Web–based crowdsourcing for heritage and cultural preservation in the Caribbean

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Abstract

In this work we apply crowd–based collaborative labeling and reporting framework in the heritage domain. Specifically, we adapt a web–based crowdsourcing tool to collect, disseminate, supplement, and archive information pertaining to the tangible and intangible heritage of various Caribbean islands. This tool provides a platform where anyone can mark, label, and add information related to an event or a place of interest on a map. This tool provides an interactive format where anyone can add or supplement information as well as socially engage about a certain heritage based entity. The goal of this exercise is to enrich and refine the knowledge base about a heritage by democratizing the process of identification and classification of heritage in a particular setting. In the end, by making available a web–enabled framework, we have an empowered citizenry that is not just the passive audience of information provided to it about its history but an active contributer and monitor of the provided information.

1   Introduction

Heritage is a complex concept. It can unify individuals through a common history, sacred sites, meaningful landscapes, or intangible elements passed through generations. Or, it can create divisions by subjective interpretations that favor a few [White, 1973, Benjamin and Underwood, 2009, Schofield, 2008]. This complexity is aptly exemplified in the Caribbean region, created through a unique history of complex interactions [Benítez-Rojo, 1992]. The islands of the Caribbean are ecologically, historically, politically, culturally, and socially disparate entities, sharing only their overall geographic proximity. In the Caribbean, the ever-evolving social and political landscapes brought by with each wave of colonial occupation, movement, and displacements of its people at varying spatial and temporal scales, has created a diverse history and makeup of the Caribbean islands since the 15th century [Rogoziński, 1999]. Over time, this history was self–identified by whoever chronicled that period – predictably it was written from the vantage point of the victor [Martin, 2011]. However, a careful reexamination of the conflicting evidence reveals a much more complex picture of the Caribbean islands than what one–dimensional outlooks of history would tend to tell us [Rouse, 1986]. Thus, much of the Caribbean heritage is often one-sided, biases towards colonialism and unrepresentative of the multivocality of the Caribbean region [Benítez-Rojo, 1992]. With the Caribbean's historical context and current setting, identifying and preserving heritage that is meaningful to all stakeholders raises important challenges. Identifying in a conclusive or definitive way of what constitutes heritage for each set of stakeholders is an almost impossible task. This becomes even more problematic in the case of populations like those found in the Caribbean islands that are composed of diverse communities with different histories [Benítez-Rojo, 1992, Cummins, 2012, Martin, 2011, Rogoziński, 1999]. This challenge of collecting, identifying and representing heritage accurately requires the input and integration of various opinions and knowledge. Often in heritage management, this task is handled though top–down approaches where a few stakeholders attempt to classify the type, time period, and other meta data related to a tangible or an

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intangible historical entity. Thus, the question becomes how to include local stakeholders in the discussion of heritage who may not be included in the top-down approach? To somewhat facilitate this process of information collection, preservation, and rendering it publicly available, we build a web–based crowdsourcing platform or tool that we applied in two different islands in the Caribbean: St. Kitts and Dominican Republic. Practically, the tool works by providing an interactive environment where people can tag and view heritage related places and events of interest, as well as, add informational content such as details, pictures, videos, news links, and how they historically identify that entity, among other details. The goal is to have a diverse set of informed and involved stakeholders as either content provider and/or audience to augment historical details that is enriched by the incorporation of multiple voices. Formally, this digital tool seeks to achieve the following goals: *(a)* citizen involvement; *(b)* transparency of knowledge sharing of heritage; *(c)* supplemental source of information gathering; and *(d)* ability to better understand social trends in the light of heritage and cultural information.

In this paper, we discuss two case studies in the Caribbean where we implemented a crowdsourcing platform or tool to answer specific questions regarding heritage. Each case study, St. Kitts and Dominican Republic, was based on a different set of question, involving a different local community collaborators and customized implementations. This paper seeks to provide user examples that merge research and local collaboration.

This paper is divided into 6 sections. Section 2 provides a brief overview of the application of crowdsourcing in the heritage domain and the use of digital crowdsourcing in the heritage domain in the last decade. The objectives of this research are stated in Section 3. The design and implementation of the crowdsourcing tool is detailed in Section 4. In Section 5, we discuss the two case studies at length. Section 6 concludes the paper by discussing the current state of the implementation of the crowdsourcing tool in the two islands of the Caribbean. As well as, the achievements, the challenges, and the extensions to the tool we intend to implement in future.

