Creating and Testing a Portable Template for Municipal-Level Adoption of the Geospatial Web 2.0

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Abstract

Governments throughout the world have begun to use Geospatial Web 2.0 (Geoweb) technologies to increase the efficiency and effectiveness of their operations and to better connect to the electorate at large. Despite the broad enthusiasm for the Geoweb, the technical development aspects required to create a Geoweb site presents a significant barrier to adoption. At the municipal level, developing a Geoweb site can be an overly technical challenge, as user-friendly tools often come with limited functionality and free tools require computer programming expertise. When looking at the Geoweb development landscape there is a lack of a solution that is low-cost, feature rich, and easy to set up.

This presentation introduces the audience to recent work developing and testing a Geoweb template designed for use and widespread distribution at the regional municipality and community levels. We describe the rationale for the selection of specific technologies, design choices made to include specific Geoweb functionality, the packaging of programming code components, and the construction of a technical manual to guide potential users with little previous knowledge of Geoweb development. We then introduced this manual to two groups of undergraduate students conducting participatory mapping research with a community-based watershed management organization located in rural Quebec. Our experiences with these students serves as a test case used to further refine the portable Geoweb template for future use at the municipal and community level.

Background and Relevance

The Geospatial Web 2.0 (Geoweb) is an online framework for collecting, distributing, and using geospatial data in a collaborative manner (Hudson-Smith, Crooks, Gibin, Milton, & Batty, 2009; Rouse, Bergeron, & Harris, 2007). The Geoweb consists of multiple components, such as geographically referenced data sources and digital earths, that all can be interlinked, or 'mashed up' via application programming interfaces (APIs) to create an online map (Haklay, Singleton, & Parker, 2008). The Geoweb is multi-directional, in that it supports use both in a traditional 'read-only' manner, and in a Web 2.0 'read-write' fashion that encourages users to contribute and share information (Gorman, 2007). The Geoweb is built on the development of free or low cost online mapping platforms, such as Google Maps and Open Layers, the provision of open, shareable data from governments, organizations, and companies, and the

acknowledgement that individuals can provide information based on their own experience (volunteered geographic information, or VGI) (Goodchild, 2007; Hudson-Smith, et al., 2009).

Governments throughout the world have begun to use Geoweb technologies to increase the efficiency and effectiveness of their operations and to better connect to the electorate at large (Ganapati, 2010; Lemuria Carter, 2005). For example, many governments in Canada and the United States now provide free access to geospatial data to all citizens. This data can then be used, or "mashed up" by citizens, advocacy groups, and private businesses to create new, innovative products and analysis, such as crime maps, maps of public sector expenditures, and community economic development instruments.

Despite the broad enthusiasm for the Geoweb, the technical development aspects required to create a Geoweb site can present a barrier to adoption (Cinnamon & Schuurman, 2010). While at the national and provincial levels there may exist resources and expertise to develop these types of tools, this can be lacking at the municipal and community levels. One approach to circumvent this has been via "Apps for Democracy" style contests (www.appsfordemocracy.org), effectively outsourcing Geoweb development tasks to skilled citizens or private developers in exchange for prize money and fame. For municipalities without the resources or engaged developer base to run these type of contests, developing a Geoweb site can be an overly technical challenge, as user-friendly tools often come with limited functionality and free tools require computer programming expertise. When looking at the Geoweb development landscape there is a lack of a solution that is low-cost, feature rich, and easy to set up. This research addresses relevant questions concerning the future development path of the Geoweb, primarily the deployment and sustainability of the technology in limited resource environments.

Methods and Data

We describe the development of an on-line, interactive platform that uses Geoweb technology as a two-way information conduit to engage citizens in environmental management issues. Developed with support from a team of Quebec government ministries, this platform is one component of a three-year project that will evaluate the potential for the Geoweb to support citizen participation in land-use decision-making in the largely agricultural municipality of Acton, 100 km east of Montreal, Quebec. One goal of this project is to make available the platform and manual to other municipalities within Quebec interested in using the Geoweb.

This presentation describes two phases of the Geoweb platform development: technical development and portability assessment. For the technical development phase, we used Google Maps API and custom AJAX components to developed a Geoweb platform where users can add a point to a map and fill out a developer-specified form. Both the point and form information are then immediately added to a MySQL database and are viewable to other platform users. This system provides a rapid way for individuals to add VGI to a map. This platform has been designed to minimize the amount of coding

and expert-level technical knowledge required for set up. Accompanying the development of the Geoweb platform is an instructional manual targeted towards non-technical users at the municipal and community levels.

The portability assessment phase of the project introduced the Geoweb platform and instructional manual to two groups of senior undergraduate students enrolled in a McGill university semester-long project course. These students had little previous exposure to the Geoweb or web development in general, though several had taken introductory GIS courses. These groups worked with the corporation de devéloppement de la rivière Noire (CDRN), a local watershed management organization to gather community input on major points of erosion on agricultural lands. Students worked with CDRN and citizens to create participatory maps using two different Geoweb platforms; 1) a simple Google My Maps, and 2) a more fully-featured site developed with our Geoweb template and instruction manual containing code snippets and tutorials. After the participatory mapping projects were completed, we interviewed the McGill student groups and representatives of CDRN to document their perspectives on implementing and using these two Geoweb platforms. In our interviews we focused questions on ease-of-use, feature availability, fit to task, and resources required for installation and maintenance.

Results

From a technical development perspective, the Geoweb template and manual present an option to users that is low-cost and comparably feature rich. From an ease-of-deployment perspective, our experiences with the McGill/CDRN erosion mapping project indicate that though promising, there are significant constraints to deploying the Geoweb at the community level. Specifically, need arose for a technologically-adept 'chauffeur' to help with deployment. This raises questions about the ability for the Geoweb template to be distributed widely to user populations. For example, potential users with previous web development experience may be able to easily deploy the Geoweb template, but these skills are unevenly distributed. In comparing the student experiences using the simple Google My Maps implementation and the Geoweb template, it became clear that there was a tradeoff between an approach that was easy to deploy, yet lacking features (Google My Maps), and feature rich, but more difficult to deploy (Geoweb template). This indicates that for future Geoweb implementations, developers must strongly consider the feature set required for their particular task before selecting an approach, or potentially risk selecting a technology that is either too difficult to deploy or too simple in feature set.

Conclusions

The various technologies that undergrid the Geoweb are in a rapid state of change. Despite continuous improvements there exists a need for a feature-rich, low-cost, and easy-to-deploy Geoweb solution, appropriate for limited-resource environments, such as

municipalities and community groups. This research developed a potential solution in the form of a Geoweb template and instructional manual. This template and manual were tested by two groups of McGill undergraduate students working with a community watershed monitoring group to conduct participatory mapping. These groups developed Geoweb platforms using both the Geoweb template and a basic Google My Map. In comparing these two implementations, the students and community group identified key trade-offs between the difficulty of deployment and the feature set. This highlighted several potential adoption constraints that could impact the success of the Geoweb template when distributed to other user groups.

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