media sharing necessitates concise, gripping descriptions and images that

catch an individual's eye. The addition of Facebook, LinkedIn, Google+, and Twitter 'share'

buttons to queried records of interest is done through a simple PHP include in the generated

front-end page.

The main landing page of the Phoenix Project website has a grid of randomly selected

records that have image content associated with them, the "Random Photo Montage." Their

thumbnails are displayed to entice the user to immediately see something of interest and click on

it. Users can additionally click on both the "Random Record" or "Random Article" functions to

do as stated, show a random record, or a random article or report, which although technically still

a record is typically heavier in prose.

The "Search by Question" feature will eventually evolve into the "Search by Question

and Generate User Article" feature in Phase B. The "Search by Question" function in Phase A

simplifies the initial prototype process by forcing three initial query terms: What, When, and Where. It uses these terms to query the relevant data and display it in an organized fashion with elementary text-based statistical values such as: the ratio of glass the user is looking for to total glass in database, total glass per time period, or total glass in a given area. This kind of statistical information will evolve in scope and into visual forms during Phase B.

Until membership status can be sufficiently defined through IRB approval, any features that track and create user data will be left out of Phase A. This initial phase will only require simple hosting on the Georgia State University servers that are managed by the IS&T staff. The site will receive automated backups of data, and enough storage space to fill the Phase A proof-of-concept with enough data to show its immediate efficacy. This display of effectiveness is necessary to begin writing well-structured requests for IRB approval, legal counsel from the university on how to store and track member usage statistics, and apply for graduate student funding to continue building the core digital database into a more feasible size that will be necessary before any realistic attempts at engaging with an online community can begin. Phase A simply does not have enough digital data to grow beyond an initial proof-of-concept. Phase B will plan to include digital conversions of the paper catalogs, the hand written field notes and other miscellaneous administrative files, and more detailed geospatial information from the excavations surrounding a few data-rich sites. Additionally, photographs of several objects will be needed to showcase the more aesthetically pleasing material.

6.1.4   Phase B

This phase will be dedicated to implementing several Gamification features and begin the process of building an interactive community surrounding the Phoenix Project database.

Building upon the initial Phase A full query access, Phase B will allow the users to begin

interacting with the data with more control. By opening up a user membership attached to the

database, users will have control over their interaction and will be introduced to various

Gamification elements.

The first step of Phase B will require getting simple feedback on the proof-of-concept

website from stakeholder communities, like GAAS, local CRM firms, and GSU students, on the

initial iteration to help make necessary tweaks before applying for funding and IRB approval to

continue the project at a relevant pace. The IRB will be necessary to track statistical information

about users and their associated memberships to offer a quantitative analysis of the successes or

failures of the Phoenix Project's goal of civic engagement. Data gathered will include activity

tracking like, usage time, voting history for the popularity of another user's search and

commentary, number of searches performed, number of comments made, ratings of other

members' answers to questions, and provided badges of accomplishment in the database, and

Google Analytics. Membership will be created by allowing users to easily link to their existing

social media accounts on Facebook, Google+, Twitter, and LinkedIn through these platform's

respective APIs, and alternatively by allowing them to perform a quick registration with basic

information and an email account. This integration with social media platforms will allow users

to more easily share content to their interaction outlets and provide a way for the Phoenix Project

to directly notify members of new content that has been added to the database or updated.

Numerous WordPress plugins exist to simplify the coding aspect of this feature. Additionally, a

Phoenix Project specific online message board will allow users to interact with one-another and

share thoughts in a centralized location for individuals regardless of access to other social-media.