2   Related work

Coined by Jeff Howe and Mark Robinson in 2006, crowdsourcing is used to define activities that take "a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call."[Howe, 2006]. Crowdsourcing exists in a variety of formats depending on the goal and context, but the unifying concept of these myriad of applications is the dependence on a freely involved group of people for creating content. Although crowdsourcing is a relatively new term, the concept existed in operational form long before this term was coined [Dawson and Bynghall, 2011]. What made this method popular in the last decade was the use of Internet to perform crowdsourcing [Doan et al., 2011]. Some of the most popular examples of crowdsourcing on the web are Wikipedia, Quora, Yahoo! Answers, Youtube, etc. The web makes it easier and quicker to reach a large group of people among whom a task can be distributed and can be performed efficiently. Using the web for crowdsourcing has resulted in remarkable outcomes in crisis management in a variety of domains all over the globe [Macdonell, 2015, Doe, 2008]. Thus, the relative increase of crowd sourcing in the field of heritage management in recent years is reflective of the current trend of increasing stakeholder inclusion and collection of information. [Alivizatou, 2012, Cummins, 2012, Deufemia et al., 2014, Hennessy, 2012, Oomen and Aroyo, 2011]. There are many instances of research and commercial activities involving active participation of a larger audience in the heritage discipline. Examples range from museums using crowdsourcing for updating collection records to archaeological sites being identified through satellite imagery by online users [Zastrow, 2014]. While the above discussion of the historical context of cultural management may have created some preliminary uneasiness about including the crowd in heritage discussions, public participation has become increasingly more popular due to the economic cutbacks and importance of inclusion [Noordegraaf et al., 2014]. Thus, crowdsourcing has and will become more and more popular in the heritage field [Noordegraaf et al., 2014, Ridge, 2014, Zastrow, 2014]. In research conducted by Noordegraaf et al. [Noordegraaf et al., 2014], it appears that despite the use of crowdsourcing, it is not ensured that a cultural heritage crowdsourcing initiative will be successful. Digital crowdsourcing has given

rise to a number of interesting computational challenges. Especially, challenging are the issues of user engagement and incentivization [Anderson et al., 2013, Ghosh, 2012, Ghosh, 2013, Ghosh and Hummel, 2013, Kamar and Horvitz, 2012, Mao et al., 2013, Benkler and Nissenbaum, 2006]. One of the key challenges with the global source of information gathering is ensuring the quality of the data [Allahbakhsh et al., 2013]. Lastly, web–based crowdsourcing tend to generate data larger than its offline counterparts. Getting useful insights from the massive amount of data is highly important for effective use of the crowdsourcing tool [Du and Ling, 2010, Sheth et al., 2014, Willett et al., 2012, Schwartz, 2014, ?, Hinkle, 2009]. In fact, the life of such a tool depends very much on the context and conditions of its implementation. These include a variety of factors such as institutional settings, types of crowdsourced information, crowd characteristics, site infrastructure, clearly defined goals, and future evaluations. Thus, it is clear that crowdsourcing in the heritage field requires clear intended work plan before the onset of the project. To ensure this, the factors listed above were used to structure the methods in each case study.

3   Objectives of the heritage crowdsourcing tool

Our overall goals of using digital crowdsourcing in the heritage domain are:

Aggregate Gather information from various sources about tangible and intangible history. These various sources include academics, local public, tourists and visitors, officials from relevant departments, such as, culture and tourism, and museums, among others.

Amalgamate To put together these diverse set of opinions to produce a more nuanced picture of the history and culture of the Caribbean.

Apprise Provide an open platform for people to gain knowledge about the historical sites, their locations and significance, as well as, knowledge about the cultural events and local heritage related businesses.

Analyze Generate summary statistics in a time effective way such that they are useful in making various strategic decisions, such as, how to promote a certain cultural event, or which heritage sites are popular in what regions, and similar such information.

The above stated general goals are then further refined for each of the two islands where we have applied the crowdsourcing strategies in the form of an implemented crowdsourcing tool. Following are the specific objectives of the tool for the islands of St. Kitts and Dominican Republic.

3.1   St. Kitts

In St. Kitts, the crowdsourcing tool is designed primarily for the use by the *St. Kitts Department of Culture*. Their objectives for the tool are:

1. Inform the public and tourists about the heritage sites and cultural events.

2. Engage the public in spreading the word about cultural events happening on the island.

3. Involve the public is identifying and protecting the heritage by tagging the lesser known sites of significance and those that need identification and protection.

4. Supplement the knowledge about the heritage and cultural sites.

3.2   Dominican Republic

In Dominican Republic, the crowdsourcing tool is designed primarily for the use by the *Museo de Alto Chavo*, secondary school teachers from the regions of *Monte Cristi* and *Valverde*. Their objectives for the tool are:

1. Build an interactive platform for addressing local interpretations of indigenous history as well as current representations of continued indigenous heritage.

2. Partner with local schools and museums to create a user base and facilitate user generated content.

3. Increase indigenous heritage knowledge by making it more transparent and readily available.

4. Supplement sources of information gathering by giving the public a channel to share their knowledge about their heritage and culture in particular to indigenous heritage.

4 Heritage crowdsourcing

4.1 Framework

The crowdsourcing tool is based on the Ushahidi crowdsourcing platform [ushahidi.com, 2008]. Ushahidi is a non–profit technology company that builds open source platforms to help citizens, journalists, organizations, governments, and other entities; gather, manage, analyze, and visualize crowdsourced data. The source of the tool is freely available on Ushahidi website [ushahidi.com, 2008] as well as github [github.com/ushahidi,]. Using this framework as a backbone, we build and customize the tool for the heritage management applications for St. Kitts and Dominican Republic.

