Research Article

Open Development in Poor Communities: Opportunities, Tensions, and Dilemmas

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Abstract

Are the dynamics that underlie commons-based peer production in materially deprived societies the same as those at work in affluent settings? This article contributes to the debate on open development and commons-based peer production by drawing on an in-depth case study of Map Kibera, a popular citizen engagement and citizen mapping project in Nairobi, Kenya. Combining insights from the literature on peer production and participatory development, this examination of the empirical findings focuses on three dimensions of information co-creation: participant motivations, the relationship between product-oriented versus process-oriented views of participation, and the governance of localized global public goods in economically resource-poor settings. This article provides a basis for greater conceptual clarity regarding the dynamics of open development in poor communities and a reconsideration of the appropriateness of a value-driven framework of commons-based peer production in materially deprived settings.

Introduction

Over the last 15 years the rapid growth of mobile networks and services has had a pervasive influence on even the most deprived societies. Governments, nongovernmental organizations (NGOs), and development institutions have built on the enthusiastic and widespread adoption of mobile telephony to expand citizen participation, both directly by creating platforms that seek to increase voice and representation and indirectly via the new information flows created by people's interactions in the digital world.

Popular information and communication technology (ICT) approaches to enhancing voice include crowdsourcing for cheap, timely, and large-scale citizen-driven data collection, open data repositories, and streams of big data for identifying patterns in behaviors and opinions. Several major funders are interested in supporting these types of approaches. In 2012, USAID, DFID, the Swedish international development cooperation agency (Sida), and the Omidyar network established "Making All Voices Count," a US$45 million fund that promotes new technologies that improve citizens' engagement with their government. The World Bank is a staunch supporter via direct funding and research of numerous initiatives that seek to improve public service delivery through technology-enabled citizen engagement. Global Pulse—a United Nations program that seeks to use big data to support development goals—is establishing three innovation labs across the globe to foster public–private partnerships and services.

Open approaches to information creation and information sharing—open data, open education, open healthcare, open science, open publishing—also are increasingly popular among donors and civil society.

This article contributes to the growing literature on the opportunities and challenges of open development (Gurstein, 2011; Raftree, 2013; Reilly & McMahon, 2015; Smith & Reilly, 2013), a branch of information and communication for development (ICT4D) studies that uses the values and practices of commons-based peer production to support positive social change among poor and marginalized groups.

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Research Question

The main question addressed here is: To what extent are the dynamics that underlie commons-based peer production in materially deprived settings the same as those at work in more affluent settings?

This examination is based on three dimensions of openness and commons-based peer production undertaken in materially deprived settings. The first dimension concerns participant motivations and, in particular, the hypothesis that volunteer, self-selected labor that is creative and of service to a wider community is an end and a virtue in itself. The second concerns the primacy of product versus process as the basis for the development of the commons. The third dimension concerns the governance of highly localized information commons and raises the question of whether socially based and informal forms of governance are adequate in such contexts.

It is argued that the dominant ideas on collaborative information production, such as the nonremunerated character of participation, need some rethinking for economically resource-poor contexts where people struggle for survival.

The article is structured as follows. The first section explores key concepts and debates around commons-based production, open development, and crowdsourcing. The last is included in the discussion as it represents one of the more popular approaches to supporting citizen voice and engagement in a development context and provides a useful background for understanding the characteristics of commons-based peer production. The second section presents findings from an in-depth study of Map Kibera (MK), a celebrated citizen media and mapping platform in Nairobi, Kenya's Kibera settlement, which has been active for more than five years. The study is investigating the values, practices, capacities, and assumptions that underlie the co-creation of open geographical datasets for marginalized groups from the perspective of participatory development (Chambers, 2010; Gaventa & Cornwall, 2008). In the spirit of the empirical study presented in this article, discussion of the findings combines insights from participatory development with lessons from studies on commons-based peer production. The third section summarizes the findings of the empirical study and elicits some implications for the open development agenda.

