

Design and Creating a Two-way Public Participation Geographical Information System Platform: An Open Source Architecture

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Introduction

Until recently, government data made its way to the Internet mainly through raw data gathered by the work of civil servants, and offered these data to citizens seeking insight into many subjects. But a new, more dynamic approach is emerging – one that enlists private actors as allies in making government information and useful online.

Public Participation Geographic Information Systems (PPGIS) platforms are viewed in almost all democratic countries as an important tool in the management of territory, inviting ordinary people to give their opinion on relevant issues to their lives and bringing together citizens and government (central or local) to the center of decision, in order to facilitate, speed up and improve government decision-making processes.

PPGIS research is entering through its second decade. There has been much that has been accomplished, but there is much to do in regard to people's contributions to community well-being [5]. PPGIS projects are though still limited in their ability to communicate, organize, and reflect user participation. Current public participation geographic information systems (PPGIS) literature approaches geospatial collaboration from an empowerment or mobilization perspective [1, 2]. Recent PPGIS mapping initiatives seek to use GIS to incorporate information held by local communities into the planning process, to address concerns articulated by community participants and groups, to reduce inequalities in public access to information and technology, and to develop and make spatial information more adaptable for community use [7].

In a 1998 specialist meeting on "Empowerment, Marginalization and Public Participation GIS" Craig et al established some basic assumptions related to what a PPGIS should contain and look like [2]. These are:

- equal access to data and information is a key component of a Web-based PPGIS
- PPGIS should have the capability to empower the community and its members by providing the necessary data and information
- establishing and maintaining community trust is key for people working with PPGIS

Despite these basic assumptions, until recently, traditional PPGIS applications have been governed by an almost legal obligation imposed by government on citizens to participate by providing input on various matters of public interest, involving citizens on the one hand and government on the other.

Almost ten years later from the specialist meeting at the NCGIA, Elwood (2008) also stated that data access is an important precursor to citizen effective participation in planning and policy making, though data access alone does not guarantee an active and influential role.

A new paradigm of participation assumes collaboration of all interested parties. Collaborative participation can help build civic capacity at least among community leaders and they can spread it to their circles of associates. This capacity in turn has the potential to create a more intelligent society, better

able to adapt quickly to changes in the conditions and more competent to address controversial, difficult issues [4].

Recently, has emerged a new paradigm of PPGIS research, two-way PPGIS platforms who are characterized by allowing a bidirectional communication and an equal access to information between citizens and government, as opposed to traditional platforms that only encourage the participation in a one-way, from citizen to the government. Despite this, there aren't yet many two-way PPGIS platforms that accomplished the purpose of an equal access to information.

Citizens should be able to see what their impact is because of the transparency of the dialogue and openness of the conclusions, on supply-driven and pragmatic approaches to engage the public in applications of GIS with the goals of improving the transparency of and influencing government policy [4, 6]. Both citizens and government become providers and recipients of information. Such collaboration takes place in design groups and in Internet systems where users are actively engaged in design process.

Collaborative participation thus dissolves many dilemmas, for example, there is no need for citizens or planners to choose between the collective and individual interest. In these dialogues the effort to meet individual interests produces a collective interest. In collaborative participation, interdependencies are uncovered and participants can discover how all may benefit from improving a resource. Participants - public agencies, powerful private interests, and common citizens - are treated equally within the discussions. In these processes learning takes place, and sometimes conflicts are resolved and innovations emerge [4].

Many authors believe that practice will increasingly be defined by the collaborative model because it better serves the purposes of participation. These methods allow decision makers to learn more accurately about preferences because participants are more representative and have more opportunity to provide thoughtful, informed input than in the standard

required methods [4]. In order to achieve a successful two-way PPGIS platform, it is intended with this work to implement concepts of Social Networks and Geospatial Crowdsourcing in the design of an open source two-way PPGIS platforms.

Contextualization

In a context of a collaboration with the Agency for the Public Services Reform (AMA), we were challenged to connect the world of PPGIS and government, by completely redesign the existing platform “A minha rua1” (“My street”). “My street” is a service that is already running on the web, allowing citizens to report problems in their neighborhood. All reports are routed to the corresponding local or central authority in charge. But since some requirements were not initially identified, technological limitations are present, and the actual participation is low (with about 4 reported situations per day, for a population of 10 million).

Designing a Two-Way PPGIS Platform

The question of an successful two-way PPGIS platform is this: how can we use technology to make it into a better platform? We believe the platforms that are the most successful in these days are those that are the most open. By designing simple and open systems it is given an opportunity to others to build on, reuse and extend. Open source software projects like Linux and open systems like the Internet work not because there’s a central board of approval making sure that all the pieces fit together but because the original designers of the system laid down clear rules for cooperation and interoperability.