This crowdsourcing tool is developed and built on a Linux based server using Ubuntu version 14.04.1 LT. The tool requires the following three softwares for its proper functioning.

- PHP v5.2.3+: This is the server side scripting language used for the development of the crowdsourcing website.

- MySQL v5.1+: The open source database tool that is used to build the database of information entered and related to the crowdsourcing tool.

- Apache v1.3+, Apache 2.0+, lighttpd, or Microsoft IIS[1].

4.2 System design

In this section we discuss the functionality of the heritage crowdsourcing tool.

4.2.1 User categories

Both in St. Kitts and Dominican Republic their are two main functional components of the crowdsourcing tool:

The administrator The institute hosting and managing the tool is in control of the administrative end. They can view, verify, and approve any crowd gathered information. They can post news links as well general reports pertaining to tangible and intangible heritage. They can view the statistical summaries of the data. They can add and delete the reports. They can change the general outlook and settings of the tool. This end is responsible for the data management and analysis of the data. The task of the administrator of the tool is to filter the information provided by the content provider for noise and misinformation. The tool is meant to share free flow of ideas. Hence, the administrator role is limited to ensuring that the information is truthful while refraining from screening the general public opinions.

The crowd The crowd is the view available to the general audience. This end is the primary source of content provision for the tool. They are the main stakeholders and users of the tool. However, this set of users have limited privileges. They can submit reports pertaining to tangible and intangible heritage. They can view the reports approved by the administrative end. They can comment on and supplement the reports.

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[1]The deployed version of the software is developed and tested on Apache 2.0

In the following section, we provide the details of the main features of the tool and explain the connection between the administrative end and the crowd end.

4.2.2 Main features

Tagging and viewing places of interest on a geographic map   The main display of the tool is the geographic map that provides a vantage view of significant landmarks related to the culture and heritage of the islands. The viewer can see the distribution of "reports" submitted for various geographic locations on the map. The reports displayed on the map can be filtered based on various categories associated with the heritage and cultural landmarks. These categories are predefined at the administration end. Figure 1 shows the front page center panel for the St. Kitts crowdsourcing website. It depicts the map of St. Kitts. The red dots are the locations for which reports have been entered into the tool. The numbers in the dots indicate the count of the reports for that general location or area.

Submitting reports   The tool provides the user with various forms to report about a place or event of interest. The forms are custom built into the tool pertinent to the goals of the crowdsourcing tool. The administration end of the tool provides a user friendly interface for building and adding new forms to the tool. For example, the St. Kitts Department of Culture aims at using this tool to inform and collect information and views about cultural events, such as, carnivals, concerts, handicraft exhibits, among others as well as about the historical sites. Thus, the default forms for the St. Kitts site requires basic information regarding the place and event of interest.

Once a user submit a report, a designated user or user group with administrative rights is alerted. A member of this group can review, approve, and verify the report at the administration end. This check is placed to ensure truthful and relevant reporting. Without the approval from the administration end, it is not possible to view the submitted report at the user end. An administration category user can approve the report without verifying it first. At the user end reports are displayed with clear indication of whether they are verified or not. Figures **??** and **??** show the default form for submitting reports in the crowdsourcing tool for St. Kitts.

Searching and viewing reports   One of the primary goals of the tool is to provide the crowd user with the most up–to–date information about historical places and cultural events of interests, supplemented by citizen provided commentary. Any user can thus search and view the approved reports. They can further filter the reports based on various criteria, such as, categories, location, type, media, verification, and custom fields. Figure 3 gives a comprehensive view of the report viewing feature built into the crowdsourcing tool for St. Kitts.

Getting alerts   The crowd user can request to be alerted about any new information of a heritage site or cultural event of interest. The user selects the location she is interested in on the map by specifying the radius of the area with respect to the point of interest. And submits her or his email address to receive alerts relevant to the location of interest. The user can optionally further refine her selection by selecting specific categories (or tags) of heritage and culture in which she or he is interested. Figure 4 shows the Get Alert feature in the crowdsourcing tool for St. Kitts.

4.2.3 User retention and data quality control features

As discussed above, the use of crowdsourcing concepts and techniques in heritage and other domains is not new. Web–based crowdsourcing is an extension of the traditional off–line crowdsourcing with added benefits of providing wider source of information as well as audience and easier and faster integration of the available data. However, it raises a number of technical challenges. In the following we discuss some of the features of the tool that ensure user engagement and quality control in digital crowdsourcing.

Maintaining a socially engaged community   For the effective use of the crowdsourced tool, it has to be promoted in such a way that the users can understand its objectives as well as understands its use effectively. In St. Kitts, for example, the use of the tool has been episodic so far. With shifting administration, the process of making the crowdsourcing tool a standard and well known source of information has been challenging. This sparse and skewed data collection process may not always be effective in making long term decisions. Hence, systematic and concerted efforts are needed for an engaged crowd and data rich environment for informing the public.

