Public Participation GIS and Participatory GIS in the Era of GeoWeb

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Editorial

In the 1990s, public participation (PPGIS) emerged as an approach to broaden public involvement in policymaking as well as use of GIS to promote the goals of nongovernmental organizations, grassroots groups, and community-based organizations (Dunn, 2007; Obermeyer, 1998; Sieber, 2006). Researchers adopted participatory GIS (PGIS) as the focus shifted to the developing world, and more emphasis was placed on providing a voice to marginalized communities rather than on communities influencing public policy. PGIS also combined explicit participatory methods from fields like Participatory Learning and Action (Pain, 2004). Overall, the goal has been to integrate the qualitative and experiential knowledge of local communities and individuals, thereby empowering them to participate in political decisionmaking. By enabling the participation of local people, especially non-experts, PGIS, and PPGIS (shortened to P/ PGIS) have provided a platform where these people can map alternate views of the same problem and analyze the same data differently from those with political power.

Since the 1990s, numerous P/PGIS applications have been developed, such as work with indigenous peoples on language preservation, collaborations of inner city communities to track bad landlords, and interaction of various population groups to address environmental problems (Ghose, 2001; Laituri, 2003; Simao et al., 2009). P/PGIS appears well articulated as a technical method. Refined understandings of the role of P/PGIS (e.g. in access and equity, power relations, accommodations of diverse knowledge) have expanded what P/PGIS means in the new century. For example, we have investigated whether new technology can empower better than old, which challenges are durable, and whether P/PGIS truly erases political power and digital divides. Elwood and Ghose (2003) found that P/PGIS created technological barriers that persisted despite technological advances, for example, when empowered individuals took their new-found skills out of the community.

Dramatic changes in Information and Communication Technologies (ICT) and terminology have obliged P/PGIS to situate itself in the era of Web 2.0 and prove its continued value. We now have social networking sites (e.g. Foursquare, Twitter), new geospatial software (e.g. virtual globes like Google Maps, free and open source GIS like QGIS), and mobile technologies that couple location-based connectivity with cameras and other sensing systems. Advances in software (e.g. interoperability afforded by mashups and bundling of online data with applications) meant that one could build an application in an afternoon because software platforms like virtual globes removed the steep learning curve long associated with GIS. Mapping reporting systems like

Ushahidi integrated geovisualization with cellphone messaging. The software also transitioned to a different business model, a software as a service (SaaS), which often was free compared to a licensed and stand-alone system. Because of the ease of the user interface, the immediacy of these applications and the multimedia potential for many of the contributions, this 'geospatial web' (geoweb) was seen as transformative of geographic practice. Some considered the geoweb as intrinsically participatory (Sieber et al., 2016). This was a far cry from GIS, which historically was considered a tool upon which participation needed to be layered.

Platforms like Twitter, Ushahidi, and OpenStreetMap have enabled a proliferation of terminologies that are infused with geospatial and participatory potential. Among the many terms are Volunteered Geographic Information (VGI), the participatory geoweb, neogeography, citizen sensing, crisis mapping, crowdmapping, and citizen science (Elwood, 2008, 2010; Fast and Rinner, 2014; Leszczynski, 2014). VGI and citizen sensing focus on the role of non-experts in the creation and sharing of geospatial and nonspatial content on geoweb platforms; citizen sensors are significant as they outnumber experts and presumably are closer to the phenomena they observe (Sieber and Haklay, 2015). Crisis mapping and the related concept of crowdmapping address geoweb-based information generation during the aftermath of natural and human-made disasters (Shanley et al., 2013). The concepts introduce the distinction between and tensions among remote and local mappers. Crowdsourcing and citizen science can be linked to the 18th and 19th century projects in Britain with projects such as Whewell tide monitoring (Cooper, 2016). New citizen science platforms increase the scale, reach, and automation of amateur scientists' contributions. Crowdsourcing is seen as an approach that allows large groups of non-experts to undertake specialized tasks for the purpose of problem solving, creating new knowledge and ideas, and developing new products at lower costs and in shorter times (Capineri, 2016). Citizen science can be seen as an approach in which non-experts and professionals collaborate in scientific research to define research questions, collect and analyze data, and interpret and disseminate results. A good example of citizen involvement in scientific research is the addressing of lead contamination of domestic water in Flint, Michigan, through collaboration of local residents and scientists from Virginia Tech University (Cooper, 2016).

