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Participatory technologies and participatory methodologies: ways forward for innovative thinking and practice

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Her latest work seeks to develop vocabularies and practices to bridge the divides between the research, development and technology practitioner communities. She has received grants from the UK Economic and Social Research Council (ESRC) and the UK Department for International Development (DFID). Her work has been published in the form of books, peer-reviewed conference papers and reports.

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Abstract

The study argues that significant gains can be obtained from the blending of participatory research principles and methods with technology-driven information generation processes, based on two examples. The first concerns the merger of information crowdsourcing with participatory statistics and numbers. The second explores the relationship between Participatory Geographical Information Systems (PGIS), the participatory creation of maps, and volunteer, geographical information (VGI), a collaborative, distributed form of mapping supported by geospatial technologies. In the first section a short overview of recent ICT innovations which have excited the imagination of the international development community is provided. In the second section, attention is drawn to key features, ways of work and professional attitudes of the open knowledge technology community. In this section, differences in assumptions concerning the meaning of participation and the role of technology in supporting positive social change and the between development researchers and practitioners and open knowledge technologists are discussed. The third section is dedicated to exploring the interface between information crowdsourcing and participatory numbers and statistics, and the fourth section that between PGIS and VGI. In the final section the main insights and implications of the study are drawn together.

This paper provides a first basis for a closer collaboration between the open knowledge and participatory development communities by beginning to clarify each group's assumptions and ideas about the role of information in social transformation and the meaning of participation and by making concrete suggestions about areas where the blending of technology supported methods for information generation with participatory approaches can yield important benefits. As the example of participatory statistics and PGIS demonstrates, the combination of approaches from different traditions can be a challenging but also immensely productive undertaking that can greatly contribute to professional practice and policy.

Introduction

'Participation' has for a long time been a key notion in development thinking, discourse and practice. The paradigm shift in development research that began in the late 1970s with the rise of Rapid Rural Appraisal (RRA) seeded a revolution in development enquiry that gave rise to a family of approaches and methods, through which 'people are facilitated to do things for themselves' (Chambers, 2010:19) by enabling them to express and communicate their insights on their everyday life to plan and to act.

Today, many of the core principles of participatory research, such as the emphasis on the democratization of information and iterative and collaborative character of knowledge creation are shared by another, emergent group of technologists: open source software technologists and civic hackers who wish to address the key developmental and democratic challenges of our time through the power of technology, bottom up collaboration and transparency. For the purposes of this paper this group is referred to as 'open knowledge' technologists.

Despite the language, values and priorities that participatory researchers and this group of technologists appear to share, their trajectories rarely intersect. Although not wholly unproblematic, this resonance of ideas presents unique opportunities to shape emergent technologies and inform the thinking that underlies their design and use. This paper begins to address this gap by investigating the opportunities for learning and innovation between these two groups. It draws from interviews with technologists[1], development practitioners[2], and the author's own experiences in interacting with the two communities, to investigate each group's assumptions about technology and participation and identify areas where the cross-fertilisation of ideas from the two domains can support methodological innovation and clarify emerging issues and concerns.

The study highlights two areas where significant gains can be obtained from the blending of participatory research principles and methods with technology-driven information generation processes. The first concerns the merger of information crowdsourcing with participatory statistics and numbers. The second explores the relationship between Participatory Geographical Information Systems (PGIS), the participatory creation of maps, and volunteer, geographical information (VGI), a collaborative and distributed form of mapping supported by the latest generation of geospatial technologies.

This paper is structured as follows. In the first section a short overview of recent ICT innovations which have excited the imagination of the international development community is provided. In the second section attention is drawn to key features, ways of work and professional attitudes of the

open knowledge technology community. In this section differences in assumptions concerning the meaning of participation and the role of technology in supporting positive social change and the between development researchers and practitioners and open knowledge technologists are discussed. The third section is dedicated to exploring the interface between information crowdsourcing and participatory numbers and statistics, and the fourth section that between PGIS and VGI. In the final section the main insights and implications of the study are drawn together.

1 A complex technology and data landscape

New technologies are supporting a 'new data landscape'[3], an environment consisting of novel and traditional streams of data generated through the interaction of citizens with information and communication technologies (ICTs) and machines that are seen to render many aspects of private and public life more accessible and understandable. What types of technologies, however, make these developments possible? What are we talking about when we are talking about new technologies?