This phase will also refine the original Phase A "Search by Query" function to produce a composed webpage of easily accessible content (graphs, charts, and tables as well as metadata) that will be saved to a separate SQL database to prevent the core Heurist and WordPress data from being corrupted, and allow the user to add personalized commentary and interpretations to the data. Other registered members will also be allowed to answer these same questions and provide their own feedback, knowledge, and vote for or rank the questions or answers.
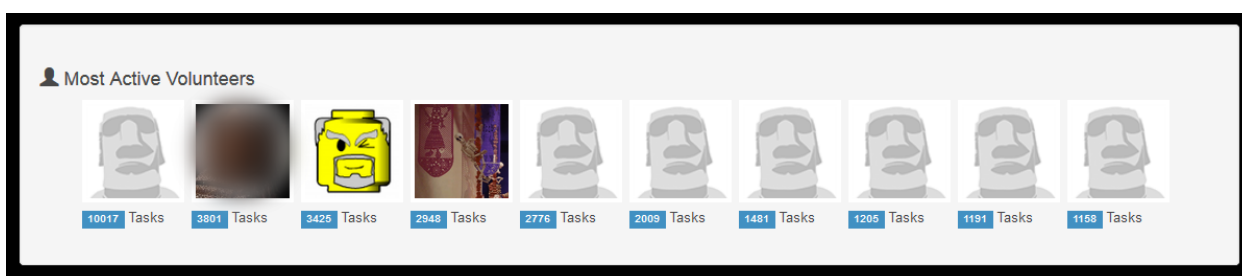
Figure 15 Example of MicroPasts Leadership Board (MicroPasts 2015)

Gamification features in Phase B will include a leadership board, badge and accomplishment system, social competition through rankings or 'upvoting,'and reminders of inactivity through social media. Leadership boards will be posted on the main landing page of the website to promote activity showing the top ten contributors for the month. This timeframe may change to a weekly leaderboard, depending on how feedback received from other members, the quantity of time spent using the website, and the quantity of activities performed, e.g., how many responses have been posted to other users. An example of what this leaderboard may look like can be seen on MicroPasts website (Figure 15).

Membership badges, or ranks, will provide a more temporally stable framework of accomplishment. Although leadership boards provide a dynamic impetus to compete, permanent rewards, ranks, or badges of accomplishment serve to reinforce the importance of the user's own accomplishments, and offer a quantifiable and coherent means to achieve status. MicroPasts also

offers an example of what these badges might look like for the Phoenix Project members (Figure

16). These badges are typically shown as a represented icon with a label clearly defining how the

badge was achieved. Members will also be reminded of inactivity through registered email

addresses or through linked social media accounts. This could be achieved through either

messages with direct questioning, e.g. "Where have you been?" or through reminders of new

content or activity on the website. The website will finally offer a mobile-friendly design outside

of basic WordPress window resizing functionality.

Once Phase B is completed and functional, there will need to be a six to twelve month

time period of data collection to report on and retool any features as necessary before continuing

on to Phase C, which will inevitably require further funding. This funding is needed to continue

the digitization of the archaeological material and create promotional materials or exhibits to

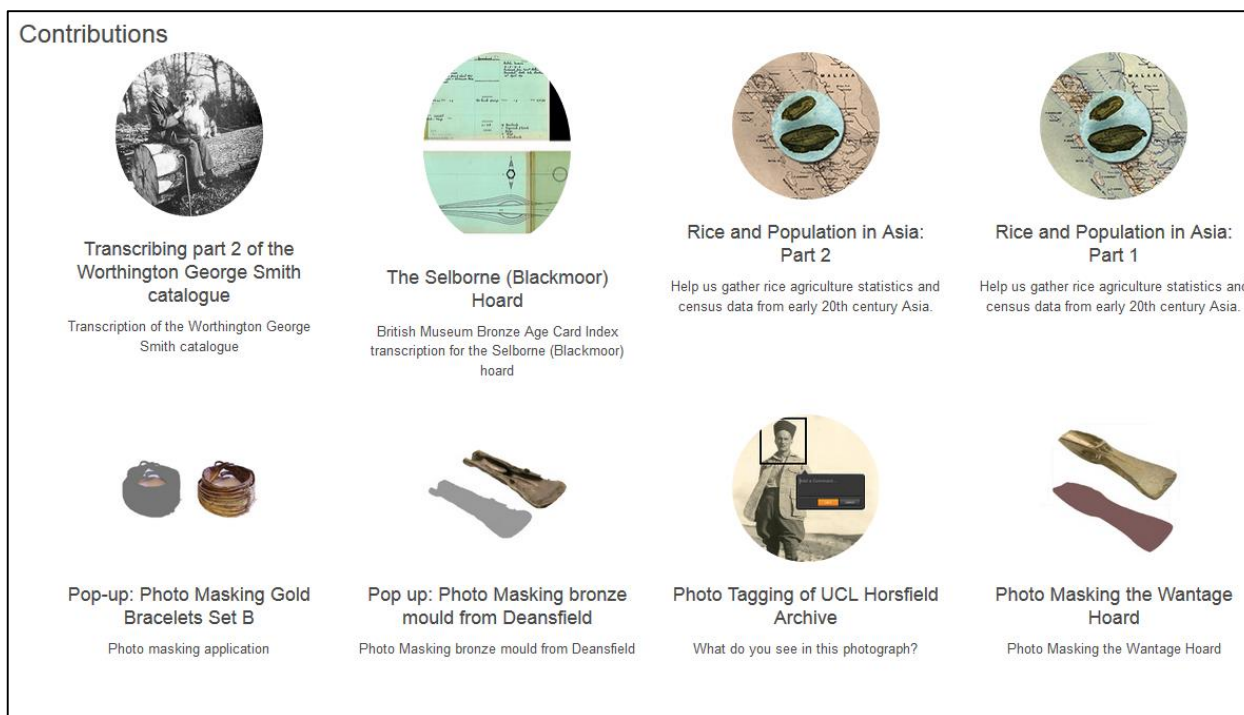help broadcast the project to more audiences. Further IRB approval may be needed to conduct

