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Creating Digital Heritage content; bridging communities and mediating perspectives

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Abstract: In this paper we focus our attention on an often overlooked aspect of digital heritage content, namely *by whom how, and with what purpose* such content is created. We evaluate digital materials that are anthropological and archaeological in nature, both digitized archives and newly created materials. In our work and efforts to understand and represent different cultural perspectives, we have encountered differences in cultural knowledge systems that have shown the need for cross-cultural consultation and communication as an essential first step in the creation of digital content for new systems of representation and knowledge transfer. Our efforts focus on developing a new educational framework that allows for knowledge exchange at different levels and between different entities, challenging the perpetuating hierarchical relationships between community and experts.

Keywords: multiple narratives, community collaboration, digital divide, educational paradigm

INTRODUCTION

The advancement of modern technologies has clearly revolutionized the way we do things, how we relate to one another, and the methods we use to preserve cultural heritage for future generations. Under this need to preserve culture, and make it readily available for present and future generations, UNESCO defines cultural heritage as “our legacy from the past, what we live with today, and what we pass on to future generations” (UNESCO). Cultural preservation, in this context, is seen as an endowment for future generations. Even though everyone might agree that saving cultural vestiges using digital media is a positive step toward preserving a legacy for future generations; not everyone agrees on *who* really benefits from cultural heritage preservation or *how* to go about preserving culture.

In the design of digital cultural heritage applications, the goal is often to provide content to a broad-based public. Because of this fact, content is often generalized and not focused on, or sensitive to, specific user groups; in other words, the creators of cultural content assume that the meanings are universal. Content is often tailored to a ‘public’ that is well aware of the importance of heritage preservation, protection, and outreach within a specific dominant paradigm. However, such a worldview is not always in concordance with the worldviews of specific cultural groups (Schmidt and Patterson 1995); that is, cross-cultural differences exist in the beliefs about the ways cultural material should be protected, represented, and communicated.

Cultural histories of distinct groups are often incorporated into a larger universal heritage, (Cameron 2008; Srinivasan, Enot, Becvar, and Boast 2009; UNESCO), whereby specific knowledge systems and cultural ideas are often overlooked in favor of dominant views or representations. Digital technologies offer many opportunities to manage cultural heritage; however, in doing so they have also brought issues of differential access to the forefront. Even

though more and more people have access to digital information, through personal computers, handheld devices, etc., the *digital divide*, originally defined as the difference between the have's and have not's, has not disappeared. Moreover, it is now clear that the issue of access is not merely a matter of who can acquire digital technologies, but it is also a matter of who creates digital content and who has access to such content. If digital heritage content serves primarily the needs of an affluent audience then based on a measure of 'content relevance', the gap may become wider instead of narrower (www.digitaldivide.org). If created content serves primarily the needs of the affluent, then, based on a measure of 'content relevance', the gap may become wider instead of narrower.

However, when appropriately used digital technologies can provide many communities with essential tools for cultural continuation, communication and survival, and a number of innovative projects and research programs have been initiated over the last decade to bridge the information gap (Cristen). All of these projects involve community collaboration and seek to address specific community needs. We have broadly classified them into three categories (Figure 1). They include: 1) projects that are based on community involvement, this category provides community and its members tools to interact and/or comment on already existing content; 2) projects based on community co-creation, these type of projects create alternative systems of cultural context and content exchange based primarily on community characteristics; 3) community-based participatory projects, these projects are often initiated based on a specific community need, cultural, and/or socio-political. Within the background section of this paper we discuss these recent developments and identify a number of issues and problems related to current approaches of community collaboration, which will be used to frame the discussion of our proposed educational model.

Our efforts are focused on *how*, by *whom*, and for what *purpose* digital heritage content is created (and maintained). Our goal is also to propose ways by which education and training can be used to reduce the digital divide. Along these lines, we propose an educational model that is multifaceted; focusing not only on information exchange and communication but also on providing communities with tools and resources that will allow them to create their own digital heritage content and systems. Our educational model brings together traditional university students and community members in order to encourage a change of attitude in the traditional paradigms in which local communities are seen as merely centers from where academics can gather data for research. By creating an educational process in which students learn about community challenges and solutions, our contention is that it will help to develop a greater consciousness about community problems and the solutions that could emerge from academy-community collaborations. This, we argue, shifts the ‘digital divide’ problem from a problem primarily for underserved communities to a broader problem of digital heritage, namely incorporate the training of the next generation of ‘heritage managers’ in collaborative projects.