Firstly, there are tools that *support faster and cheaper data collection:* Global Positioning System (GPS) Units, basic functionality (that offer texting and voice capabilities) and next generation mobile phones (which offer mobile internet connectivity and support greater number of software programmes than the basic functionality mobile phones) tablet PCs that offer tactile interface, standard laptops and netbooks, Personal Data Assistants (PDAs), inexpensive digital cameras and video-recorders (such as Flip cameras) make up an ecosystem of relatively inexpensive devices that can be used to capture a variety of data (including text and numerical data, geographical co-ordinates, photos and videos). Some devices, like the one laptop per child XO have been developed in recent years to address the requirements of resource-poor environments, but have received mixed reviews about their potential benefits (Kraemer, Dedrick, & Sharma, 2009; Yeh, Gregory, & Ritter, 2010).

Secondly, there are developments that *support improved data exchange over a variety of channels and networks.* Many of these devices can support data exchange over a variety of networks, including fixed-line networks, mobile phone networks, fixed line and mobile broadband and satellite telephone and Internet broadband networks. The emergence of open source mobile platforms, like Android, is creating exciting possibilities, as it will allow users to run the same programs seamlessly across different devices and types of networks. An interesting category of innovations have emerged that combine low-tech hardware and open source software to establish connections between various types of networks and bridge the offline and the online. These include the programmes FreedoFone (http://www.freedomfone.org/) and Patatat (http://www.patatat.com) that

support the creation of simple SMS based forums and message lists without the need for an Internet connection, and Walking Papers (http://walking-papers.org/), which enable people to print maps on OpenStreetMap (OSM). OSM is an open mapping platform-often called the Wikipedia of Maps- that aims to create the first public digital map of the world. It consists of a collection of tools for editing geographical data and a database that stores the geographical information.

Thirdly, there are technologies for *improved data generation, aggregation and publication*. Open source information crowdsourcing tools, like Ushahidi and FrontLine SMS, and open mapping platforms are supporting decentralised data collection, aggregation and publication. In simpler terms, they can organise efforts for information collection and draw together reports and data generated by people working over disparate networks, locations and social networks. Information collected in this manner can be used to create complex information artefacts, mashups that combine multiple layers of information (geographic, demographic, or event-specific). The geographical mashups created at the aftermath of the earthquake in Haiti by Ushahidi, for example, featured reports of people posting pleas of help over Facebook and Twitter, and messages sent to a dedicated telephone short code or by email. The maps that were used as the basis for these mash-ups were the product of another crowdsourcing effort, that of the OSM community. Teams of OSM volunteers working in different cities across the world used satellite images taken after the earthquake to create detailed maps of Port-au-Prince that identified collapsed buildings, blocked roads, hospitals key landmarks. In subsequent sections the role of Ushahidi and OSM will be further explored.

In international development these technologies are used for:

- Improved policy response and service delivery for more effective development and aid programmes. This includes applications for monitoring and evaluation of interventions and data generation for tracking short and long-term change. The recent global financial crisis has also given rise to a number of initiatives that are designed to track the effects of change locally and globally. Global Pulse, (http://www.unglobalpulse.org/) a United Nations programme that aims to 'harness innovation to protect the poor and the vulnerable' is a leading initiative in this area.

- Increased transparency and accountability to support processes of democratization and positive social transformation. The open data movement, promoting the opening up of government data to the public, has been an important driver of developments in this area.

- Monitoring and coordination linked to humanitarian assistance, emergency relief and conflict. The role of social media and mobile technologies in the aftermath of the Haiti earthquake in

2010 has sparked interest in the opportunities afforded by new information flows for relief agencies. Networks like Crisis Mappers[4] and semi-professional technical communities like the Humanitarian OpenStreetMap Team (HOT) have started to work closely with relief organisations to develop technologies, capacities and standards to improve the information that humanitarian actors use to make decisions in emergencies.

For many participatory researchers and practitioners these developments hold the promise of taking participatory methods to scale and circumventing defects that are inherent in the highly localised and often transient character of participatory interventions. For example, the next generation of mapping platforms, can allow communities to retain maps produced collaboratively, that in the past were often taken away by the agencies leading the intervention.

2 Participatory and open knowledge technology communities in perspective: common vocabularies, divergent priorities and practices

Many of these innovations and their applications are driven by an emergent group of technologists who in the last seven years have become increasingly engaged in development at a policy and grassroots level. The group comprises open source technology entrepreneurs and civic hackers.

'Open source' software is licensed under terms that support its free use, modification and distribution. The source code, that is, the full detailed set of instructions written in a standard programming language that constitute the software, is available for anyone to review and change without the need to pay the high license fees typically demanded for proprietary software development. This can lower substantially costs, allowing programmers to adapt software to the specific needs of their users, including translating it in different languages and making it work seamlessly with other programs on a variety of devices. This is particularly important in pro-poor development, where one-size-fits-all solutions are often either unfeasible or problematic.