Social Media

We argue that two fundamental changes must exist in new PPGIS platforms: there is a shift from hierarchies to increased equal rights platforms; improved communication, more transparency, and bi-directionality.

The role of the authority in former PPGIS platforms was really an authoritarian role: having all the power and only partly knowing and controlling the entire

platform. This is completely different from the crowd source platforms we know to be successful. So, one fundamental change is to diminish hierarchies and prevent people from hiding themselves behind the institution.

The second major conceptual design issue is related to transparency and communication. While former platforms use mechanisms to prevent citizens from seeing each other's participation, we aim to enable people to see the participation of others, which is a fundamental feature in social media.

If citizens are requested to participate, the administration must use the same platform to communicate with them. Not only to provide feedback, but also to publish useful information for the citizen.

The very first paragraph of Wikipedia's "social media" definition says: "Social media includes web-based and mobile technologies used to turn communication into interactive dialogue". Since we definitely want to move from the traditional governmental monologue (traditional PPGIS platforms) to interactive dialogue, social media seems to promise that, while also complying with our other requirements as well.

We decided to move from a traditional web application where citizens can report problems, to a social network where dialogues occur between citizens and public servants. This dialogue is open. The problems reported are open, and the feedback is also open as well. Public servants not only answer problems reported by citizens, but also will publish information that might affect citizens daily life.

The existing tools, such as Twitter, YouTube or Facebook are public, hosted social networks for individuals to create user accounts. Since we want communication around people's neighborhood problems, we need to develop our own social network tool to integrate, among other smaller things, the concept of 'problem' and 'neighborhood'.

Instead of developing such a social network from scratch, we select one of the many social engines available. We needed an engine that already has the typical social network features implemented, such as user registration, user profile management, user groups, friendship support, messaging, discussions, etc. We chose Drupal because it has all such features already implemented and it is open source. Because it is open source the code of the platform it will be free and it will be possible for common users to extend and take fully advantage from the platform and the data.

To extend the social engine to support the “My Street” application, we started by implementing the notion of ‘problem’ that can be reported by the citizen. To submit a problem, the user publishes a slightly different post, since the problem’s location and its type must be specified. The location can be pinpointed on the map. The type of problem is chosen from a closed domain. After choosing the problem type, the user can add more information (and media) concerning the problem being reported. The reported problem is displayed like any other user’s post. Other users can see the reported problem and can say if the problem also affects them, as well as post additional media about it. Another extension of the social network engine is related to the spatial component. In the “My Street” application, the location is very important. It is important to know where the problems are, but it is also important to create relationships and engage communities around their neighborhood. In the user profile, users can add one or more locations, like their place of work and their residence. Accordingly, users can define more than one neighborhood they care about. These locations are used to filter problems for those areas related to the user. These areas are also used to filter the information published by the authorities. As soon as users log on, they can see all the recent information about their friends and group activities, as well as things that have been reported and fixed in their neighborhood(s). Location is a key component to implement this thematic social network.

Finally, parallel to the core social network back-office tools must exist to keep track of all the problems being reported. Internally, as soon as the problem is reported, this information is routed to the corresponding municipality and assigned to a specific public servant accordingly to its type. We need to know what problems are still pending solution, their duration, which problems have

been partially addressed, how long it takes for their solution, etc. Various statistics are collected and the performance of each municipality is openly published.

Examples of features that we want to include are:

- Advanced search
- RSS feeds
- Mashups with other data sources
- Discussion forums and wikis
- Visualization
- Automated content and topic analysis
- Collaborative filtering and crowdsourced analysis

Outlook

In this paper, a new paradigm of PPGIS platforms are translated in concrete design solutions to be developed on top of an open source platform, already supporting typical social network features, like friendship, messaging, etc. The goal in the short term is to improve the relation and consequently the participation between the citizens and the authorities. While the conceptual issues will remain valid for a larger period, the concrete design issues can be constantly improved. For that purpose, the platform itself is open source and it is designed from the beginning to allow its enhancement and the development of extensions. While it might be difficult for the average citizen to improve its implementation, it would be great that public and private companies would like to enhance the platform with extensions that can be used to communicate with other stakeholders related to the public space: recycling companies, lighting companies, transit operators, etc.

Since the implementation is open source, porting this PPGIS platform for other environments like set-top boxes, smart tvs, mobile phones and tablets became easier and less expensive. Such porting costs can be supported by content providers, for example, to keep users connected on their platforms.

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