**MULTIPLE NARRATIVES
Digital heritage systems**

Critical Approaches toward Heritage management

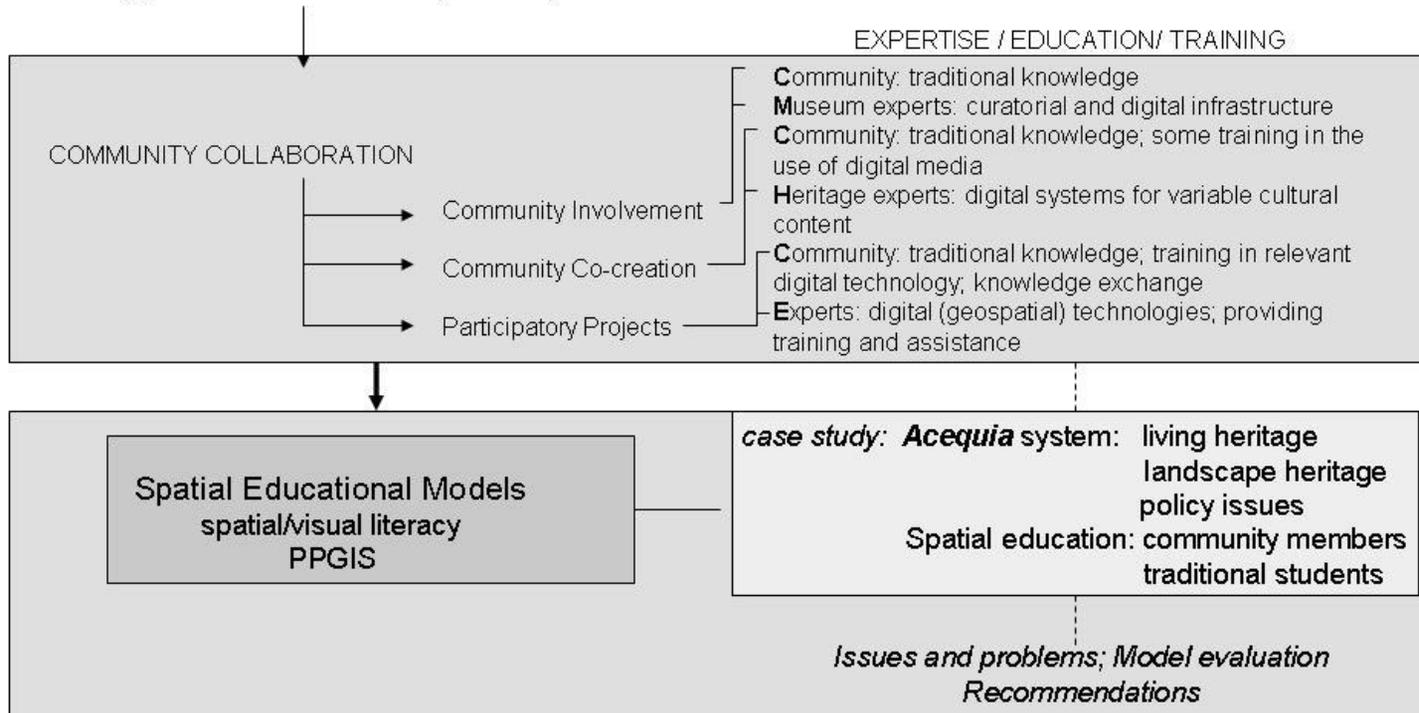


Figure 1: Chapter Overview

Our education model is derived from project-based learning strategies that offer creative settings in which students and community members collaborate in order to facilitate knowledge exchange. We focus on geospatial technologies because they provide a means to understand socio-cultural phenomena. Additionally, they help students develop spatial/visual literacy, which is essential when creating alternative frameworks for digital heritage content (www.bie.org; www.csiss.org; Bransford, Brown and Cocking 2000, Forte 2007; Goodchild and Janelle 2004; Ware 2000).

The objectives of this chapter are: (1) outline the problem of digital heritage in the context of community-based projects, (2) provide an overview of the breadth of projects that are currently considered to be community oriented, (3) explore current issues and opportunities for digital heritage applications to incorporate multiple narratives, and (4) present a case study in which we outline an educational strategy that encourages ongoing dialogue in the creation of digital heritage content and the use of digital media.

BACKGROUND

In the traditional paradigm of cultural heritage management, the stakeholders are typically representatives of government agencies and NGOs, academia and industry – as such these bodies become the determinants, or producers, of heritage content and the ‘public’ constitutes the consumer (Figure 1). Digital heritage, a relatively recent phenomenon is a growing part of cultural heritage management. According to UNESCO, “digital heritage is made up of computer-based materials of enduring value that should be kept for future generations” (UNESCO). The limitation of such a generalized definition is that the focus is on preserving the material aspects of cultural heritage rather than on understanding cultures as dynamic and

STAKEHOLDERS IN DIGITAL HERITAGE

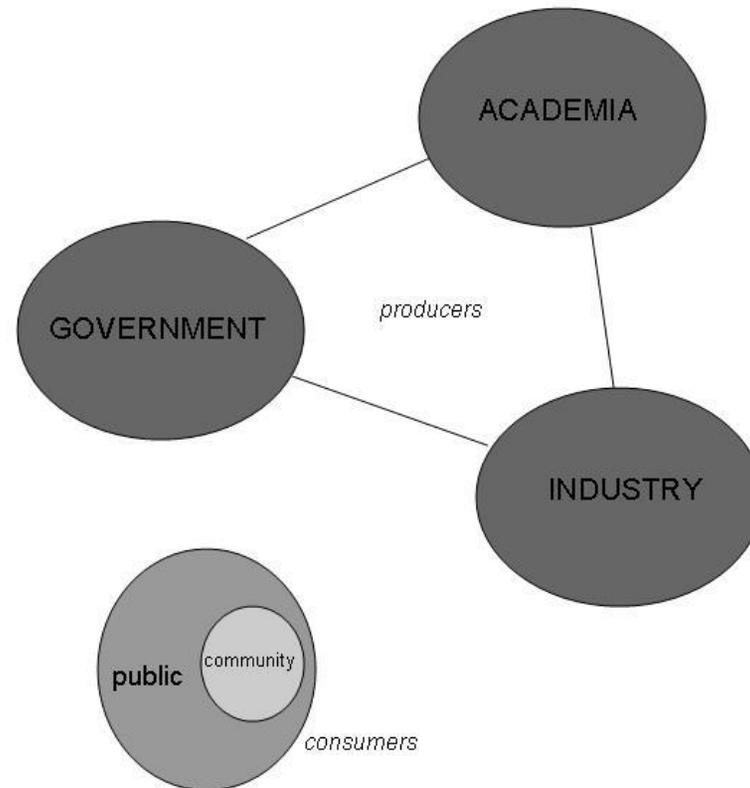


Figure 2: Traditional Paradigm of Stakeholders in Cultural Heritage Management

adaptive entities that constantly deal with and adjust to global circumstances. Given these circumstances, digital content cannot continue to be constructed by only the traditional stakeholders, but instead the concept of stakeholders must become more encompassing to include communities; otherwise the process of cultural heritage management becomes simply a reflection of colonial practices in which peoples' histories and voices are not included.