Open source software is characterised by a collaborative model of development that is often volunteer driven. Improvements and new features contributed by programmers and suggestions made by users can provide the basis for generating quickly improved versions and new spin-off programs. For example, the code of FrontLine SMS, a popular platform used for sending and receiving text messages with large groups of people via mobile phones has been used as the basis for MedicMobile (http://medic.frontlinesms.com/), an SMS aggregation programme specifically adapted to the needs of the medical community.

Open source software can also provide a means of engaging different communities of experts and practitioners in the innovation process and support lateral thinking and cross-fertilisation of ideas. After the Haitian earthquake, for example, coders from the Ushahidi and OSM communities worked together with other programmers to develop mechanisms and standards for different programs to talk to each other. Open source technologies are, therefore, participatory in two ways: they are the *product* of collaboration of dozens and sometimes hundreds of programmers but they also provide the *means*, the tools, for organizing collaboration that can be freely used and modified by anyone.

The term 'civic hackers' was coined by Josh Tauberer, a US open government activist, to mean those programmers who are using information technology 'to improve civic education and participation and to improve government transparency and accountability'.[5] Civic hackers are a leading force behind the open data movement which argues that access to government data in useful and flexible formats can support citizen action and public scrutiny. This can increase government transparency (Brito, 2008). The movement has been slowly gaining momentum in developing countries (Hogge, 2010). In July 2011, for example, the Kenyan government opened up some of its data (http://opendata.go.ke/).

How do the expectations and assumptions of open knowledge technologists regarding the relationship between access to information and civic empowerment and the meaning of participation compare to those of development researchers and practitioners, especially those embracing participatory approaches to inquiry? The rest of the section answers this question by drawing upon interviews with technologists, participatory researchers and practitioners.

Several interviewees pointed out the absence of a convincing theory of change on the part of the technology community with regard to how access to ICTs and information can lead to positive social change. According to Wheeler, the latest generation of ICTs is often 'used quite clumsily in relationship with processes of social mobilisation, development and transformation' (Wheeler, interview, 12.12.2011, p.8). This is largely due to how each community perceives the relationship between information and action.

For the more technologically determined this relationship is direct: increased access to information can support citizen action and seed positive social change. The primary task that technologists set for themselves is to remove that first obstacle by ensuring that the right services, tools and policies are in place to generate and publish information. For development researchers this connection is not evident. In the past decade, innovations in citizens' right to information and participatory methodologies, such as participatory budgeting and citizen report cards, have tested the connections between citizen representation, access to information, and accountability: that is the

ability of duty bearers to provide information and justification for their actions, and the ability of citizens to hold them to account.

The evidence base on the impact of these strategies is mixed and inconclusive, pointing to the complexity of using them in order to affect real change (McGee & Gaventa, 2010). Not only is the link between information and action not evident, but the increased availability of information may further empower those already privileged (Gurstein, 2011). This is because the use of information often requires skills and resources that are not readily available to the poor. A large part of the development community views, consequently, ICTs as inextricably linked to political issues and struggles. For some this means that their use should be purely instrumental, driven exclusively by social agendas. For technologists, such over-determination may leave little room for experimentation, for discovering new unexpected uses of new technologies.

Another important set of differences between the technology and development practitioner communities concerns those arising from the rhythms and modes of their work. Open knowledge technologists are great believers in the power of iteration in knowledge production and the benefits that can be obtained from low-hanging fruits, easy wins that can demonstrate the viability of a project and help recruit volunteers and other enthusiasts who are willing to dedicate their time and talents to support the collective effort. Many successful open knowledge projects, including Linux, an open source operating system that rivals Windows, and Wikipedia started out modestly, with a small core of contributors, building buy-in and attracting new contributors as the reputation of the project as a viable and interesting project grew. The 'bazaar' mode of production (Raymond, 1999) that underpins many open knowledge projects privileges speed, speed in getting a product out that gives concrete forms to imaginings and invites and sustains interest in an initiative.

These priorities and rhythms of work may complicate matters when trying to engage marginalised communities. Sammy Musyoki, one of the interviewees of this study, worked with GroundTruth, a technology intermediary, to help them improve their approach to community engagement. GroundTruth founded the Map Kibera project (http://mapkibera.org/), a collaborative mapping project that aimed to create the first digital public map in Kibera, one of the largest informal settlements in Africa. Musyoki (2010) pointed out some of the tensions emerging from the open source model of collaboration and the requirements of participatory research that involve a carefully crafted strategy of engaging with the community to define the direction and use of research.

A third important difference concerns the principal aims of process of data collection. For many technologists the key output of an effort to build a shared knowledge resource is the data, the information that is generated through the collective effort. For participatory development

researchers, the lessons that emerge through the process of community engagement and the building of the relationships between different stakeholders are as important as the final product of the effort.