Crowdsourcing, Commons-Based Peer Production, and Open Development: A Concise Literature Review

Terms such as open development, commons-based production, and crowdsourcing are often used interchangeably to refer to the possibilities for co-creation supported by reduced communication and coordination costs afforded by ICTs. However, this tends to obfuscate some important differences among them regarding the governance of tools, processes, and outputs of digital collaboration. This short literature review addresses this weakness by highlighting the substantive institutional differences and participant motivations between these models of collaboration. The review sets the scene for unpacking the opportunities and tensions of information co-creation discussed in the second section of this article.

Varieties of Digital Collaboration: From Crowdsourcing to Commons-Based Peer Production

Digital collaboration lies on a co-creation continuum, which ranges from anonymous, one-off reports on an unfolding crisis (for example, the 2010 response to the earthquake in Haiti; Meier & Munro, 2010) to sustained, long-term engagement in communities of practice that coalesce around peer production projects such as Wikipedia.

Crowdsourcing involves participants who are invited to contribute to highly specific and predetermined tasks, whose completion requires little effort. U-Report Uganda, a successful innovation pioneered by UNICEF, crowdsources the voice of Ugandan youth through SMS-based polls.

The high degree of task fragmentation that characterizes crowdsourcing, especially in the microlabor market domain, has experienced growing criticism. For example, Amazon Mechanical Turk (AMT) is a commercial-drawn online platform where participants can earn payment for completing microtasks such as annotating objects in images or scanning websites for particular information. Ekbia and Nardia (2014) argue that the division and structure of the labor in AMT render Turkers invisible and part of the system infrastructure. Their lack

of access to the completed product of their efforts compounds any sense of alienation that may derive from lack of connection with other Turkers.

Not all crowdsourcing projects define the role of participants as narrowly as do AMT and U-Report Uganda; certain citizen science projects, where scientists partner with non-experts during the research process, support much richer sets of interactions. For example, Zooniverse[1] includes dedicated fora where project participants can interact with each other and with lead scientists. Also, data generated through crowdsourcing may become part of the commons and be available for others to use.

Digital collaboration projects undertaken by distributed communities of practice—the type of actor most often associated with peer production—involve both communities and crowds. For example, OpenStreet Map (OSM), the digital platform that is the basis for MK, seeks to create a digital map of the world, a geographical commons available to all. OSM's community consists of long-term contributors linked by bonds of trust, forged and sustained through online and offline interactions, and who act as caretakers of the platform. The OSM community's interactions are sustained by fora, mailing lists, chat channels, and offline meetings.

OSM's crowd consists of contributors who dip in and out to provide geographical data (Budhathoki & Haythornthwaite, 2013). Studies of free/open source (F/OS) software suggest that contributions to narrowly defined, crowd-appropriate tasks provide a good starting point for developing the expertise required for more substantive engagement in an online community (Berdou, 2011; Lakhani, 2006).

In contrast to online collaborative communities, where the sense of collective identity is supported by an array of tools such as online mailing lists and fora in addition to meetings in the real world, most crowdsourcing applications do not support collective interactions. This is especially true in developing countries where poor Internet connectivity makes texting the prevailing medium for crowdsourcing efforts. SMS-based crowdsourcing places considerable limitations on the content and direction of communication. Messages are limited to 160 characters, and reporters cannot reach other participants directly. As a result, and in contrast to most peer production communities, many forms of crowdsourcing do not offer the possibility for the emergence of distributive and adaptive forms of governance. In many cases, the crowd is meant to form apart and to stay apart.

OSM, like Wikipedia and the F/OS operating system Linux, is a *peer production project,* one where its governance is said to develop through adaptive and distributed authority (Mansell, 2013), rather than top-down leadership and management. Distributed and adaptive authority is based on trust among contributors and shared values such as meritocracy or the idea that the greater an individual's contribution to the project, the greater their say in what happens. This form of authority is (a) adaptive because it is based on forms of decision making that may be informal and fluid such as discussions in online fora underlined by the aforementioned values and (b) distributed because it involves loosely connected online groups whose members are dispersed across the globe (Mansell, 2013).