According to Cameron (2007:170) “digital heritage is a deeply political concept and practice” and thus current stakeholders must be careful to avoid superimposing their beliefs about what is worth preserving on others. Fortunately, digital heritage applications have the ability, or potential, to represent multiple narratives (Russo and Watkins 2007), and consequently can be a useful medium for democratizing access to information as well as a process of collaboration between academia and local communities. This is because digital media is a relatively low-cost method to preserve and disseminate materials that would otherwise only be available to a small audience.

Issue	References	Main Contribution
Critical Approaches in Digital Heritage	Cameron, 2007	
	Kwan and Lee 2004	Critical GIS
	Levinson, 2008	Spatial cognition, linguistic diversity
	Srinivasan, 2009	Design of digital systems, community collaboration and ontologies
Spatial/visual Teaching and Learning	Goodchild & Janelle, 2004	Integrating spatial perspectives and technologies in social science
	Forte	Informative and Communicational aspects of digital technologies

Table 1: Literature Related to Main Issues

Recent efforts to include community perspectives focus on two concepts, which include the approaches of multiple narratives and multivocality. ‘Multiple narratives’ takes into account

the existence of different perspectives and as such it contradicts the concept of a (single) Truth. The widespread adoption of digital technologies, such as social networking, allows for an increase in user feedback, enabling a dynamic interaction that diminishes the sharp distinction between creators (official interpreters) and consumers. The result is that user or visitor perspectives, i.e. multiple narratives, can be integrated into cultural heritage material (references). ‘Multivocality’, a related concept, is described as giving a voice to underrepresented groups to provide alternative interpretations (of the past) (Habu et.al. ed. 2008). These groups are often descendant communities, and their ‘alternative’ interpretations are expected to provide depth to the accepted interpretation of the cultural material, instead of a mere personal experience. In this approach only specific groups are targeted to provide a contribution, and it is mostly about their history.

Although people have begun to employ the concepts of multiple narratives and multivocality in their efforts to create alternative interpretations of cultural material, the frameworks for interpretation including the materials selected and how they are represented, are often determined by the same three stakeholders (Waters 2007, Smith 1999). Until communities (descendant and otherwise) become stakeholders on equal footing we believe that multiple narratives and multivocality will only provide superficial change in cross-cultural understanding.

A community can be defined as a group of people with a common background or *shared* interest, and community oriented research generally indicates a research project that is initiated by experts in collaboration with a community focused on a specific *shared* component, whereby the nature and intensity of this collaboration can vary. Communities, however, are more often than not heterogeneous entities that may be defined as homogeneous only by outsiders. The preservation or perpetuity of community characteristics, values, and traditional knowledge from

a community perspective should therefore be considered as a dynamic process of redefining relationships in an ever-changing world, instead of monolithic cultural entities, or worse, as relics. The next section discusses the three broad categories of community collaboration outlined in the introduction serve to provide a framework for discussion of current research from which future opportunities, issues, and problems for digital heritage can be distilled.

Projects based on community involvement

Although many organizations and institutions carry out projects based on community involvement, museums offer a good example. In the 1970s museums began to implement more outreach programs in order to provide information or services to groups in society who might otherwise be neglected. Today, many museum collections are not only being digitized to extend outreach via online collections, but the general public and/or community members also have opportunities to interact and enhance the information through dynamic applications, for instance via social tagging (Trant 2006). Museums that hold archaeological and anthropological collections traditionally represent cultures of ‘the Other’, because they primarily hold objects obtained from non-western societies. Cameron (2008) posits that the pre-occupation with material remains is a distinct western epistemology. Western societies are often described as ‘object-centered’, whereas the majority of societies are concept-centered (Cameron 2007). The recognition of this fundamental difference has increasingly led to people realizing the importance of intangible heritage and other perspectives (Balenquah, 2008).

The motivation for undertaking large-scale digitization projects is often driven by research interests and consultation with descendant communities is not necessarily a priority. Two New Mexico examples serve to demonstrate the range of attitudes toward the value of multivocality. The first example is a digital online archive of cultural objects and other research

materials related to Chaco Canyon, a UNESCO cultural heritage site in northwest New Mexico (<http://www.chacoarchive.org/index.html>). The introductory text on the homepage reifies Chaco Canyon as universal heritage. The research efforts of the Anglo community are considered instrumental in recognizing the site as a “vivid symbol of the cultural resources of the United States”, and while the importance of Chaco to present day Puebloan communities in the region is acknowledged, their input seems secondary.

The target audience for this archive is primarily the archaeological research community in an effort to address questions regarding the Chaco Phenomenon (Lekson 1999) that have remained unanswered. Even though feedback from descendant communities, through tribal consultants, is welcomed as a way to correct any misinterpretation of cultural materials, the objectives do not necessarily promote a different attitude toward cross-cultural communication (<http://www.chacoarchive.org/contact.html>).

The second example, on the other hand, is a project based on a partnership between the A;shwi A:wan Museum and Heritage Center (AAMHC) in Zuni, New Mexico, the Cambridge Museum of Archaeology and Anthropology (MAA), and the University of California, Los Angeles. It provides a model to “explore the appropriateness and usefulness of emerging technologies in providing access to heritage objects held by distant institutions” (Srinivasan, Boast, Becvar, and Furner 2009). This project is based on innovative models of community collaboration and includes community as partners instead of subjects, seeks to develop culturally appropriate categories, and redefine large institutions from centers of dispossession to instruments of self –definition (ibidem). This collaborative effort involves providing the Zuni community with a digital database of objects that are culturally important to the community. This database is editable and extendable. An important component of this project, along with

obtaining information on what the objects mean to different tribal members, is feedback regarding the usefulness of having access to these digital objects for providing knowledge within the community, i.e. what is its role in the larger framework of knowledge sharing and continuation. Results show that access to such digital objects can facilitate community solidarity and provide additional information for local teaching and research without the responsibility of physical curation, often impossible due to lack of funds or space (Brown 2007).