In the following sections, further dimensions of thinking and practice that characterise the priorities and values of two groups are highlighted.

3 Information crowdsourcing, citizen reporting and participatory research

Can citizen reporting and information crowdsourcing, as understood in current development practice, be refined through the application of participatory approaches? In this section the interface between information crowdsourcing and participatory numbers is explored. Both processes are about numbers generated by many people with the aim of communicating their view of reality and seeding positive social change. It is argued that the scale and speed of crowdsourcing platforms can be creatively combined with approaches for generating numbers achieved through the integration of statistical and participatory methods.

The term 'crowdsourcing' refers to a multifaceted, online problem-solving process which in the context of international development has come to acquire a very specific meaning, that of inviting and aggregating reports provided by citizens primarily via SMS to address the lack of supplement official sources of information primarily in times of crisis.

The term was originally created by Jeff Howe (2006), editor of Wire magazine, to describe a new business practice whereby an organisation outsources a function once performed by employees to a large and, in principle, undefined group of people through an open call.

This definition of commercial crowdsourcing is exemplified by the case of the Mechanical Turk (https://www.mturk.com/mturk/welcome), an online labour marketplace created by Amazon.com that allows individuals to earn very small sums of money by completing simple information processing tasks that are too complex for computers to perform. In Amazon's Mechanical Turk such tasks include annotating images, translating short sentences in different languages and scanning websites for specific products.

Crowdsourcing can be done in isolation, as in the case of the Mechanical Turk, where tasks are designed to be completed by individuals working on their own, or collaboratively. Amongst the plethora of terms used to describe different forms of online collaboration, 'peer' (Duguid, 2006) or 'social production'(Benkler, 2006) are perhaps more suitable to describe cases where the content

creation, including data collection and processing, involves collaboration that sometimes results in the forging of close work and social ties amongst participants. The distinction between these two types of online work, collaborative, conducted in the context of an emerging or existing community and isolated, is an important one because its expresses different priorities and power relations.

Two examples of online cooperation from the development field illustrate these differences and help us discuss their implications for power and participation from the perspective of participatory methodologies. The first is the widely quoted example of the use of Ushahidi, a popular crowdsourcing platform, at the aftermath of the Haitian earthquake, in January 2010. Shortly after disaster struck teams of volunteer programmers, students and technology enthusiasts started to pool together information featured in traditional media and posted by Haitians on social media, Twitter, Facebook, blogs or communicated over phone calls. These updates, which included direct appeals for help, gave a moment-by-moment view of the situation on the ground. To further support the relief effort, technologists worked with Haitian mobile service providers to create a telephone short-code, a special four-digit number that eyewitnesses could directly call report incidents on the ground.[6]

The information was, where possible, 'geolocated', that is assigned a location on a map, and translated from French and Creole to English by members of the Haitian diaspora. Work took place in Tufts university and in CrisisCamps, volunteer, grassroots events where technologists gather to support humanitarian efforts in times of crisis, organised in major cities all over the world.[7] The processed information was published online, as a map mash-up and, later, in a spreadsheet, and forwarded to humanitarian agencies and relief workers on the ground.

The Haitian crowdsourcing effort was regarded by many as groundbreaking (Coyle & Meier, 2009; Goodchild & Glennon, 2010). It showcased the power of new technologies-specifically social media, mobile phones, information crowdsourcing tools and open mapping platforms- to create alternative channels of communication through citizen reporting and support frameworks of collaboration that allowed teams of volunteers working all over the world to process and disseminate the collected information very quickly. A closer look at what happened reveals that this response involved multiple 'crowds', groups of people contributing to the common effort in various ways.

First, there was the 'crowd' of Haitian citizen reporters who contributed by sending in their report to the dedicated phone line. Each reporter worked in isolation, providing some a piece of information that added to the overall picture of what was happening on the ground those precious first hours and days after the earthquake. This crowd was specific to that occasion; it was ephemeral, assembled for that specific purpose and was meant to dissolve after the end of the crisis. Secondly,

there was the network of volunteers working collaboratively over the net to make sense of the collected information. The work of the first group is consistent with the first definition of 'crowdsourcing', of an undefined network of people responding to a call who are dispersed and operate in isolation from each other. As in the case of the Mechanical Turk, participation of this type is narrowly defined. In Haiti it simple consisted of sending in a text message, making a phone call or posting something on the web.