Figure 16 Example of MicroPasts Membership Badges (MicroPasts 2015)

additional research on usage statistics once the original approval expires unless an indefinite compromise can be termed. If the Phase B implementation is successful, the project as a whole will benefit many fields of research, making continual funding more realistic to obtain.

Because the server will reside on Georgia State University's network, the concerns over the longevity of the server are not important due to the stability of a university system's network. In the case of needing to move the server, funding will need to be set aside to move the website over to a new server—an easy prospect because of the widespread support of SQL, recently purchased by Oracle. Finally, faculty will have to be tapped to act as an administrator of the website once it begins developing a user base that will necessitate moderation. This responsibility can also be shared with graduate assistants or other trusted individuals.

6.1.5   Phase C

The final phase of the project will attempt to fully implement civic engagement through empowering the membership with more access to the database by using White Hat principles of relinquishing more control of the historical narrative to their own interpretations. Members will be allowed to reinterpret all records of information and their reinterpretations will be shown along with the accepted professional interpretations. An example of this would be determining the date and style of a particular artifact. A ceramic vessel might be professionally dated to the 1920's, but another user will have the option to offer their own interpretation with their own reasoning. All members will have the ability to vote on these interpretations, and the most voted will remain at the top of a list of interpretations below the professional interpretation. Unknown items or artifacts will also benefit from user suggestions, effectively crowd-sourcing information to help define the shared cultural heritage and adding another game-like activity to promote engagement.

Minigames will also be added to enhance the Gamification through actual games that users can interact with. The games will feed back into the game badge and leaderboard ranking systems through providing additional badges or accomplishments. The first game will consist of an image guessing game, where users will have to correctly identify an object shown through multiple choice options. The images in this game will be randomly selected from all records that have the necessary identification to automate the process rather than requiring direct administrative setup. An online quiz game will allow users to perform archaeological evaluations of objects. It will be similar to the image guessing game, but will focus on training users in methodology like studying and answering questions on interpreting sections of trenches or units, or reading and interpreting site plans. These quizzes will require administrator creation but a template can be used to make it easier to add new quizzes. Another game will utilize the same black hat principles from Day of the Figurines. Users were subjected to random, unscheduled events, where if the user did not respond, they would miss out on an opportunity to interact, in an attempt at fostering emotions like guilt to affect the users behavior towards a desired goal. Online competitive matches will sporadically alert users through social media or email to an event where users might be required to locate an item in the database based on clues, or correctly identify an unknown object for certain awards or prizes, like unique badges. Additionally, these competitions can also be scheduled events, where if a user simply participates in a regularly occurring event, they will acquire unique prizes not accessible to those who did not participate. This provides a comfortable regularly occurring enticement, while the unscheduled games provide the anxiety-focused enticement.