Community co-creation

As mentioned above, digital heritage applications are valued because they can represent multiple narratives, through, but not limited to, dynamic audience interaction and community co-creation (Russo and Watkins 2007). Unfortunately institutions that hold cultural collections often employ frameworks that are underlain with epistemologies and ontologies that preclude multivocality. Community co-creation projects, on the other hand, are focused on creating culturally appropriate categories, are inward looking, and seek to serve the community. In his work, Srinivasan (2009) addresses the roles that digital media and web 2.0 technologies serve in community revitalization efforts and he investigates whether a digital space can provide community control over design and content. Srinivasan's *Village Voice* project shows that media systems with ontology-based designs can facilitate the exchange of meaningful information within a community, in this case, an urban based Somali community. On a similar vein, Kimberly Cristen's Wumpurrarni-kari Archive, a browser based application, provides tools for access and contribution based on the user's gender, age, or social standing in the community (<http://www.mukurtuarchive.org/>).

These projects show how digital media for communities can be tailored to specific community needs. This approach is identified as *inreach* (Srinivasan 2009). The Digital Cultural

Communication (DCC) framework proposes an additional step based on the belief that the role of cultural institutions as sole authority and ‘cultural gatekeepers’ needs to be reconsidered (Russo and Watkins 2007, Trant, Kenderdine). The DCC framework proposes making communities partners in creation and consumption, in this way “cultural institutions can take a proactive role in developing new literacy by enabling direct experience of content production and creating environments for community engagement.” (Russo and Watkins 2007: 151) In this model of community co-creation, cultural institutions would provide infrastructure and training programs, while communities would provide self-produced original content. Such changes do not mean that the roles of curator or cultural heritage manager will disappear, to the contrary, their responsibilities will be redefined and expanded (Russo and Watkins 2007). Community multi- media co-creation projects have shown the potential for creating multiple narratives. Given the potential of such projects, Russo and Watkins (2007) suggest that the next step is to redefine the role of cultural institutions as facilitators instead of primary authors. However, such changes, we argue, necessitate innovative education and training programs for the next generation of heritage managers.

Participatory research

Based on the fact that communities are not static, and past, present, and future are integrated, the ‘preservation’ of cultural heritage cannot be separated from current socio-political issues. Participatory projects place cultural heritage within broader socio-political frameworks, for instance, to secure community rights and resources not just regarding the past, but for present and future purposes. Out of participatory approaches to planning and communication management the practice of Participatory GIS – Geographic Information Systems) has emerged. This practice, based on geospatial technologies, such as Geographic Information Systems (GIS),

Global Positioning Systems (GPS), and Remote Sensing technologies, is geared toward community empowerment and has been used to support conservation efforts and sustainable (natural) resource management and property rights cases worldwide. Participatory approaches have become more established and methodologies defined.

PPGIS approaches “integrate several tools and methods whilst often relying on the combination of ‘expert’ skills with socially differentiated local knowledge. It promotes interactive participation of stakeholders in generating and managing spatial information and it uses information about specific landscapes to facilitate broadly-based decision making processes that support effective communication and community advocacy. If appropriately utilized, the practice could exert profound impacts on community empowerment, innovation and social change. More importantly, by placing control of access and use of culturally sensitive spatial information in the hands of those who generated them, PPGIS practice could protect traditional knowledge and wisdom from external exploitation.” (<http://www.ppgis.net/> , <http://www.crssa.rutgers.edu/ppgis/>). Although not specifically geared toward heritage, the PPGIS approach provides specific guidelines that can be adapted for digital heritage projects.

ISSUES, CONTROVERSIES, AND PROBLEMS

In the process of “digitizing information” we find several controversies and problems related to issues of cross-cultural communication, especially about the ways that cultural material should be protected, represented, and communicated. We believe that information that is inherited from the past is invaluable (Cameron 2008: 171) and in this respect local communities can greatly benefit from information that is preserved; however, they often do not. The role of the (western) museum as authority has led to the existence of a single curatorial voice, considering the current preservation practices as the only right way to manage cultural material

(Srinivasan, Boast, Becavar, and Furner 2009). A fundamental difference, for instance between tribal museums and western museums is that tribal museums serve dual purposes – as curators of material objects and cultural centers.

Based on the above discussion we have identified several problems and issues in creation of multiples narratives: The first major problem can be defined as the position of the community as secondary participant, this problem can also be defined in terms of ‘top-down’ research approach. Multivocality is not an objective fully incorporated in established heritage institutions, and it tends to perpetuate the ‘universality’ practice, with a narrow view of ‘public’. Second, is the problem of the fallacy of the homogenous community, diverging interests exist within communities along gender, age and other divisions. Finally, the problem of data inaccessibility and/or the inability to make use of these data persists. For example, an interest exists to incorporate new media in tribal/community museums and centers, but can be hindered by access to appropriate content and technology. However, when inaccessibility issues can be overcome, opportunities arise for communities to use these digital objects for educational purposes in community centers.

Communities often do not have access to the information that they themselves helped provide. Sometimes this problem is due to a lack of access to the technologies required to access these cultural data; however, often this problem arises because in essence most digitized cultural information is stored by universities, museums, and government archives. These digital archives if not inaccessible are highly restricted making the process of acquiring access difficult and cumbersome. Moreover, if access can be defined as the inability to use the data in a meaningful way, related to, but not limited, to data conversion issues. Thus, the quest should be to ensure that local communities from where data emerges have “meaningful access” to these digital

archives so they can inform their future generations about the cultural achievements of their ancestors.