Regardless of the terminology, are we essentially talking about the same things? If so, what are the implications in this revisit of P/PGIS? There is considerable overlap between these concepts and P/PGIS in terms of three central components – people (who the individuals are), technology (how they participate), and purpose (why they choose to contribute). Despite these similarities, there are significant differences. New technologies allow a global community and trans-jurisdictional community of interest to participate in both data collection and research activities irrespective of their location and temporal nature of the problem. In comparison, P/PGIS is in danger of becoming a numbers game, where community-based applications increasingly are judged on the basis of the volume of contributors (e.g. the increasing scale of participants in humanitarian tasks in OpenStreetMap). As Elwood and Leszczynski (2013, p. 559) pointed out the paradox posed by the geoweb: it is now supposedly so transparent and easy-touse that anyone can participate. If anyone can now use an app then it can be concluded that everyone is using it. Thus the goals of broad-based participation are fulfilled. Moreover, if an individual cannot participate with an app whose user interface is effortless then this constitutes a moral failing. New forms of geoparticipation can evoke a type of social Darwinism that prioritizes participants who can easily use the app. In this way the geoweb acts as a disruptive transformation of participation, without learning the critical lessons of P/PGIS.

Relative to P/PGIS, roles have shifted and new actors have emerged. Indeed there is an ecosystem of actors in play (Leszczynski, 2012). Where once there was a single proprietor, there is now an interlocking system of interoperable software, hardware, and data components. A P/PGIS built on this ecosystem means many more components to maintain but also more options for contributing on varied platforms (Brandusescu et al., 2016). Roles shift from GIS-assisting professionals to system administrators and computer programmers (Stephens, 2013). With new actors and new ecosystems comes a transition in knowledge politics such that experts and individuals who are comfortable with GIS and spatial reasoning are focused to a greater extent on data creation and visualization using technology rather than decision-making processes. Numerous exogenous actors, like Google, Snap, and Twitter, bring their own agendas and business models to participatory activities. The SaaS business model means that the software is not as 'free' as one might think; systems monetize the participation of the very people marginalized in the new political economy envisioned by the web (Leszczynski, 2012). By contrast, individuals impacted by political decision are inclined to generate knowledge for specific purpose and must rely on supportive experts for this purpose. This situation not only creates a factioning among the locals, but also is influenced by technological knowledge, age, and digital divide. This problem is more pronounced in the context of P/PGIS as it is more localized in focus and requires involvement of local residents. Citizen science and crowdsourcing eliminate this problem by broadening participant numbers and bringing in scientific knowledge, but they might fail to address the local problem which is the focus of P/PGIS.

Other significant changes revealed in the emergence of geoweb concerns the purpose of participation, what is being generated, and how do the individuals participate. Crowdsourcing allows the generation of both structured and unstructured geospatial and textual data by individuals using their local knowledge. Despite large quantity of data generated by this approach, the quality of data may require special handling to ensure that it is fit for purpose (Mashhadi and Capra, 2011; Wiggins et al., 2011). This new way of contributing geospatial content is not collective as envisaged by P/PGIS. Collective generation of data, where the participants are motivated by individual interests, can fail to capture the knowledge and experience of indigenous and marginalized groups. It can fail to capture the consensus – the community interest and indeed, can redefine community to one of interest as opposed to geography. Collectivity tied to specific physical place was the motivation behind emergence of P/PGIS. In certain crowdsourcing and citizen science activities, the investment of participants can be brief, immediate, and an adrenaline rush. The knowledge and data created in these approaches is based on witnessing the problem and using personal knowledge rather than analyzing the problem based on local knowledge (Elwood and Leszczynski, 2013).

The geoweb has enabled a kind of passive or ambient participation. Whereas P/PGIS is a deliberative process of contributing information, for instance, about landlords or water pollution; we now have cell phone apps that a 'participant' can leave on while he/she anonymously moves in spacetime. Passivity is additionally possible in the harvesting and repurposing of individual's data. Data, for example from Twitter, can be repurposed according to the developer's own needs and not the original intent of the contribution (Stephens and Poorthuis, 2015). In these passive contributions, it is easy to infer the incorrect intent. A comment about a person's physical attribute ('hotness'), while walking downtown, can be misinterpreted as a citizen science observation of a microclimate. Passivity afforded by the geoweb offers greater convenience to members of a community, both on the part of citizens and the state. The poor mother with young children no longer must travel to attend a public meeting at 7 pm on the third Monday of the month. She can participate online or, increasingly, she does not need to be asked for her opinion at all. A left-on application can simply infer her opinions from her choices in where she goes. As Tufecki (2013, p. 851) pointed out 'the lowering of participation costs has been proposed as a key mechanism of democratization […] [However,] lowered participation costs often lead to discussions of "slacktivism", characterized as low-cost participation through online methods'. The consequence of this lowered bar is a furthering of the notion that citizens are consumers, that participants in society best function as inputs to a decision making process or, in the case of citizen science, unpaid volunteers who displace paid staff. P/PGIS must consider what it means to participate in an era of the geoweb.