Members will also be allowed to upload their own data to the Phoenix Project through simple to use online forms. These data might be locations for features or artifacts and will

receive an additional flag as "unconfirmed" until a professional administrator can verify the data and remove the flag. This flag is necessary for professional and academic researchers who wish to filter out any unconfirmed or unethically gathered (fossicking) data in their research projects that require factual data. Although not all user-submitted data will understandably be genuine, it provides the stakeholders interacting with the Phoenix Project an important level of interaction and control over the online community, while retaining a degree of professional and ethical separation in the data for researchers.

Member chosen levels of anonymity also provide incentive for owners of private collections to submit their artifacts and cultural heritage to the public. Although Phoenix Project administrators will have access to knowing which members are submitting what data, those users can select whether or not other members or the public can see who owns the objects and data submitted. Although this does not necessarily fall in line with the SAA guidelines that restrict involvement and support of private collections, the goal is to provide a place that encourages those with private collections to have their collections publicly curated through consultations with Phoenix Project administrators who can assist in locating suitable curation facilities. All private collection material will remain 'unverified' until donated to some form of public curation like a museum, or university (SAA Guidelines 2015). Furthermore, the SAA guidelines typically apply to private collections obtained through illegal markets or fossicking. It would be difficult to accuse a collector with a private collection of early twentieth century whiskey jugs or early glass power line insulators of site destruction or unethical practices when their collection may have been inherited from grandparents, or purchased through estate sales, antique shops, and other legal means. Rather than alienate these collectors, the project seeks to educate them and reward proper curation and dissemination of information and data. This feature will be carefully

weighed and tweaked before being available in Phase C due to the complicated ethical issues arising from private ownership of archaeological and historical data.

Registered professionals and academics will also have the same access to submit data to the Phoenix Project and expand its influence. By uploading their own datasets to the Phoenix Project, they can better research their own topics in a cohesive and pliable database, while also sharing their data directly with the public. Professional and academic members will also have access to statistical information unique to their membership to add to their *curriculum vitae*. IRB-approved surveys will be used to assess what quantifiable information best assists this community to record and communicate their public engagement. This might be represented as the number of hours logged answering questions for public stakeholder groups, number of submitted public-oriented articles, or successes in moving private collections into public curation. The goal is to provide an incentive within an academic system of scholarly capital to interact with the public and show quantifiable efforts for employment and tenure applications.

By the end of Phase C, the only concerns for sustainability will be the server itself. If the project is truly successful, the website will be self-moderated by various professionals and academics affiliated with Georgia State University and other Atlanta cultural heritage communities. A strong, core user-base will also facilitate self-moderation by delegating this responsibility to trusted long-time users. Additionally, these moderators will need to seek new sources of data if no current data from within the collection requires digitization. This new data might come from CRM curation to continually fill the database with new information relevant to the Atlanta community. Funding will always be necessary to update and improve the website, but at this stage, it should only be to seek out new data to engage the community that actively uses it.

7 CONCLUSION

Praxis is often left out of the discussion of research for various reasons. The Phoenix Project offers a powerful opportunity to continue exploring a new paradigm of civic engagement with archaeological data, and more importantly, stakeholders' and researchers' cultural pasts. It is not sufficient to think only in terms of public involvement, because the responsibility of research in any discipline is to actively engage the community it is involved with. It is no longer enough to simply offer data for free. It is a praxis-based researcher's responsibility to successfully integrate that data within the cultural frameworks of its stakeholders, utilizing contemporary vernacular outlets. The digital age of information offers a tremendous opportunity to start exploring successful avenues of this methodology through social media and Gamification, and the Phoenix Project, through the online Heurist interface, is an important step at solidifying this archaeological Praxis approach towards civic engagement.