SOLUTIONS AND RECOMMENDATIONS

Cross-cultural dialogue can play an important role if digital heritage experts understand and are willing to understand the needs that emanate from local communication from which culture is borrowed to preserve a “universal culture” that in most cases is only accessed by a very limited number of people. To this effect, Information Communication Technologies (ICTs) and the development of human networks have proven to be efficient tools that provide a venue to communicate and collaborate in spite of geographical distances (Keck and Sikkink, 1998). To prove effective in digital heritage, the axis that control the information society (academia, industry, and government) should promote the development of formal network by which the “construction of a trans-community network” (Yashar, 1998:36) can serve as a vehicle to advance the preservation and advancement of local and “universal” cultures in a manner that is conducive to expand not just “western epistemology” but rather the epistemology of those cultures that are intended to be protected and preserved. In this way, the three dimensional experience that the digitalization of cultural heritage is intended to provide can be extended through the cross-cultural dialogue that can take place between technology experts, scientists, and community representatives.

The question in this regard is what are the conditions and processes that need to exist for a formal network to become efficient and serve as a link or a node to an identified group of people who share the same goals and objectives? The answer to this question lies not just on assessing the roles that ICTs can play in facilitating processes, but rather in the importance that society in general puts in developing the know-how in how to create grass roots approaches to

network development using the tools available. The importance in this regard is not the network per se, but rather the opportunities that it provides in analyzing and creating information, especially when to expand and identify cultural attributes enclosed within the notion of cultural self-determination as a basic human right to control and manage one's own cultural attribute and the way that these cultural heritage can serve to future generations. This effort also requires that local communities become active participants in the process of ownership and appropriations of existing technologies, manage the development of specific content that exemplify the claim of ownership, ensure cultural and linguistic survival, and develop a process by which convergence and networking sustains the effort of preserving cultural digital, while ensuring the preservation and continuation of cultures in the verge of extinction (www.istec.org).

There are many ways in which strategic alliances between different partners can be forged, but the most important alliance in terms of knowledge and information transfer is the connection between academia and local communities. A bridge between academia and surrounding communities can ensure that the critical mass needed to sustain a process of technology appropriation is developed to advance and support the notion of preserving cultural heritage through digital media. The next section describes a case study that models some of our solutions and recommendations to the three major problems cited above – Community as Secondary Participant, the Fallacy of the Homogeneous Community, and Data Inaccessibility. We suggest an educational framework to lessen disparities in the creation of digital heritage content, much in line with PPGIS objectives.

Case Study: An Education Framework for Co-Creating Digital Heritage Content

We contend that academia can facilitate the co-creation of digital heritage content not **solely** by providing access advanced technologies, but by providing access to **knowledge** about

how to use advanced technologies to record, map, and recreated social and cultural attributes. Many people view local communities as merely passive consumers of technology. In reality community members are active users of technology and as such can play a key role in digitizing knowledge; however, the tools and skills to digitize such knowledge need to be put in their hands. The case study is an example of how geospatial technologies including Global Positioning Systems (GPS) and Geographic Information Systems (GIS) can be used to augment the work of community leaders.

To better understand the processes and protocols involved in transferring knowledge and information to a local community. A Partnership between the Bernalillo County, the Iberoamerican Science Technology and Education Consortium (ISTEC), the Partners for Environmental Justice, Raza Planning in the Planning and Architecture department at the University of New Mexico, Central New Mexico College (CNM), USDA, the Ortiz Center in collaboration with the South Valley Acequia Association was created to support the existing need of ensuring the water currently used for irrigation. The *acequia* landscape, the intricate gravity based canal system that provides the livelihood for many New Mexican communities, is under continuous threat by urbanization and gentrification. This irrigation system has its origins in *acequia* system brought over by the Spanish and assimilated with existing indigenous water management system. Several forms of *acequia* systems are in existence, the New Mexico *acequias* are a communal system, requiring the collaboration from all *parciantes* (Rodriguez 2006). ‘Ethnographic landscapes’, such as the *acequias*, are significant as traditional cultural properties, because of their association with cultural practices or beliefs of a living community that are a) rooted in that community’s history, and b) are important in maintaining the continuing cultural identity of the community (Hardesty, 2000:182).

Case Study: Two New Mexico Acequia Communities

In New Mexico, water has always been a scarce and precious resource. Demands to move water out of traditional communities to industry, sprawling cities, and commercial uses that are often viewed as ‘higher economic uses’ threaten the survival of traditional water management systems, and the water security of historic, agricultural communities in New Mexico. The culture and livelihood of many New Mexico communities are dependent upon *acequias*.

The case studies that we worked on involved two New Mexico communities seeking to document their traditional water management systems using Global Positioning Systems (GPS) and Geographic Information Systems (GIS). Although both community projects focused on *acequias* – historic communal irrigation systems based on water sharing practices, the goals of the two communities differed due to each community’s unique circumstances. Thus, despite the fact that both communities used GPS and GIS to document and map out their *acequias*, the cultural heritage content and end-products were tailored to fit the distinct needs of each community.

South Valley, New Mexico: An Urban Context

According to the laws of the Indies, indigenous communities and *acequia* communities have the oldest and primary water-rights in the state. However, due to the commercial demand for water these rights are currently contested (Dumars, O’Leary and Utton 1984). *Acequias* have existed for centuries, most were implemented during the 17th and 18th century during Spanish and Mexican administration, immediately following the land grant establishments. During that time local courts resolved water disputes; the concept and process of general stream adjudication (in which the state literally sues residents to prove water rights) is relatively new, first appearing in the 1907 Water Code.

The impact of the 1907 Water Code on traditional water use is that every person claiming ancient water rights needs to prove that he/she is indeed in need of water for beneficial use, at present, but more importantly that this was true in the past, tested at certain benchmark dates. Failure to provide the necessary documentation in this adjudication process can lead to loss of water-rights, rights that will subsequently go to the highest bidder.