The promotion of a tool is usually an off–line task separate from the functionality of the tool itself. Hence, the primary stakeholders of the crowdsourcing tool, for example, government bodies engaged in promoting culture and tourism, have to make concerted efforts in making the tool well know among the masses. However, once the awareness is created, there certainly are automated techniques for keeping the community engaged. In the heritage crowdsourcing tool, people can comment on posts by others. They can also provide ranking to the already submitted information. These mechanism helps keeping the audience engaged. It gives them the sense of responsibility, ownership, and empowerment. Effective use of the crowdsourcing tool can ensure an engaged community.

Quality control of information   One of the main challenges of crowdsourcing is the checks that need to be put in place to ensure the quality of information contributed. This is further complicated by the fact that this challenge does not result in explicit gains to the contributors of the information. In a web environment, with multiple sources of information, maintaining and resolving conflicting information in a timely fashion is a significant task. Moreover, clear reviewing procedures have to be put in place to maintain consistency in the information being disseminated through the tool.

One of the features of the heritage crowdsourcing tool is that the reports submitted by the content provider has to be first approved by the appropriate user with the administrative rights. This task is further divided into two steps. The administrative user can "verify" and "approve" a report. The report gets integrated into the tool (and, as a result, appears at the crowd end) only after it has been approved. The verify step is optional. However, at the public end, all reports appear tagged with whether they are verified or not. With this two step measure, there is minimized centralized control of information yet ensured relevant, correct and objective information provided.

Incentives for reporting   In crowdsourcing environments where there are no explicit reward for the quantity or quality of reporting, it becomes very hard to keep the content provider engaged. Moreover, guaranteeing truthful reporting gets challenging as well as there is no penalization for wrongful reporting. In the heritage crowdsourcing we face similar challenges. Also, for this tool, we made a strategic decision of allowing the crowd to report in free text format and keep the option questions limited, since one of the main goals is to collect the free and open ideas regarding heritage and cultural entities. This further complicates the task of ensuring the reporting is truthful as that requires parsing of free text. We implemented two mechanisms that can somewhat mitigate these issues: 1) the reports submitted by the content provider need to be approved by an administrative user and 2) users can rank the reports by giving them credibility ratings, hence, keeping checks on the information provided from the user end.

Structuring and analysis of free–text based information   In the heritage crowdsourcing tool, the content provider is allowed to enter free text of information. This feature gives the content provider flexibility to share their opinion freely. However, it raises the problem of automating the approval and analysis of the report. In the current version of the tool the descriptions entered by the crowd need to be manually studied, its relevance and veracity need to be verified by a user within the administrative role. In future versions of the tool, we intend to add some features for automating the natural language processing step of report verification and further analysis.

5 Case Studies: St. Kitts and the Dominican Republic

The heritage crowdsourcing tool is separately implemented on the islands of St. Kitts and the Dominican Republic for a variety of reasons. Both islands have different historical contexts as well as goals for heritage management.

St. Kitts was one of the first British colonies in the Caribbean. This history is perhaps most visible in the UNESCO World Heritage Site, Brimstone Hill Fortress, an impressive fort built on the west side of the island. Further, the island is dotted with relics of a sugar cane past, leaving behind old mills and refinery factory. As tourism has become one of the most important economic sectors of the island, there is interest in creating new interactive ways of reaching tourists and attracting them to local sites of importance. Further, as tourism becomes the economic base of the island, there is also a need to increase accessibility of local entrepreneurs and artisans to this market. Thus, what is the local heritage for Kittitians and what are representative foods, crafts, music and dance of that heritage? To answer these questions, the public needs a platform where they can voice their opinion. The heritage crowdsourcing tool is implemented in St. Kitts in collaboration with the St. Kitts Department of Culture in an attempt to provide one such platform for the locals as well as the visitors.

In the Dominican Republic, at the time of Christopher Columbus's landing, there was a sizable Amerindian population living there. As more Spain continued to colonize the Dominican Republic, much of this indigenous life was eliminated, but important archaeological sites remain and provide important links to the past. Moreover, many aspects of Amerindian and indigenous culture are still important and relevant for communities in the Dominican Republic. Further, the Dominican Republic has been home of a variety of Indigenous resurgence groups, archaeological excavations, and local initiatives. Therefore, investigating the important indigenous heritage in the Dominican Republic is of vital interest for local communities.

As these two short summaries of each island's historical context prove, despite the insularity of the Caribbean, the region varies greatly. Thus, to investigate local heritage in the region, even in a single island such as St. Kitts or the Dominican Republic, would require a vast amount of resources and time. To meet these types of challenges, crowdsourcing local heritage creates the possibility for a democratic and representative collection of information in a simpler, efficient, and effective format.