The first phase of the larger project serves as both a small learning ground that can grow into a much larger platform for public interaction as well as a stepping-stone to obtain future funding, focused specifically on grants from the National Endowment of the Humanities (NEH) that support digital humanities projects. Phase B will begin implementing the previously specified gamification features to test which work well in the context of civic engagement to promote sustained user-interaction. This phase will require the most tweaking as more data is collected through user activity statistics and qualitative surveying. Phase C hopes to allow the Phoenix Project to expand beyond its initial implementation of civic altruism through allowing open access to the collection of historical Atlanta heritage into a dynamic and powerful dataset that promotes civic engagement by empowering both researchers, and the communities they work with and in through a sustainable online community of sharing and interaction.

The historical collection tied to Atlanta's dwindling past is incredibly important to researchers and the current communities that live in the city. Often Atlanta's cultural heritage is thought to have been burned away with Sherman's march, but it is the city's citizens who have slowly razed the city's heritage in the name of urban development and renewal. In terms of Atlanta, I hope that the Phoenix Project will engage, remind, educate, and challenge various stakeholder groups through gamified online civic engagement to better collaboratively understand the landscape of Atlanta before modern urban development in an effort to preserve it—not just from a data standpoint—but through the social consciousness that informs the city's culture and future development.

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APPENDICES

Appendix A   PHP Code Examples

Query Function: Random Image Block Display

```php
1
2 <?php
3 $username = "root";
4 $password = "*******";
5 $hostname = "localhost";
6
7 $HEURIST_HOSTNAME = "http://localhost";
8
9 // these Heurist ID values might change depending on heurist database
10 $H_ID_Files = "38"; //uploaded file id code
11 $H_ID_DigitalRecord = "5";
12
13 //connection to the database
14 $dbhandle = mysql_connect($hostname, $username, $password)
15 or die("Unable to connect to MySQL");
16
17
18 //select a database to work with
19 @mysql_select_db("hdb_www_phoenix") or die( "Unable to select database");
20
21
22 $query = "SELECT * FROM Records WHERE rec_RecTypeID = $H_ID_DigitalRecord ORDER BY
       RAND() LIMIT 12";
23 $result = mysql_query($query);
24 $array_random_records = array();
25 while($row = mysql_fetch_assoc($result)){
26 //iterate over all the fields
27
28
29 foreach($row as $key => $val){
30 //generate output
31 if($key == "rec_ID") $array_random_records[] = $val;
32
33 }
34
35 }
36
37
38
39
40 $array_image_file_ids = array();
41 foreach($array_random_records as $recID){
42
43 $query = "SELECT * FROM recDetails WHERE dtl_RecID = $recID AND dtl_DetailTypeID =
       $H_ID_Files ";
44 $result = mysql_query($query);
45 foreach(mysql_fetch_assoc($result) as $key => $val){
46 //generate output
47 if($key == "dtl_UploadedFileID") $array_image_file_ids[] = $val;
48
49 }
50
51 }
52
```

```
53
54 echo "<table border=0 padding=5>";
55
56
57 $counter = 0;
58 echo "<tr>";
59 foreach($array_image_file_ids as $recID){
60
61 $rec_num = $array_random_records[$counter];
62 $counter++;
63
64 $query = "SELECT * FROM recUploadedFiles WHERE ulf_ID = $recID";
65 $result = mysql_query($query);
66
67 foreach(mysql_fetch_assoc($result) as $key => $val){
68 //generate output
69
70 if ($key == "ulf_OrigFileName") echo "<td><a href=" . $HEURIST_HOSTNAME .
       "/HEURIST/h3//records/view/viewRecord.php?db=www_phoenix&recID=" . $rec_num .
       "><img width=200 height=200 src=" . $HEURIST_HOSTNAME .
       "/HEURIST/h3/records/files/downloadFile.php/" . $val .
       "?db=www_phoenix&ulf_ID=";
71 if ($key == "ulf_ObfuscatedFileID") echo $val . "></img></a></td>";
72 }
73
74 if ($counter == 4) echo "</tr><tr>";
75 if ($counter == 8) echo "</tr><tr>";
76 } echo "</tr>";
77
78
79 echo "</table>;
80
81 ?>
```

