CitSci.org: Online Participatory GIS

Abstract

Citizen science websites are emerging as a common way for volunteers to collect and report spatial ecological data. Engaging the public in citizen science is challenging, and, when involving online data entry and map use, becomes even more daunting. Given these challenges, citizen science websites must be easy to use and result in positive overall satisfaction for many audiences. Can a website in support of citizen science be easy to use and received positively by those participating? What aspects of citizen science should these websites support? Can citizen scientists effectively use an online Public Participation Geographic Information System (PPGIS)? Does online participation translate into greater motivation for continued website use, and increased appreciation, and give them an honorarium receipt form upon arrival. Participants completed a protocol analysis, a series of tasks developed using an iterative design (Zimmerman and Paschal 2009), that resulted in four scenarios. Upon completion of task analyses and observations, participants completed a post-protocol questionnaire. Throughout the development process we conducted extensive website testing. We employed a full-time tester who ran structured and unstructured test scripts to ensure proper website function. Finally, we also conducted performance, robustness, and reliability evaluations (Graham et al. 2009 in review) to ensure fast performance and scalability.

Evaluation & System Improvement

We conducted several mixed-method evaluations throughout the entire development process. We began with investigative semi-structured interviews with potential end-users to identify user requirements and needs. This helped us create an initial requirements specification based on an initial needs assessment. In the middle the development process, we conducted formal website usability analyses (Newman et al. 2009 in review). The formal usability analyses conducted involved a purposive sample of 16 citizen scientists who were asked to perform a series of task scenarios (Newman et al. 2009 in review). The usability analyses were conducted at the Center for Research on Communication and Technology Usability Laboratory of the Department of Journalism and Technical Communication at Colorado State University. We briefed participants on the research project, asked them to sign a consent form, gave them a $25 cash honorarium as a token of appreciation, and gave them an honorarium receipt form upon arrival. Participants completed a protocol analysis, a series of tasks developed using an iterative design (Zimmerman and Paschal 2009), that resulted in four scenarios. Upon completion of task analyses and observations, participants completed a post-protocol questionnaire. Throughout the development process we conducted extensive website testing. We employed a full-time tester who ran structured and unstructured test scripts to ensure proper website function. Finally, we also conducted performance, robustness, and reliability evaluations (Graham et al. 2009 in review) to ensure fast performance and scalability.

Results & Future Directions

While the Citizen Science website provides a broad range of information and participants rated the website positively overall, completing basic website tasks and more complicated map-based tasks identified a wide range of user problems. Most participants had a difficult time with aspects of registration, navigation, early warning features, finding links to quickly add GIS software. Although considerable attention has been given to the development and application of usability evaluation methods for interactive map applications, PPGIS, and geovisualization environments (Haklay and Tobón 2003, Koua et al. 2007, Nivala et al. 2008), situating usability evaluation into the broader context of citizen science activities is needed. Citizen scientist user requirements, like those of most map users (Meng 2005), are not sufficiently understood. Thus, we conducted an additional preliminary needs assessment to determine what online analysis features citizen scientists desire. Thus far, 42 citizen scientists have responded. Approximately 67% want to analyze data they collect and feel that they would use online analysis features such as calculating averages or creating graphs. Only 7% did not want to analyze their data online. Thus, more interactive and participatory online GIS appear to be desired, yet difficult to use.

Development

To begin addressing these questions, we built a website in support of citizen scientists between 2005 and 2008. Our development process began with brainstorming and investigation of user needs through interviews and proceeded with iterative development, testing, implementation, deployment, and engagement. We used a user-centered design approach and used user-oriented programming to create a flexible and easily maintainable system. The system is built with open source and proprietary components. Each component was evaluated against a “make-or-buy” decision process on appropriateness of technology, performance, flexibility, and ease of maintenance. We use PHP, Java, MySQL, GD, JSP, Java, Javascript, HTML, CSS, and several open-source geospatial libraries.

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