5.1 St. Kitts

5.1.1 Background

In St. Kitts, the aforementioned historical context has led to an under representation of local heritage and local artisanship. This includes local sites, such as historic, natural and archaeological. Further, because of the concentration of tourism in Basseterre, the capital, and the Southeast Peninsula of the island, local artisans in other parts of the island often do not have access to tourism markets. Following discussions with the Department of Culture, a crowdsourcing tool that allows for local information to be gathered and displayed was deemed a necessary tool for expanding knowledge and tourism. Hence, everyone who lives or visits St. Kitts can be an active contributor to the perception of the history and culture of St. Kitts. Working together with collaborators, the crowdsourcing tool was created with input and participation as well as direction from local agencies, the Department of Culture and the Department of Information Technology. This ensured that the crowdsourcing tool was developed with relevant and useful questions in mind. As mentioned above, these question are, first related to the identified need of increasing local participation in defining local heritage through participation in both submitting information and commenting on the information. Second, the identified need of creating a more active and publicized artisan community in cuisine, music, crafts and arts. This is connected to the local intangible heritage of St. Kitts. These two questions defined the work plan of the creation of the platform. These defined the type of categories and labels that would be used in the crowdsourcing website. These categories were broken down into the following labels:

1. Historical and Natural sites: (a) Amerindian (b) Colonial (c) Community (d) Natural.

2. Visual Arts: (a) Photography (b) Painting (c) Crafts (d) Artisans (e) Designer (f) Videography (g) Film.

3. Culinary Arts: (a) Farms (b) Restaurants (c) Food and Vendors.

4. Performing Arts: (a) Music (b) Drama (c) Dance (d) Festival.

5. Literary Arts: (a) Poetry and Literary Event (b) Novelist (c) Writer.

6. Professional Auxiliary CCCI (Creative and Cultural Industry Services): (a) Television Stations (b) Radio Stations (c) Newspapers/Magazines (d) Electronic Media (e) Hair/Make-up Salons (f) Stage/Decor/Tent/Chair Suppliers (g) Sound System Suppliers (h) Lawyers (i) Accountants (j) Tour Operators.

7. Official Reports

These labels were defined together with local stakeholders to ensure comprehension by users. These categories/labels are displayed on the map of St. Kitts as well as chosen by users to identify their submitted corresponding site. Thus, users submit information on what type of heritage it is, for example, natural. They also provide a description of what it is and where it is. Once submitted, information must be verified and approved by the database manager. In this instance, the database manager is the local stakeholder, Department of Culture. No background workshops were done before the creation of the site as the general public was the audience of interest. According to background research, internet use in St. Kitts is around 79 percent. This amount is even higher for the younger generations [Staff, 2014]. For this reason, local collaborators felt that social media would be enough to reach the public about the crowdsourcing website. Once the site was created, a workshop was given to Department of Culture staff on the use and management of the site. Finally, a workshops was also given to the Department of Information and Technology staff as they would be hosting the site on their server.

5.1.2 Institution Setting and Administrator:

Governmental agency: St. Kitts Department of Culture

5.1.3 Goal

To provide an online platform for the collection of local heritage and artisan industries of St. Kitts. Research questions:

1. What heritage is important to Kittitians?

2. Where is this heritage?

3. Is the collected heritage represented at a national scale?

4. How can crowdsourcing link with intangible heritage to promote local artisan industries such as cuisine, craft, music?

5.1.4 Stakeholders

1. St. Kitts Department of Culture

2. Local industries who want to be featured on the site

3. Local participants who want to share their heritage on the site

5.1.5 The Crowd

1. Kittitians

2. Tourists

3. Global public

5.1.6 Type of Information Collected

1. Important local histories connected to sites defined as either/and Amerindian, community or colonial, and natural sites.

2. Important local histories tied to intangible aspects as defined as either/and Amerindian,community, local, and natural.

3. Information on local artisans, musicians, cuisine and crafts.

4. Community comments .

5. Photos, videos, news links attached to submission.

5.1.7 Incentives

Users are motivated to participate through sharing and ownership of their personal information. Users share their own personal experiences and areas of importance found on the island of St. Kitts. This information is viewed by a global audience, including the mass amounts of tourists who come to the island. Thus, once the information is verified, contributions become a part of the national representation of Kittitian heritage. Participation by Local artisan could be thought of as membership based. The goal of including this target group is to increase their own profitability by creating access in the tourism market. As the Department of Culture verifies the craft or product of the local artisan to assure its quality, the local artisan gains new opportunity in reaching customers.

5.1.8 Site Infrastructure

1. Stand alone site

2. Managed by Department of Culture, hosted by Department of IT

3. Links to site on social media and government websites

5.1.9 Site Evaluation

1. Number of total site visits tracked through database

2. Number of total submitted sites through email or directly on site

3. Number of posted comments

5.1.10 Expected Analysis

The collection of local heritage histories in St. Kitts can be used to identify important local sites that may not be recognized or preserved by national agencies. Further, analysis of local artisan locations can be disseminated to tourism agencies to increase share of market. Through this, the crowdsourcing platform creates a greater representation of heritage throughout the island as well as promote local entrepreneurship.