Query Function:Basic Key Term Search

```php
<?php
$username = "root";
$password = "******";
$hostname = "localhost";


$HEURIST_HOSTNAME = "http://localhost";
$databaseName = "hdb_www_phoenixproject";
$databaseNameShort = "www_phoenixproject";
// these Heurist ID values might change depending on heurist database
$H_ID_Files = "38"; //uploaded file id code
$H_ID_DigitalRecord = "5";
$H_ID_Person = "10";
$H_ID_Place = "12";
$H_ID_Site = "23";
$H_ID_CollectionUnit = "24";
$H_ID_SpecCatalogEntry = "25";
$H_ID_RecordingEvent = "26";

//connection to the database
$dbhandle = mysql_connect($hostname, $username, $password)
  or die("Unable to connect to MySQL");
```

```php
//select a database to work with

@mysql_select_db("$databaseName") or die( "Unable to select database");

$keyword = $_POST["keyword"];
$recIDholder = 0;
$recNameHolder;

//Search through all records looking for any reference to the keyword
//for each reference, the detail id needs to be looked up in the detail types
table (ie the dropdown options)
//    with the dtl_value . First check is dtl_value matches then check if the
trm_Label $key value matches
//if a reference is found, list the record as its Records title

$query = "SELECT * FROM recDetails";
$result = mysql_query($query);

while($row = mysql_fetch_assoc($result)){
    //iterate over all the fields

    foreach($row as $key => $value){
        //generate output
    $tempKey = $key;
    $tempVal = $value;
    if ($tempKey == "dtl_RecID"){
        $recIDholder = $tempVal;
    }

        if ($tempKey == "dtl_Value"){
        $recquery = "SELECT * FROM Records WHERE rec_ID = $recIDholder" ;
        $recresult = mysql_query($recquery);
        foreach(mysql_fetch_assoc($recresult) as $a => $b)
            if ($a == "rec_Title") $recNameHolder = $b;
        if (strpos($value, $keyword) !== false) echo "<a href=" .
$HEURIST_HOSTNAME . "/HEURIST/h3//records/view/viewRecord.php?db=" .
$databaseNameShort . "&recID=" . $recIDholder . ">" . $recNameHolder .
"</a><br><br>";

    }
    }

}
?>
```

Query Function:Search by Geolocation

```html
<script
src='https://maps.googleapis.com/maps/api/js?key=AIzaSyBM0LredW2XL1XPBTzeEVKS
PYOYHLHU9Wg&sensor=false&extension=.js'></script>
```

```html
<div id='locationpicker'></div>

<script>
    google.maps.event.addDomListener(window, 'load', init);
    var map;
    function init() {
        var mapOptions = {
            center:new google.maps.LatLng(33.76602,-84.356004),
            zoom:10,
            zoomControl:true,
            zoomControlOptions:{
                style:google.maps.ZoomControlStyle.DEFAULT,
            },
            disableDoubleClickZoom:true,
            mapTypeControl:false,
            scaleControl:true,
            scrollwheel:true,
            panControl:false,
            streetViewControl:false,
            draggable :true,
            overviewMapControl:false,
            overviewMapControlOptions:{
                opened:false,
            },
            mapTypeId:google.maps.MapTypeId.ROADMAP,
            styles:[ {
            "stylers":[
              { "hue":"#007fff" },
              { "saturation":89 }
            ]
          },{
            "featureType":"water",
            "stylers":[
              { "color":"#ffffff" }
            ]
          },{
            "featureType":"administrative.country",
            "elementType":"labels",
            "stylers":[
              { "visibility":"off" }
            ]
          }
],
        }
        var mapElement = document.getElementById('locationpicker');
        var map = new google.maps.Map(mapElement, mapOptions);
     google.maps.event.addListener(map,'click',function(event) {
        document.getElementById('lat').value = event.latLng.lat()
        document.getElementById('long').value = event.latLng.lng()
    })
        var locations = [
        ];
        for (i = 0; i < locations.length; i++) {
            if (locations[i][1] =='undefined'){ description ='';} else {
description = locations[i][1];}
            if (locations[i][2] =='undefined'){ telephone ='';} else {
telephone = locations[i][2];}
```

```
            if (locations[i][3] =='undefined'){ email ='';} else { email =
locations[i][3];}
            if (locations[i][4] =='undefined'){ web ='';} else { web =
locations[i][4];}
            if (locations[i][7] =='undefined'){ markericon ='';} else {
markericon = locations[i][7];}
            marker = new google.maps.Marker({
                icon:markericon,
                position:new google.maps.LatLng(locations[i][5],
locations[i][6]),
                map:map,
                title:locations[i][0],
                desc:description,
                tel:telephone,
                email:email,
                web:web
            });
link = '';       }
}
</script>


<form>
<input id=lat size=20>Lat</input>
<input id=long size=20>Long</input>
<br>
<input id=long size=20>Search Radius in Miles</input>
<br>
<input type="submit" value="Search"></form>
</form>
```