The work of the second group is in more in line with the second definition of online, distributed work that is collaborative in character. The teams of volunteer data processors supported each other offline and online, learning new skills and forming new friendships along the way. Some of them belonged to pre-existing technical communities, such as that of Ushahidi and OSM. Many among them together with newcomers joined to form new communities such as those of Ushahidi's Standby TaskForce[8] or became contributors in CrisisCamps. These groups demonstrate characteristics of 'communities of practice', groups of people who pursue a common goal by interacting regularly and by engaging in processes of collective learning (Wenger, 1998).

There are many permutations of these two models. In Kibera, Nairobi, for example, the founders of Map Kibera helped to establish a network of citizen-reporters that provided regular updates on events in their community. Voice of Kibera (http://voiceofkibera.org/) had two tiers of participation: an inner circle of regular journalists that spread the word about the effort, trained new reporters and decided which incoming reports could be posted online and an outer circle of occasional reporters or one-off eyewitnesses. While the first tier of operated on a collaborative basis, as an emergent community of practice, the second tier was closer to the dispersed, albeit localised, model of crowdsourcing.

Let's concentrate for the moment, on some of the issues underpinning the unbounded, solitary model of crowdsourcing. Two aspects of crowdsourcing have attracted significant criticism within and outside the humanitarian community. The first concerns its capacity to yield reliable data that can be generalised.[9] The credibility of crowdsourced data has been considered by technology enthusiasts as an emergent quality of the *volume* of reports: more reports afford a more accurate representation of events and can help weed out false ones (Okolloh, 2009). This is dependent on the ability of those initiating and managing the process of information collection to *mobilise* large numbers of contributors.

The self-selected and faceless nature of 'crowd', combined with the prerequisites of access to a mobile phone or the web and the literacy level and technology skills required to write and send a text message are important, non-mundane factors that determine the profile of respondents. When

it comes to reaching the poor and the poorest of the poor, for crisis response, but also for monitoring and evaluation and community empowerment, the concept of citizen generated information needs, therefore, to be carefully rethought, taking into account different barriers to access and dimensions of participation.

Recognising these biases, proponents of crowdsourcing have argued that the approach should be regarded as one of the first steps along the chain of data collection designed to yield reliable evidence. The approach's speed and cost-effectiveness render it, the argument goes, ideal for a first, cheap, quick and dirty investigation of a given domain of experience to be followed by more systematic research. In this regard, crowdsourcing resembles the quick and dirty form of RRA, that usually consists of a brief on site visits of a professional with the aim of forming a first understanding of the selected issues.[10] Pilot studies in traditional social science can also perform this function. In practice very few, documented applications of crowdsourcing have been used in this manner, that is along a chain of investigation that results in ever more reliable and, therefore, actionable data. Another way of counteracting some of the biases of the model and in particular the self-selected, faceless character of the 'crowd' has been proposed in the form of 'bounded' crowdsourcing[11], where the reporters are known, vetted and trusted individuals, like the ones in Voice of Kibera.

The second criticism voiced against crowdsourcing concerns the one way flow of information from respondents to selected sites and organisations. The extractive nature of some forms of crowdsourcing has been highlighted and critiqued. Patric Meier, director of Ushahidi and leading figure in the crowdsourcing movement has coined the term 'crowdfeeding' to describe the process of returning the information collected by the public back to the public, usually on a one-to-one basis, as responses to individual appeals for help, queries, reports. Less attention has been paid to sharing the collected data with the public, in a form that can be understood, to support advocacy, planning and collective action. This can be particularly valuable in cases where the data can be used to extract accountability from local and national authorities, companies and development organisations.

The issue of access to the fruits of the collective effort is an important dimension of *governance*. Other important aspects of governance, some mentioned above, concern the ability to define the agenda of the research effort, namely to specify questions are asked, to whom and for what purpose. Participatory methods have developed ways of thinking and dealing with these issues which can prove extremely valuable when we consider the potential of new technologies to scale participation and support social change.

The first important lesson that this mode of inquiry affords concern the role of citizens in the research process. In participatory research citizens are seen as having a say at every step of the process of inquiry: from defining what information is relevant, to how it is measured and how it should be shared. The definition of questions and selection of indicators are the result of community engagement, of discussions and negotiations with community members about the aims of the research and about what aspects of their life and living conditions they consider more relevant for a given issue.

The reasons for this are epistemological, practical and ethical. Even at the earliest stages of research process the involvement of citizens can enable the emergence of new insights, priorities and definitions of issues (Chambers, 1995). The application of participatory methods has contributed, for example, to a significant shift in how we view poverty, by bringing into focus dimensions of well-being and deprivation that are not typically associated with wealth, such as the importance ascribed to having a voice within a community, or lacking social supports (ibid). Although the process of community engagement can be labour-intensive and time-consuming it can help generate valuable information and illuminate domains inaccessible from traditional modes of research. Studies of poverty, for example, that rely, exclusively, on monetary indicators can fall short of revealing important aspects of the lives of the poor. The definition of indicators in consultation with the community can, therefore, help researchers avoid costly missteps and contribute towards the *validity* of their studies, that is, the degree to which they accurately capture the concept that they try to measure.