5.2 Dominican Republic

5.2.1 Background

Crowdsourcing is particularly useful in situations where information could have been overlooked, ignored or has not been effectively mined. The Dominican Republic's rich history of indigenous populations, encounters with the Spanish and subsequent diversity, leads to a variety of histories that can be disregarded within a national framework. As mentioned above, indigenous heritage and connections to the Amerindian past are an important part of local histories in the Dominican Republic. Thus, crowdsourcing could serve as the connection between people, these histories and sharing their experiences in a collaborative format. To create an effective crowdsourcing tool, a collaboration grew between the Museo de Alto Chavo, secondary school teachers from the regions of Monte Cristi and Valverde as well as researchers from Leiden University and University of Konstanz. The Museo de Alto Chavon is a private museum located in La Romana, Dominican Republic. The museum has interactive archaeological collections on display as well as active participation in schools. Further, educative practices in the Dominican Republic are seeking to create a curriculum that is culturally inclusive, sensitive to the rich indigenous heritage, making a collaboration with secondary schools necessary and relevant. Working with both the Museo de Alto Chavon, and archaeological museum, and local secondary schools in the region, centered the focus on the often overlooked indigenous heritage of the island that has been increasingly promoted in the Dominican Republic education system. The basis of this collaboration led to the combination of the principles of of crowdsourcing with inclusive education. As the stakeholders and general users of the proposed website would be different from the general public of St. Kitts, workshops were adminstrated in August 2015 in La Romana with secondary school teachers to understand the need and desired use of interactive education tools. The workshops included an overview of crowdsourcing, a mockup of the potential site and a questionnaire of desired use administrated to teachers. The survey was created to investigate preliminary interest of a crowdsourcing tool for education purposes. A total of 23 teachers participated from the two regions Monte Cristi and Valverde. More than 60 percent of teachers saw the benefit of using an online interactive tool with their students to promote indigenous heritage. Further, while 36 percent of teachers rarely used an online tool for educational purposes, this was because there was a lack of tools. From these results, it is clear that there is a real interest in creating interactive education tools, as more than half use an internet based activity for education purposes. Following the workshops, the process followed a similar work plan as the tool in St. Kitts. The focus of the site would be on indigenous heritage expressed in both the present and past. Categories or labels were created collaboratively. The Labels are found below:

1. lugares indgenas (indigenous sites)

2. practicas indgenas contemporneas (contemporary indigenous practices)

3. eventos (events)

4. collecciones de patrimonio indgena (indigenous collections in museums)

Further, as the tool was built to collect information on present day transformations of indigenous heritages, users not only submitted what and where and the label, but how does the site describe indigenous heritage to them, how they learned of the site, and how often they visit the site. Important to note is that the site is in Spanish. Once the crowdsourcing tool was created, a trial period of 1 month was used to work out any issues or bugs. Local collaborators, then, posted information about the site on their social media. Further, they reached out directly to teachers who participated in the workshops, as well as principals of secondary schools in the regions of Monte Cristi and Valverde. This ensured follow up with the intended audience, school teachers and students. Thus, the intention behind the crowdsourcing tool in Dominican Republic was to be built directly as a curriculum activity for teachers but also usable for the general public.

5.2.2 Institution Setting and Administrator

Local private agency, museum :Museo de Altos Chavon

5.2.3 Goal

To provide an online platform that can be used as an educational tool for promoting indigenous heritage in the Dominican Republic that encourages active participation of students and the public

5.2.4 Stakeholders

1. Museo de Altos Chavon

2. Teachers from the schools Monte Cristi and Valverde region, Dominican Republic

5.2.5 The crowd

1. Students from secondary schools in the region of Monte Cristi and Valverde, Dominican Republic

2. Interested public from Dominican Republic

3. Global public

5.2.6 Type of Information Collected

1. Local indigenous histories connected to locations

2. Community commentary

3. Photos, videos, newslinks attached to submissions

5.2.7 Incentive

While the site is open to the general public, special attention has been focused on creating a users base with secondary schools through collaboration with teachers at regional schools. This creates more of membership type of incentive as those teachers and students who use the tool are doing so from previous knowledge and workshop participation.

5.2.8 Site Infrastructure

1. Stand alone site

2. Managed by Department of Culture, hosted by Department of IT

3. Links to site on social media and government websites

5.2.9 Site Evaluation

1. number of total site visits tracked through database

2. number of total submitted sites through email or directly on site

3. number of posted comments

5.2.10 Expected Analysis

The information collected reveals the continuation and valuation of indigenous sites in the Dominican Republic. As it is administrated by the Museo de Altos Chavon, the site increases the museums visibility. As it is used as an educational tool, the exercise of collecting the information creates greater dialogue in school communities about the indigenous past. Further, the information can be used to analyze the transformation of these indigenous sites and the values associated with them into the present.

6 Discussion and future work

6.1 St. Kitts

The St. Kitts heritage crowdsourcing website (www.culturesnaps.kn) was launched in March 2015. There has been little traffic to the site for much of 2015. There has been episodic contribution to the site over this period. We identified various shortcomings that have hindered the active use of the tool the researchers has hoped for. These deficiencies include: a) lack of focus in the objectives of usage of crowdsourcing for culture and heritage management, b) lack of strong social media campaign for the tool, and c) changing management, thus, creating a lag in the management of the site . We are working with the local cultural, tourism, and educational bodies for increasing the use and effectiveness of this tool in St. Kitts.