The second factor behind the success of peer production is the set of principles for organizing collaboration, "an architecture of participation," where every contribution, however small, adds up to create a larger whole (Benkler, 2006; O'Reilly, 2004). These principles include modularity, granularity, and integration—the ways in which different aspects of work are broken down and then combined—and transparency. The social basis of governance and the "architecture of participation" make commons-based peer production one of the most important organizational innovations to be supported by the Internet, which is distinct from bureaucracies and markets (Bauwens, 2009; Benkler, 2002; Demil & Lecocq, 2006; Jenkins, 2006).

Value-based approaches, especially those espousing hacker community ideals of openness and freedom, are prevalent in both scholarly and popular accounts of the successes of commons-based peer production. Yochai Benkler, perhaps the most influential analyst of distributed collaboration, argues that peer production "offers an opportunity for more people to engage in practices that permit them to exhibit and experience virtuous behavior" (2006, p. 394). Benkler and Nissenbaum (2006) identify three clusters of virtuous behavior that underlie peer collaboration. The first cluster is volunteerism and self-selection: the fact that in peer production individuals can choose to join and leave projects as they please, unhampered by employment contracts

1. https://www.zooniverse.org

or commercial entities. The second cluster includes creativity, productivity, and industry, which are the opportunities offered by peer production for project and product-based mastery and innovation. The third cluster includes the altruistic aspects of participation such as benevolence and generosity, which encapsulate the willingness of contributors to help develop global public goods available for others to use without direct remuneration.

Universal explanations of the success of peer collaboration, which attribute its success to a set of general principles and values such as those proposed by O'Reilly (2004) and Benkler and Nissenbaum (2006) tend to underestimate how significantly the character of the outputs of peer production shape the opportunities for democratic participation in processes of production and information sharing. The idea that the principles of F/OS development could support the democratization of most areas of immaterial production has been critiqued by many.

Duguid (2006) challenges the idea that the constant tinkering, reworking, rewriting, and overwriting that often underpin F/OS software development applies to other production domains. While software offers a relatively easy way to test changes by running programs to check that they work correctly, Duguid argues this is infeasible in projects such as Wikipedia, where neither the latest or earlier versions of an entry are necessarily the best. Analysis of the empirical findings of this study highlights the complications that emerge for advocacy and collective action through the tinkering and rapid product development favored in F/OS and peer production.

Using open hardware as an example, Alison Powell (2012) questions the transferability of the peer production model to domains with high material costs such as are involved in manufacturing. The importance of the material underpinnings of peer production come to the fore in the case of MK, where access to computers, the Internet, or even electricity cannot be taken for granted.

Participant Motivation in Peer Production

The aptness of Benkler and Nissenbaum's three virtuous clusters for explaining the success of F/OS and commons-based peer production is confirmed by the literature on participant motivations. Many studies examining F/OS software development agree that contributors are guided by a mix of altruistic and non-altruistic motives. In volunteer open-source software development, contributors acknowledged the value of the resource they created in software programs, which could be freely modified and shared, but many also saw their contribution as an opportunity to improve their skills and become better programmers (Lakhani & Wolf, 2005). Both casual and serious OSM participants indicated they were motivated mainly by the ethos of peer production (Budhathoki & Haythornthwaite, 2013).

A rigorous examination of the literature on the motivation of open-source developers (von Krogh, Haefliger, & Wallin, 2012) contributes two important findings to the discussion. The first is that intrinsic motivations, such as creativity, play, and altruism, are linked to extrinsic motivations such as access to better career opportunities. In practice, this means that individuals see values such as play, creativity, and altruism as connected fundamentally to reputation and career. The more one works and plays, the more likely one will find (better) employment. The second finding highlighted by von Krogh et al. (2012) is that individual motivations alone cannot explain the success of open-source development. Equally important in the mix of individual motives is the culture of technical excellence and the social practices underpinning each project such as queries and the ability to consult others. For Benkler (2009) the power of peer production to harness diverse motivations is one of its defining characteristics.

The ability to organize, give order to, and make sense of largely heterogeneous contributions from people of varying backgrounds and motivations is also emphasized in crowdsourcing (Estelles-Arolas & Gonzalez-Ladron-de-Guevara, 2012). Here, the goal is to obtain a mix of people who contribute ideas, insights, and information that, when pieced together, provide insights that the initiators of the crowdsourcing effort could neither develop on their own nor obtain without significant cost. In crowdsourcing as in peer production, what matters most are the insights, information, ideas, and products to which projects give rise, rather than who does or does not contribute, who does or does not talk.