Query Function:Search by Image

```php
<?php
$username = "root";
$password = "*******";
$hostname = "localhost";
$H_ID_Person = "10";
$H_ID_Place = "12";
$H_ID_Site = "23";
$H_ID_CollectionUnit = "24";
$H_ID_SpecCatalogEntry = "25";
$H_ID_RecordingEvent = "26";

$HEURIST_HOSTNAME = "http://localhost";
$databaseName = "hdb_www_phoenixproject";
$databaseNameShort = "www_phoenixproject";
// these Heurist ID values might change depending on heurist database
$H_ID_Files = "38"; //uploaded file id code
$H_ID_DigitalRecord = "5";

//connection to the database
$dbhandle = mysql_connect($hostname, $username, $password)
  or die("Unable to connect to MySQL");
```

```php
//select a database to work with
//$selected = mysql_select_db("hdb_www_phoenix",$dbhandle)
//   or die("Could not select examples");

@mysql_select_db("hdb_www_phoenixproject") or die( "Unable to select
database");


$query = "SELECT * FROM Records WHERE rec_RecTypeID = $H_ID_DigitalRecord
ORDER BY RAND()";
$result = mysql_query($query);
$array_random_records = array();
while($row = mysql_fetch_assoc($result)){
    //iterate over all the fields

    foreach($row as $key => $val){
        //generate output
    if($key == "rec_ID") $array_random_records[] = $val;

    }

}

$array_image_file_ids = array();
foreach($array_random_records as $recID){

    $query = "SELECT * FROM recDetails WHERE dtl_RecID = $recID AND
dtl_DetailTypeID = $H_ID_Files ";
    $result = mysql_query($query);
    foreach(mysql_fetch_assoc($result) as $key => $val){
            //generate output
        if($key == "dtl_UploadedFileID") $array_image_file_ids[] = $val;

        }

}

echo "
<table border=0 padding=2>";

$counter = 0;
echo "
<tr>";
foreach($array_image_file_ids as $recID){

        $rec_num = $array_random_records[$counter];
        $counter++;

    $query = "SELECT * FROM recUploadedFiles WHERE ulf_ID = $recID";
    $result = mysql_query($query);

        foreach(mysql_fetch_assoc($result) as $key => $val){
        //generate output
```

```php
        if ($key == "ulf_OrigFileName") echo "
<td><a href=" . $HEURIST_HOSTNAME .
"/HEURIST/h3//records/view/viewRecord.php?db=$databaseNameShort&recID=" .
$rec_num . "><img style=width:200px;height:200px; src=" . $HEURIST_HOSTNAME .
"/HEURIST/h3/records/files/downloadFile.php/" . $val .
"?db=www_phoenix&ulf_ID=";
        if ($key == "ulf_ObfuscatedFileID") echo $val . "></img></a></td>
";
            }

if ($counter % 4 == 0) echo "</tr>
<tr>";

} echo "</tr>
";

echo "</table>
";
?>
```

Query Function:Random Artifact

```php
<?php
$query = "SELECT * FROM Records WHERE rec_RecTypeID = $H_ID_SpecCatalogEntry
ORDER BY RAND() LIMIT 1";
$results = mysql_query($query);
while($row = mysql_fetch_array($results)){
    foreach($row as $key => $value){
        //generate output

    if ($key == "dtl_RecID")
        echo "<a href=" . $HEURIST_HOSTNAME .
"/HEURIST/h3//records/view/viewRecord.php?db=" . $databaseNameShort .
"&recID=" . $value . ">Random Artifact</a>";
}
}
 ?>
```