The South Valley, an unincorporated area comprising almost 40,000 people on the southern border of Albuquerque – New Mexico’s largest city, will soon begin the adjudication process in which valley residents must prove **both** historical and contemporaneous use of the *acequias*, **in order to keep** their water rights. Given that *acequias* are communal systems reliant on adequate water flow, the loss of water rights by even a small number of residents impacts the entire system as an insufficient number of users equates to inadequate water flow. The end-result is that water flow is stanchied and the system fails – a system that is an integral part of the South Valley’s cultural heritage and an ancient system that evolved from Africa and eventually impacted water distribution in Mexico and the US Southwest. Thus, it is essential to not only collect data to prove water use, but it is also necessary to place these data in a cultural heritage context in order to preserve this legacy from the past. The use of technologies such as GPS and GIS offer a means to fulfill both of these needs. However, for their use to be effective we argue that community members must be involved in all phases of the project from developing research objectives to determining data types (attributes) to data collection to database design and to designing end-products that included web interfaces to manage the data collected. In order to fulfill these requirements the technology itself needs to be put in the hands of community members.

Embudo Valley, New Mexico: A Rural Context

The residents of the Embudo Valley are not currently facing adjudication of their water rights (although the process is ultimately unavoidable); instead, their primary concern is loss of cultural knowledge, a large part of which revolves around *acequias*. This rural northern New Mexico community of about 1500 residents, many of whom trace their roots to early Hispanic settlers, wanted to GPS and GIS map the valley's *acequias* and its features and then link/associate these maps to cultural heritage information. For example, many locals reference acequia features to the human body, a conceptualizing of landscape that is widespread, but hardly integrated into GI systems (Levinson 2008, Majid et.al. 2006). It are these types of data, among others, that Embudo community members seek to link to GIS-based maps in an effort to help document their cultural heritage and the role it continues to play in everyday life.

Achieving Common Goals via Collaborative Education

Despite the differences between the South Valley and the Embudo Valley, these two communities had three similar overarching goals. They included: (1) developing a community-based and community-run GIS that manages data related to local *acequias*, (2) collect GPS data to make maps of the *acequias*, and (3) initiate a training program to teach community members basic GPS and GIS skills to facilitate mapping efforts. Given these common goals, we worked with members from both communities to design an introductory-level course to teach geospatial technologies, specifically GPS and GIS, to both traditional and non-traditional students.

We assumed that students would have varying levels of expertise. The technical-geospatial knowledge of the CNM students served to complement the cultural heritage knowledge of the community participants. In this way, traditional and non-traditional students worked side-by-side learning from one another. This strategy proved very effective.

The approach that we propose integrates aspects from the broad categories of community

collaborative projects discussed earlier. However, in addition we incorporate these aspects within an educational framework to create digital heritage content. Given the integrative and educational nature of the approach, project goals must be multi-faceted. The case study goals included not only creating digital heritage content but also: (1) teaching and training traditional students, (2) teaching and training non-traditional students, i.e. community members, (3) involving community members in the creation of digital heritage from start to finish, (4) progress toward achieving community-defined goals, and (5) providing community-defined end-products. To achieve these goals, we organized the project into seven stages.

Project Stages

In retrospect and in order to provide a process that may be useful for others, we have organized our work into several stages, which are listed chronologically; however, in reality they acted as a feedback loop – one stage did not necessarily presuppose the next. The seven stages in the process included:

1. Identify Community Needs
2. Establish Strategic Alliances between Different Organizations
3. Conduct Field Visits and Create a Plan of Action
4. Organize/Attend Workshops and Community Meetings
5. Develop/Use a Range of Tools for Community Input
6. Intensive Short Course- Train Community Members in the Use of GPS/GIS
7. Evaluation Process: Student and Community

Stage 1: Identify Community Needs /Stage 2: Establish Strategic Alliances

Typically academics and other cultural heritage managers approach digital heritage projects with specific interests/subjects in mind. In the case of our work, these two stages were somewhat indistinguishable as the project theme began from the onset with the community. In

these two stages, we worked with community members to formulate goals, generate ideas for heritage content, and identify potential short-term and long-term end-products.

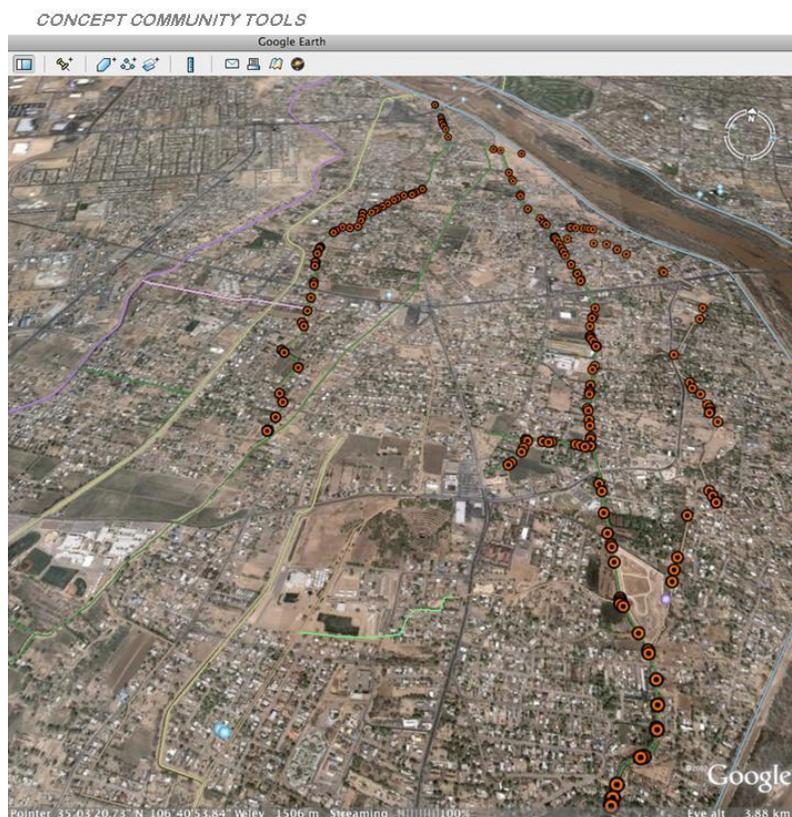
Stage 3: Conduct Field Visits and Create a Plan of Action / Stage 4: Organize and Attend Workshops/Community Meetings