The process of community engagement also performs another function, that of ensuring community buy-in in the data collection effort. This is part of the process to support community members to assume *ownership* over the collected information. This is an important concept in participatory research and is expressed by community participation in the research design, data analysis and use, including setting the conditions under which data is shared. The latter is particularly important in cases where the publication of the data can put at risk vulnerable groups, or groups that have been systematically denied their rights and access to services. At a time when the open data movement is gaining momentum, the ethics of sharing demand closer investigation and is one of the areas where discussions between the development researchers and practitioners and technologists can significantly add to thinking and practice.

How are these issues relevant for crowdsourcing? Firstly, these concerns reveal the importance of the process through which research questions are defined. In doing so, they highlight the political character of the data collection effort, which always privileges the needs and priorities of certain groups over others. This is worth considering in light of the appeal that crowdsourcing has as a

cheap data collection method for many development organisations. Secondly, participatory thinking draws into focus the importance of the role of the public at every stage of the process of research: from research design and data collection to data analysis and use. Crowdfeeding may be a step in the right direction, but it may be insufficient to support collective action, especially in the context of development, where traditional survey questionnaires, excel spreadsheets and pie graphs might not always be the right way to inform or engage citizens.

Participatory research has a store of ideas and techniques that can support the generation of numbers and statistics and the communication of the research findings to the public. These included some intensive visual methods such as matrix ranking and scoring, card writing, sorting and positioning, proportional piling and mapping for enabling people to quantify their views experiences. Meetings, workshops, community score cards and village books, CD-ROMs and travelling caravans can be used to present and discuss the results of the research with communities (Reyes & Due, 2009). One of the challenges for the technology community is to create tools that apply and extend these techniques in ways that take advantage of complementarities between offline and online dynamics, such as those supported by Walking Papers.

The blending of participatory statistics with crowdsourcing tools and techniques can offer additional opportunities for innovation. Participatory statistics involves the application of statistical principles with participatory methods to produce results from a representative sample which can be generalised to reach conclusions about the general population (Barahona & Levy, 2002). From the perspective of the technology community and civil society, the adoption of this approach, can strengthen the generalisability of the results obtained through crowdsourcing, by helping define, for example, a methodologically sound sample population. Equally, the adoption of crowdsourcing tools and techniques by researchers and development organisations can support the quicker delivery of information on changes in poverty and vulnerability conditions that provide development policy makers with a more timely understanding of key development events as they unfold.

4 VGI and PGIS

Many of the values and concerns that underlie participatory numbers and participatory research such as the prioritization of citizen's involvement in defining the direction of the research also apply in participatory mapping. The examination of the dynamics of digital, collaborative mapping or VGI (Goodchild, 2007), and participatory mapping will deepen the discussion on the relationship between collaborative data generation supported by new technologies and participatory methods, whilst highlighting some issues that are specific to mapping.

Let's begin with some definitions. VGI or neogeography (Turner, 2006) encapsulates the possibilities supported by new technologies for the democratisation of information. The wide availability of GPS units and internet based geocoding services, such as Google Maps, is allowing a growing numbers of citizens to easily determine location. New technologies and services are also enabling the public to edit geographical information and create customized maps. These three tasks, determining location, editing geographical information, and creating maps were for a long time the purview of experts, highly skilled professionals with access to expensive equipment. This is one of the reasons why the relationship between Geographical Information Systems and addressing the needs of the poor has for a long time been a controversial one (Abbot et al., 1998; Dunn, Atkins, & Townsend, 1997). In developed countries, these innovations are leading a revolution, the geospatial revolution in which, volunteers, following a model of collaborative authoring, much like the one has led to the creation of Wikipedia, are changing the conditions of the production and dissemination of geographical information.

Similar to crowdsourcing, VGI can be done in isolation. Entering or editing data on a platform like Google Earth can done on a one off or sporadic basis by dispersed individuals to solve a particular problem or add to the pool of common knowledge. However VGI can also be intensely collaborative, leading to the formation of a sense of community. OSM is supporting a global community of GIS specialists, amateur mappers and technologists that are joined together by their commitment to open data, open source technologies and democratization. The Haiti crisis activated and expanded this network, training students and other members of the public to created updated maps of affected areas and help coordinate the relief effort. The collaborative effort supported by new technologies can also operate at a local, face-to-face level. OSM is often organising mapping parties12, events where volunteers get together to map specific locations to support the data collection effort and strengthen the bonds of community.