This Special Issue was compiled during International Map Year (2015–16). Our goal was to demonstrate the unique role and usability of maps and geographic information in our world, with an intent to address the future of P/PGIS in an era of the geoweb. We chose articles in this Special Issue to expand our knowledge of P/PGIS and its place within the terminologies identified above. The first article From Mental Maps to GeoParticipation discusses the connection between P/PGIS and mental maps that were focused on visualizing and representing participants' spatial knowledge, and justifies the need to use available geospatial tools and technologies to encourage social engagement of certain communities in P/PGIS. The paper addresses the tension between new mobile technologies and P/PGIS. The second article A Shared Perspective for PGIS and VGI considers differences and similarities between P/PGIS and VGI from the perspective of participatory use of spatial information, attempting to reveal the connections and contradictions that the crowdsourcing brings to P/PGIS. The third article From PGIS to Participatory Deep Mapping and Spatial Story Telling: an Evolving Trajectory in Community Knowledge Representation in GIS makes a case for incorporating deep mapping to represent community knowledge in P/PGIS while addressing the geospatial knowledge and technology needs of communities. The fourth article Upside-Down GIS: The future of Citizen Science & Community Participation differentiates citizen science from P/PGIS based on theory and practice of community engagement with examples from the United States Federal Community of Practice.

The major focus of P/PGIS is to empower local communities by enabling their participation in decision-making through the use of maps, and geographic information and technologies. A durable challenge has been to measure the success of P/PGIS interventions, which is the focus of the fifth article Powering up: Revisiting Participatory GIS and Empowerment. The manuscript offers a strong 'wake-up call' to researchers and practitioners who attempt to ascribe empowerment to their projects. After 20 years of using that term in P/PGIS, the field has yet to lay the groundwork for understanding what empowerment means and how it materializes itself. The sixth article Facilitating PPGIS through University Libraries focuses on accessibility of

P/ PGIS as central to participation of marginalized groups and knowledge generation. Barriers to the availability of interoperable geospatial data can prohibit individual participation in P/PGIS. The authors provide an example of a university library system that enables data access and ensures integration of information from different datasets without much effort from citizens, emphasizing that even with interoperability standards and Web-based interaction, access to expertise remains important. The seventh article Mapping the Digital Terrain: Towards Indigenous Geographic Information and Spatial Data Quality Indicators for Traditional Knowledge and Traditional Land-Use Data Collection describes the need to establish indicators to assess quality of data generated by indigenous groups so that those datasets can be integrated with structured geospatial databases used in P/PGIS applications. The hope is that quality of outcomes is enhanced when producing interoperable data.

In addition to those introduced above, the following articles are associated with this Special Issue and will be published in Issue 54.1 (February). Like the sixth article, the manuscript Community Geography: Addressing Barriers in Public Participation GIS argues for using academic resources and leveraging university-community partnerships to eliminate barriers to access to data and geospatial technology for successful P/PGIS intervention. The final manuscript Cartographica incognita: 'Dijital Jedis', satellite salvation and the mysteries of the 'Missing Maps' also addresses crowdsourced collaborative mapping in the context of P/PGIS. It asks the provocative question, 'Why would a nonprofit organization not want to repurpose crowdmapping if it gave voice to marginalized people by providing "satellite salvation"'? The article examines the extent to which forms of participation and emergence of actors could be used to benefit communities in generation of participatory geoinformation.

In this sea of changing tools and technologies it appears that P/PGIS may be competing with other approaches and terminologies. At its core many of the new projects remain mission-driven, are led by local residents, and requires generation of data and knowledge to resolve a specific problem. The data generated through platforms old and new still suffer from lack of interoperability and data quality issues. Analytics may have been improved since the days of the command-line but still require considerable expertise; moreover, evidence-based policy, especially from the non-credentialled, must have entree into politics. Moving forward, researchers and practitioners should focus on not answering the place of P/PGIS amid new technologies and approaches but instead examine the extent to which new participatory technologies are effective in integrating local, scientific and personal knowledge in resolving political decisions and societal issues of interest to local communities.

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