6.2 Dominican Republic

The Dominican Republic website is in the testing phase. While relatively recently implemented, the crowdsourcing platform in the Dominican Republic is already showing interest from teachers as well as the general public. Workshop attendees and school districts were contacted to follow up about the launch of the crowdsourcing tool. As a relatively a new concept in educational tools for the Dominican Republic, it has been used more by the public than by the teachers. As the site has only been recently released more time is needed to see its use by schools. The site has gained a lot of traction because of the already active social media presence that the Museo de Altos Chavon has. The Museo de Altos Chavon posted information about the crowdsourcing tool on its social media pages and received more than 200 hits. This highlights the importance of creating an active web following to create a strong user base. Investigating its use by school teachers and students will be a topic of future research. The site will be officially launched at the Museo del Hombre's August 2016 conference, as officials from cultural and educational ministries will be present.

In this work we applied crowdsourcing techniques for supplementing heritage and cultural knowledge in two islands of the Caribbean. While cultural heritage is often promoted by national identities, crowdsourcing provides an integrative approach by acknowledging the dynamism in culture, heritage, history, and representation. Through different contexts, both case studies reveal the efficacy of applying crowdsourcing techniques in the culture and heritage domains. Further, these tools, when used collaboratively, can create new types of public engagement. Through crowdsourcing, cultural heritage can be better appreciated from a local perspective. While neither tool has been as successful as the researchers would like them to be, with regards to gaining public participation, it is important to note that external promotion efforts need to be deployed locally for creating a user base. In many instances, resources to create proper social media campaigns are limited, thus preventing extensive use of such crowdsourcing sites. Researchers are still working with their collaborators and hope to continue working together to increase usage of the sites.

Research in the heritage field frequently deals with the question of heritage subjectivity, making the relevance of this contribution to the heritage field in the Caribbean region even more timely. As the Caribbean is a region diverse cultures, a one–size–fits–all approach will not be useful for producing meaningful methods of knowledge dissemination of culture and history. With the collaborative crowdsourcing application novel opportunities for learning, exchange and engagement can be created within the communities.
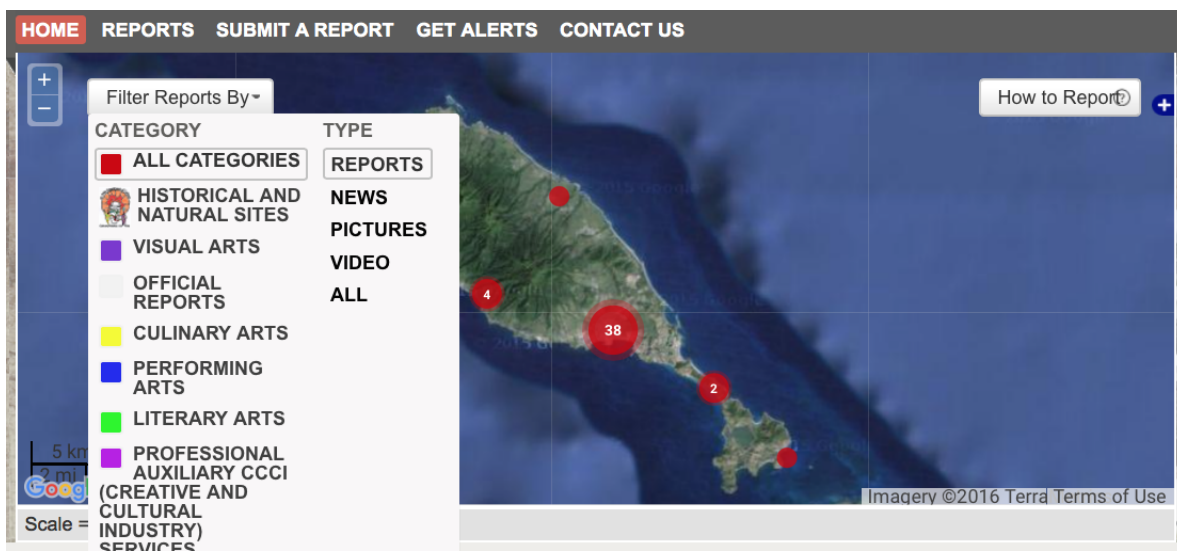
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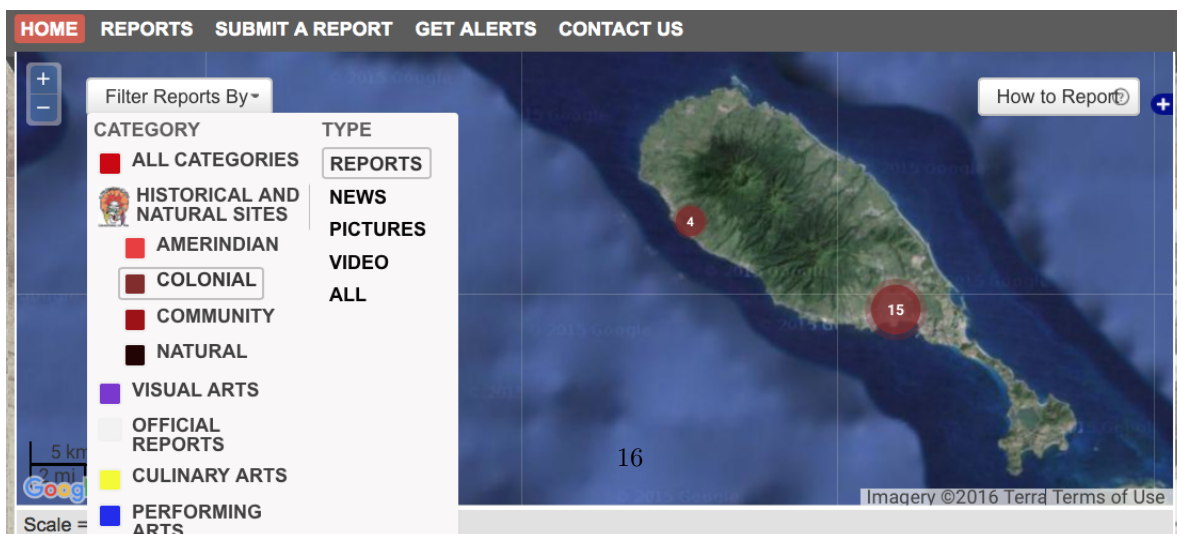[White, 1973] White, H. (1973). Interpretation in history. *New Literary History*, 4(2):281–314.