Query Function:Random Document

```php
<?php
$query = "SELECT * FROM Records WHERE rec_RecTypeID = $H_ID_DigitalRecord
ORDER BY RAND() LIMIT 1";
$results = mysql_query($query);
while($row = mysql_fetch_array($results)){
    foreach($row as $key => $value){
        //generate output

    if ($key == "dtl_RecID")
        echo "<a href=" . $HEURIST_HOSTNAME .
"/HEURIST/h3//records/view/viewRecord.php?db=" . $databaseNameShort .
"&recID=" . $value . ">Random Document</a>";
}
```

```
}
?>
```

Query Function:Random Report

```php
<?php
$query = "SELECT * FROM Records WHERE rec_RecTypeID = $H_ID_DigitalRecord
ORDER BY RAND() LIMIT 1";
$results = mysql_query($query);
while($row = mysql_fetch_array($results)){
    foreach($row as $key => $value){
        //generate output

    if ($key == "dtl_RecID")
        echo "<a href=" . $HEURIST_HOSTNAME .
"/HEURIST/h3//records/view/viewRecord.php?db=" . $databaseNameShort .
"&recID=" . $value . ">Random Report</a>";
}
}
?>
```

Appendix B   Glossary of Technical Terms

PHP
PHP is a server-side scripting language designed for web development that can be blended with HTML and Javascript or used on its own. PHP stands for Hypertext Preprocessor.

HTML
Hypertext Markup Language (HTML) is the standard XML based markup language used to create webpages and other online content. Web browsers use HTML to interpret design and layout.

MySQL
A widely used open-source relational database management system that is regularly featured in a LAMP software stack. SQL stands for Structured Query Language. Written in C and C++.

Javascript
A dynamic programming language commonly used in web content and activated client-side rather than server-side. With AJAX, javascript can interact with a server dynamically rather than only on a user's own browser.

AJAX
Asynchronous Javascript and XML (AJAX) is a set of related web development techqnieus used on the client's browser to create asynchronous web applications rather than static websites. Rather than reloading an entire page to refresh content, AJAX allows a user's browser to dynamically change specific elements through Http Requests.

LAMP
A model of web service software stacks named for its original four components:Linux, Apache, MySQL, and PHP. LAMP's parts are interchangeable with other software packages, e.g., a WAMP stack is a LAMP stack installed on the Windows operating system. A LAMP stack allows the building of dynamic websites and web applications.

LINUX
A Unix based computer operating system operating under the free and open-source model.

APACHE
An HTTP webserver. It is the world's most widely used HTTP webserver software and operates under the free and open-source model. It is most widely used on Linux servers, but is available on most major operating systems.

WordPress
A free and open-source blogging tool and content management system built on PHP and MySQL. It contains many interchangeable templates and plugins that can be further customized.

Heurist

A generic relational database developed by Ian Johnson at the University of Sydney based on the MySQL database format.

XML
Extensible Markup Language (XML) defines a set of rules for encoding data in a format that is readable by both humans and machines. It focuses on generality so that specific sets of rules, like HTML, can be created while still maintaining a base framework that can be easily translated to other sets of rules.

KML/KMZ
Keyhole Markup Language (KML) is an XML based notation for defining geospatial data, e.g. place marks, images, polygons, textual descriptions, etc. It is now owned by Google and the standard for their Google Maps and Google Earth frameworks. A KMZ is simply a zipped(compressed) KML file that might also contain specific overlay image content or larger data, like 3d models, referenced in the attached KML file.

API
An application programming interface (API) is a set of prefabricated code libraries for building applications specific to a given framework, e.g., a Facebook API provides code libraries to quickly design applications for the Facebook architecture. An API provides the 'building blocks' to create an application that a programmer can quickly build with rather than create the blocks themselves.

OGP
Open Graph Protocol (OGP) lets web developers seamlessly integrate their web content into social media platforms that reference or link to it by choosing how the content is displayed on these platforms through embedded meta data.