PGIS emerged from the merging of participatory research, specifically participatory learning and action methods (PLA) and geographical information technologies. The approach 'combines a range of geospatial information management tools and methods such as sketch maps, Participatory 3D models (P3DM), areal photographs, satellite imagery, Global Positioning Systems (GPS) and Geographic Information Systems (GIS) to represent people's spatial knowledge in the forms of virtual or physical, 2 or 3 dimensional maps used as interactive vehicles for spatial learning, discussion, information exchange, analysis, decision making and advocacy' (Rambaldi, 2006, p. 2).

Giacomo Rambaldi, a leading PGIS practitioner, has explored some of key differences between PGIS and VGI (Rambaldi 2011). These include the more localised and contained character of mapping in PGIS, the significance attributed to the process of learning and the commitment of

technology intermediaries to building relationships of trust with communities. This is what he has to say in comparing the social dynamics of participation between VGI and PGIS:

> *I think that when it comes to crowdsourced cartography people contribute pieces of information without thinking about it and the responsibilities they have in doing that act and the implications of that act. They just drop a bit of information...and then usually they are not the ones using that information. When you were doing sketch maps at the village-level, or doing 3-D models at the village level…I mean with that information you have, first of all as an informant, a great responsibility because everybody's watching you, everybody's scrutinizing what you do. So you put your reputation at stake when you put information on a map. If you do it now, using other means, you don't put your reputation at stake because you are one of the millions, and nobody run up to you if you put something which is wrong. While, at the village-scale action and so on, and for work done at the village level you are an informant-- you are much more responsible for what you do. You are accountable for what you do.* (Rambaldi, interview 1.11.2011, p.5)

What Rambaldi has perhaps in mind when talking about these differences is primarily dispersed, isolated crowdsourcing. In social or peer production, like that driving creation of Wikipedia, reputational benefits, that is, the accumulation of social capital among one's peers, are among the main motives for participation (Benkler, 2006; Lakhani & von Hippel, 2003). Reputational gains can facilitate one's work within a community, by making other members more inclined to respond to queries and requests for help and can improve one's career prospects. Although the online and offline dynamics of social capital are very different, members of online communities of practice do have a stake in ensuring that their contributions are of high quality. An interesting question that can emerge when we consider members that can belong to both online and local communities is where do their primary allegiance lie, who they are primarily accountable to.

This was particular relevant in the Map Kibera initiative, an interesting experiment that aimed to bring together the worlds of collaborative VGI and participatory, pro-poor development. Although Kibera, a large neighbourhood on the edge of Nairobi, is said to be the home of about a quarter of a million people, its inhabitants lack access to fundamental geographic information about their community. The project started out in 2009 with the aim of producing the first digital public map of Kibera and provide Kiberans with an informational basis for better coordination, planning and advocacy within their community and between their community and the government. Inspired by participatory approaches, the founders of the project trained local youth in the use of open source geospatial technologies to create the map themselves. They initially taught 15 people how to use GPS and OSM and they encouraged them to collect the information that they thought was most

useful for community empowerment. What's more they wanted to instil in them the values of open source, reciprocity, collaboration, information sharing.

Although at the time of the study, the mappers' sense of belonging to a global, OSM community was not strong, one can easily imagine a situation, where their allegiances to local and global communities might be divided. The new, unexpected connections that new technologies make between global and local networks creates exciting possibilities, but also demonstrates the need for carefully consideration of governance arrangement, namely who from within a community has the right to define what information is collected and shared with local and global publics.

A study of the project that was completed in March 2012 highlighted some of these challenges and the opportunities that emerge from the application of VGI principles and techniques in a development context and their merger with participatory concerns and priorities (Berdou, 2011). Map Kibera aimed to seed the creation of an information commons, a shared information resource that could be used and modified by anyone with the necessary skills and access to the Internet. The publication of geographical information pertaining to vulnerable groups as part of an information commons exemplifies some of the complications around data ownership that emerge from recent ICT innovations. In a PGIS context decisions about what information should be published and which should remain hidden would result from community discussions.