In the next stage of the project we scheduled field visits to the two project areas. These field visits allowed us to begin the initial phases of data collection, help us to understand potential issues associated with data collection ranging from logistical (e.g. transport, lodging, and community liaisons) to data types and formats to database design, and establish more community contacts. For example, we met with some of the *mayordomos*, ditch managers, who provided us with a wealth of information on both the physical and cultural aspects of the *acequias*. These field visits gave us the opportunity to talk with more community members and help us to realize that although we were attempting to include the voice of the community in the creation of cultural heritage content, we also had to be aware that these communities were not homogenous entities, but rather they were comprised of diverse and distinct groups whose needs were not always be convergent. In an effort to address such heterogeneity within communities we sponsored a workshop and attended community meetings.

Stage 5: Develop/Use a Range of Tools for Community Input / Stage 6: Intensive Short-Course

Given community heterogeneity, we realized that it would be necessary to provide a range of tools to obtain community input about the project. Workshops and community meetings offer two venues to hear community suggestions, needs, and concerns; however, not everyone attends such events. Therefore, we worked with community members to develop additional ways to obtain community feedback. Given that the first phase of the project was focused on collecting GPS data on the *acequias*, we decided to make use of Google Earth (Figure 3). While many

community members had access to the internet, we realize that people's computer skills vary and therefore to fully make use of the tool a short training session at a community meeting is necessary. Despite our project's emphasis on providing technical training to community members, this is something that we did not do, and in retrospect it was a shortcoming. In future work we plan to use a wider-range of tools for community input as well as provide better training/instruction for those tools.



SOUTH VALLEY



Figure 3: Community Input Tool

Although our project revolves around educating and training community members in geospatial technologies, it is important to keep in mind that community members play an equal role in the education process. In an attempt to collect balanced digital heritage content, we paired traditional students with technical experience with community members with cultural knowledge, i.e. knowledge about the historic and contemporary roles of the *acequias* in community life as well as the actual physical components of the *acequias*. The collaboration among students proved to be one of the most successful parts of the project.

Another important point to keep in mind is that most community members were non-traditional students with jobs and obligations that made it difficult to attend semester-long classes. To surmount this problem we designed the course as an intensive short-course that took place over the course of two three-day weekends in the summer.

The course itself contained two components: fieldwork and lab work. In addition to data collected in the field, students were trained in accessing and integrating existing data into the project. The available data differed for the two communities, but ranged from downloadable GIS files to historic paper maps, that needed to be scanned and georeferenced. Lab exercises and student projects were framed by the requirements dictated by community needs. In both cases, historical information was critical. Ultimately, the course served both academic and community needs and helped to co-create digital heritage content with a community-guided narrative.

Stage 7: Evaluation Process: Student and Community

Evaluating the success of the project involves both short-term and long-term strategies. Short-term evaluations focused on obtaining feedback from students on the course and from community members (who did not attend the course) on the first set of end-products. Long-term evaluations will focus on asking community members questions about the usefulness of the

community-based GIS. An important factor, and this is where the MOU becomes critical, is that the community is served only if continuation of collaboration is guaranteed. Long-term partnerships between community, academia and potential other partner, will not only be beneficial for the community, but will provide a different education model to academia, one in which social awareness is combined with innovative research

Project Outcomes

The case study highlights several important points that we believe are useful in developing digital heritage applications that invite non-traditional stakeholders to co-create digital heritage content. First, by co-educating and co-training community members and traditional students, multiple narratives become a reality as people with different perspectives work side-by-side. Second, as community members become versed in digital technologies, they have the skills to develop and/to maintain digital systems to house community-owned heritage data. Third, MOUs as standard practice help create sustainable partnerships between establish strategic alliances between the academy and communities. Fourth, community members play an equal role in the education process because they provide insight that helps to expand traditional paradigms.

FUTURE TRENDS

The success of academic-community partnerships necessitates a paradigm expansion. We see this expansion as a future trend that will help solve the issues, controversies, and problems surrounding who creates digital heritage content, who has access to it, and for what purposes. Novel ways of learning, teaching, and knowledge creation, within academia and through community involvement are essential and will enrich digital heritage networks and break

down old, knowledge, (and power) structures. New structures and collaboration efforts will not only benefit and expand the way knowledge is created and managed, but it will also create critical lines of communication and collaboration between academia and local communities. Strategic alliances, under the social construct of the information society, have been created based on the triple helix paradigm (Etzkowitz and Leydesdorff 1997).

The triple helix paradigm is a socio-linguistic paradigm that promotes and allows sharing of information, resources, and knowledge between industry, academia, and government. This paradigm has been propitious to develop the information society and the advancement of the information communication technologies that now make possible the connection of millions of people throughout the globe. Even though this paradigm has been instrumental to develop the information society, it has not been able to level social differences, and in turn we still experience major disparities between those who have meaningful access to ICT's and those who do not. In order to change this disparity, our argument is that we need to expand the social paradigm from a triple helix of development to a quadruple helix (Figure 4). The major difference in these paradigms is that the triple helix establishes communication between three entities on a two dimensional axis; in contrast, the quadruple helix uses a multidimensional axis in which industry, academia, government and international NGO/multilateral organizations are connected to the core of the formation and as the parts support the development of the core (our society) – the result is that the entire formation grows in unison.