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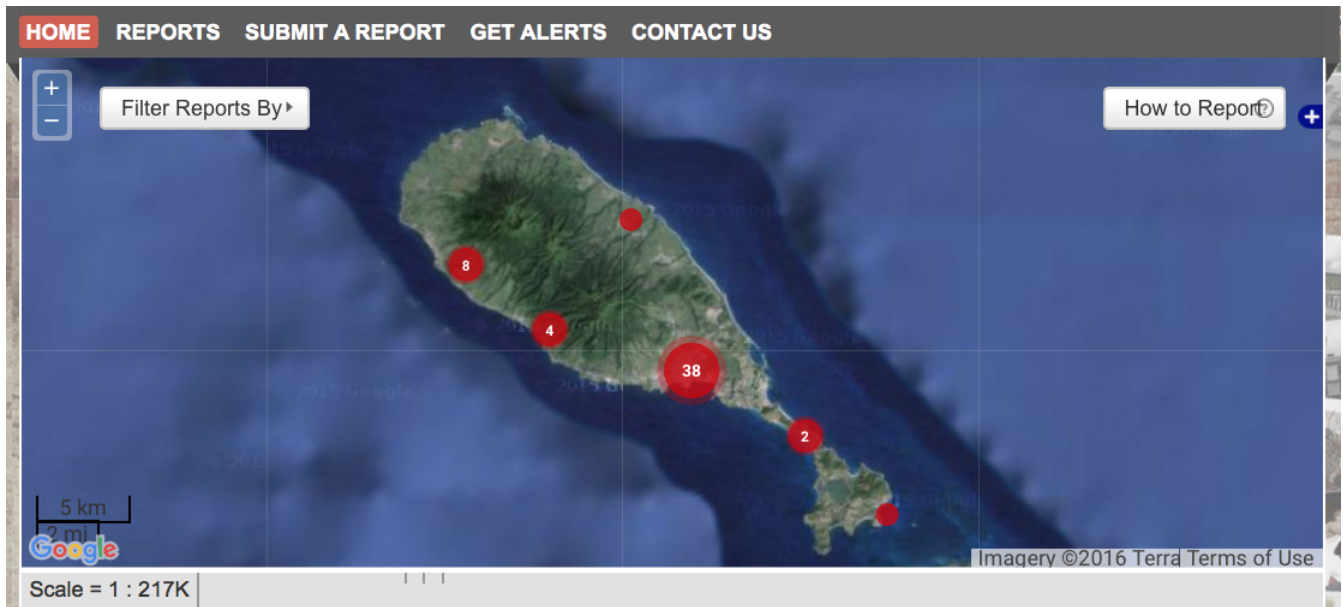
(a) Main map. Dots indicate the locations with submitted
reports. Number indicates count of reports

(b) All categories

16

(c) Category colonial selected

Figure 1: St. Kitts - main map display

Figure 2: St. Kitts - default submit report form

Figure 3: St. Kitts - View reports.
Left hand panel displays first 5 of the 10 reports sorted by date. The green and red vertical bars left of the pictures indicate the verified/unverified status of the reports. The reports can be viewed over the geographical map instead of the list view. Right hand panel provides all the options for filtering. Multiple filtering criteria can be selected for filtering the reports.

Figure 4: St. Kitts - Get alerts