In his interview, Jon Corbett, explained how this challenge was addressed in the context of a mapping project for First Nations communities:

> *Absolutely, all the data is housed on our own servers. If you put this into an indigenous context, you can drop markers onto the map and you can know that they are not being stored on the Cloud. They are not searchable by anyone else unless you have access to this site. And within the site we have multiple layers of access even and restriction from administrators through to chiefs, through to elders, through to community members, through to general users. Some information is accessible to some and not to others. So even for that map you've got in front of you, if you click on any one of those markers, you can see you're logged in as an administrator right now. And you have the ability to say which layer you want that marker to go into and set the visibilities, is it visible to the public, just members, or is it totally hidden. And so basically we've tried to develop a tool where community members could not just contribute their information, but they actually begin to manage that information as well.* (Corbett, 7.11.2012, pp. 8-9)

In order to be productive such discussions would require participants to have a basic understanding of technology and be able develop an understanding of implications of different licenses for data use and modification. This can be a challenging task for communities, facilitators and the technology intermediaries called upon to implement the decisions.

Similar to crowdsourcing, the merging of VGIS tools and principles with participatory methods offer significant opportunities for methodological innovation. The realisation of these opportunities presents a steep learning curve both for technologists wishing to support positive social change and for development practitioners who might not be well-versed in technologies and, therefore, fully understand the social implications of different technology choices.

Conclusions

The use of new technologies and new modes of collaboration developed by the technology community, reminds Wheeler (interview, 12.12.2011) of the people experimenting with Participatory Rural Appraisal (PRA) in the 70s. Early PRA practitioners were very enthusiastic about participatory methods and their potential, but did not give much thought of their real implications for democratization and empowerment. PRA recovered from its naive phase due to a massive backlash that resulted from the superficial application or the abuse of participatory methods. It almost took two decades for the PRA community to shift focus away from methods to issues of governance and the politics of knowledge (Cornwall & Guijt, 2004). The critique of participatory development, expressed among others, through the book by Cooke and Cothari (2001) provided a basis of articulating even more clearly the tensions, and ethical dilemmas that underlie much of participatory practice.

It is, therefore, perhaps unfair to demand from the technology community a level of maturity and methodological and theoretical sophistication that took so long for participatory research to achieve. According to Chambers (interview, 9.12.2011), the open knowledge community has demonstrated a great willingness and capacity for learning. As the case of GroundTruth demonstrates, many technology practitioners are increasingly acknowledging the importance of power dynamics in translating information into action and are seeking to refine their approaches. In this paper, it was argued that this learning can be strengthened through a cross-fertilisation of ideas between the open knowledge and the participatory development communities. This cross-fertilisation can support:

- A deeper problematisation of the links between access to technologies, information and social transformation through a better understanding of the interaction between technology dynamics and social mobilisation.

- An in-depth understanding of different dimensions and aspects of technologically mediated or 'invited', that is organised in the context of a particular initiative, participation, particularly as they relate to issues of governance.
- The discussion of the ethics of sharing of information from a local level to global publics and the formulation of relevant recommendations.
- The development of methodological innovations that merge technology-based modes of participation with the methodological sophistication supported by development thinking and practice.

One issue that has not been addressed in this paper concerns the context in which the exchange of ideas and the development of new practices and methodologies can take place. The experience of the author suggests that this can most productively take place in practice, through ways that afford structured opportunities for learning, action and reflection. Another question that was not addressed concerns the role of different agendas in technology production and adoption. All technologies, even those that are designed on the basis of open source ideals, are inadvertently connected with business and professional interests. As the case of large software companies demonstrate 'openness' can be a strategy for solidifying a dominant market position or gaining a foothold in emerging markets. These aspects of open knowledge processes and technology therefore, also need to be part of the discussion.

This paper has provided a first basis for a closer collaboration between the open knowledge and participatory development communities by beginning to clarify each group's assumptions and ideas about the role of information in social transformation and the meaning of participation and by making concrete suggestions about areas where the blending of technology supported methods for information generation with participatory approaches can yield important benefits. As the example of participatory statistics and PGIS demonstrates, the combination of approaches from different traditions can be a challenging but also immensely productive undertaking that can greatly contribute to professional practice and policy.

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[2] The interviewees were: Giacomo Rambaldi, a leading Participatory Geographical Information (PGIS) researcher, Carlos Barahona, a statistician with an interest in participatory numbers and statistics, Jon Corbett, a geographer specialising in the use of technologies for community empowerment, Joanna Wheeler, a researcher focusing on issues of citizen, participation and democratisation, Sammy Musyoki, an experienced participatory researcher and facilitator, Robert Chambers, a leading participatory researcher, Ruth Carlitz, a PhD student focusing on citizen monitoring and government accountability, Nick Lunch, a well-known participatory video practitioner, Jeremy Holland, an experienced participatory researcher, Ruth Carlitz, an expert in participatory Monitoring and Evaluation. The interviewees were selected on the basis of their expertise in key areas in participatory research and practice. Interviews were transcribed and thematically analysed. Many thanks are in order to interviewees for time and willingness to participate in this study.

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