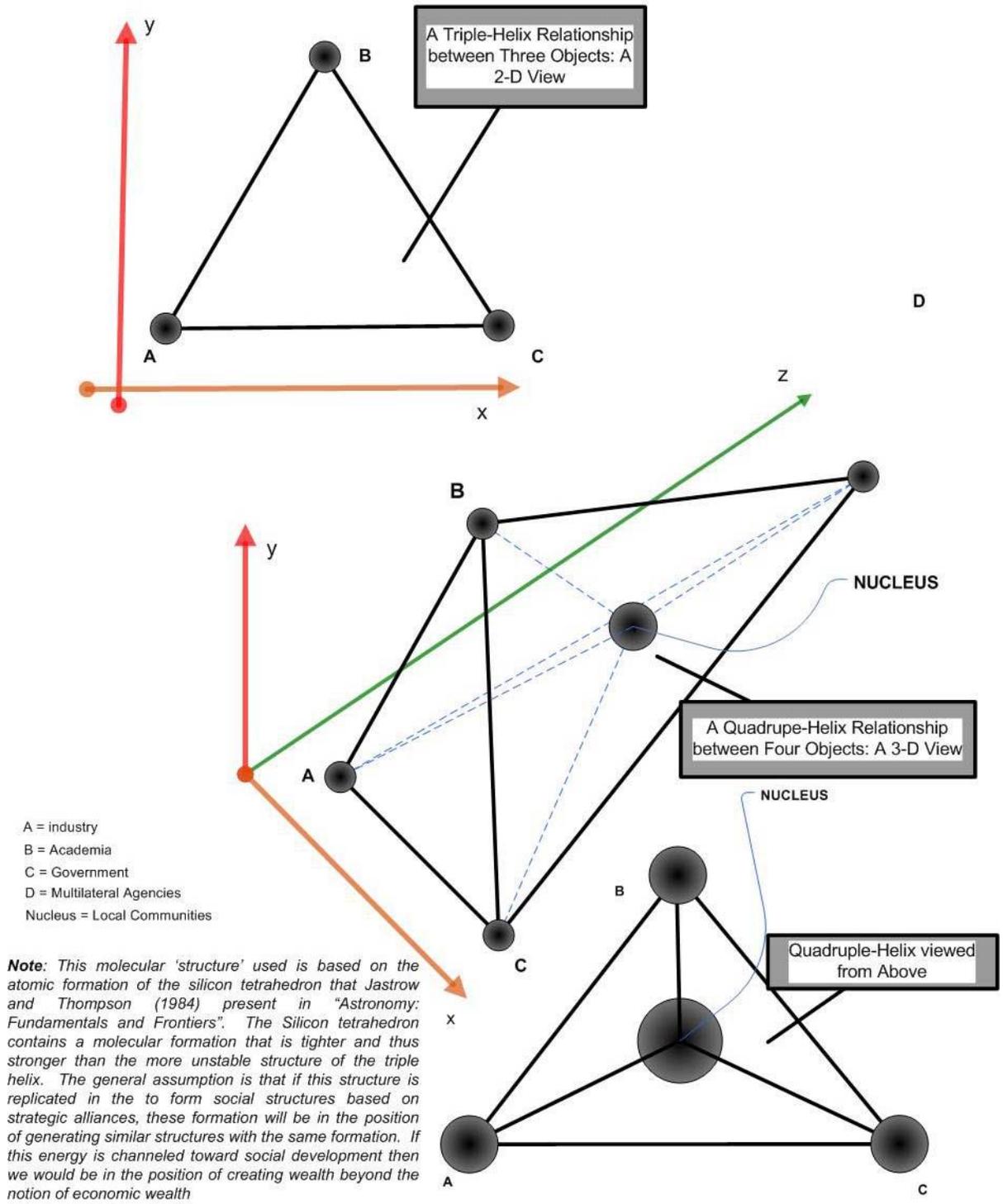


Figure 4: Expanding the Paradigm from Triple to Quadruple Helix

The reason why we advocate for a paradigm change is because the development of existing projects and the use of digital media cannot be disassociated from the production of culture and those who produce it, which in most cases are local communities and their continuous use of the cultural precepts attached to their local histories and cosmovision about the world. In indigenous and local communities these histories and their cultural precepts are vestiges of the cultures that projects, such as the digital heritage initiative, tries to save for future generations. If culture is not static, but its rather evolving then a need to train and support the digitalization of local customs and cultures should also be part of archiving and safeguarding those cultural attributes that are emerging and that are being preserved at the local level. The university can and should be instrumental in serving as a bridge and a conduit to pass on the know-how needed to train communities in using geospatial **technologies** for community mapping, develop effective databases, promote the use of open source systems, create user friendly web based interfaces, train and support the creation of local technology hubs that can serves as information repositories to ensure that information is collected, analyzed, and processes in a way that it can be stored and used by communities to promote local social and economic development. In addition, the effective use of digital media can also support local communities to claim, protect, and manage their natural resources, create educational content based on their own culture and traditions, and exercise their right for self-determination through social and economic development.

CONCLUSION

New media offer a number of opportunities to redefine community involvement and cross-cultural collaboration and several innovate projects demonstrate such possibilities (see Christen; Diaz- Kommonen 2002; Kenderdine 2008; McCarthy 2007; Srinivasan 2009). We

build on such work in two distinct ways. First, we focus on *who* makes digital content and for *what* purpose taking into account heterogeneity. Second, we focus on developing a new educational framework that helps to restructure the existing hierarchical relationships between community and experts. To illustrate these two points, we provide a case study that exemplifies how educational programs that combine teaching of students from different background and expertise, in a project-based learning strategy is effective in stimulating dialogue and cross-cultural understanding. It also elicits the need for sustainable collaborative projects that ensures the community continuation of practice, grounded in agreements that provide clear understanding of ownership, sharing, and responsibilities.

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Possible Paper Titles/Essays

21. Multiple Narratives: Redefining Cultural Heritage Paradigms
22. The Fallacy of the Homogenous Community
23. Critical GIS: New Approaches to Digital Heritage
24. Forging Strategic Alliances: Bridging the Academy-Community Gap