This has important implications for open development and, in particular, open civic technologies where distributed collaboration supports citizens' expression and representation.

The Gambit of Open Development

Open development is a field of action and research that is rooted in the work of people interested in exploring the relationship between digital platforms and positive social change (Reilly & McMahon, 2015). Open development is regarded by its proponents as a paradigm shift from the previous generation of ICT4D initiatives, which focused on enabling access to technologies and ready-made services that were largely government- and donor-led. Supporters of the new approach favor bottom-up collaborative innovations and initiatives that enable citizens to connect in new ways and to co-create complex information goods (Heeks, 2010; Thompson, 2008).

Among the most important supporters of the open development approach is Canada's International Development Research Centre (IDRC). In 2011, building on insights from a workshop dedicated to exploring the connections between digital openness and social change (Smith & Reilly, 2013) and taking advantage of the momentum building around open data, IDRC established a program of research and action called Information and Networks (IN). A recent evaluation of the projects undertaken by IN refines IDRC's original definition of openness, and the links between openness and positive social change (Reilly & McMahon, 2015). A key insight of the evaluation concerns the contextual and situational character of openness. What is or should be open to some, whether an output or a process, might be inaccessible or undesirable to others. These tensions are especially evident in the case of highly localized initiatives such as MK.

The Study: Map Kibera

Kibera in Nairobi, Kenya, is considered one of the largest informal settlements in Africa. Most Kiberans live in extreme poverty, earning less than a dollar a day.[2]

MK[3] started in October 2009 with a small grant from Jumpstart International, an NGO focused on community-based mapping. The grant was to facilitate creation of Kibera's first public, digital map and to train local youth in the use of global positioning system (GPS) and open-source geographical information system (GIS) tools. The core project team expected participants to join out of a sense of civic duty and a desire to improve their skills. Indeed, basic computer literacy and a passion for media and technology were the main recruitment criteria. The project aimed to tackle the lack of publicly available geographical information about Kibera and the resources available to its citizens. The project's American founders, Mikel Maron and Erica Hagen, expected that making available such information would enable better coordination, planning, and advocacy, both within the community and between Kiberans and the government. Maron and Hagen worked with local partners to understand the community's needs and priorities, established the project in Kibera, and assisted with youth recruitment.

During October–December 2009, a basic map of Kibera was created and made available through the project website. UNICEF supplied a second round of funding that allowed more training and further mapping related to water and sanitation, security, education, and health. This included mapping of public water points and toilets (areas in the community that were perceived as unsafe), schools, clinics, and informal pharmacies. In this second phase, which ran February–August 2010, community meetings were organized to engage Kiberans in the mapping efforts and to refine an understanding of their needs and the map's potential uses. During this period the founders established two additional projects aimed at extending use of the map and contributing to the creation of a community information platform. These projects were an SMS reporting project called Voice of Kibera (VoK) and a video journalism initiative, the Kibera News Network (KNN).[4] Maron and Hagen also set up an organization called GroundTruth to capitalize on MK's successes.

Six years after its inception, the program is going strong. A new initiative, called Open School Kenya,[5]

2. http://www.kibera.org.uk/facts-info
3. www.mapkibera.org
4. http://voiceofkibera.org/
5. http://openschoolskenya.org

geolocates informal and formal schools in Kibera, providing information on fees, sponsors, and availability of special programs (such as feeding), as a means of supporting parents and the local government.

Methodology

The findings presented here draw on an in-depth case study of MK, which blended participatory and traditional social science research approaches. The study's participatory component consisted of four reflection and self-assessment exercises conducted by Dr. Samuel Musyoki.[6] The exercises aimed to inform GroundTruth's approach to community engagement, and a three-day action research workshop—organized by Mark Skipper[7]—was designed to develop the training skills of mappers, videographers, and SMS reporters and to investigate their attitudes toward information sharing.

The mainstream social research component consisted of five semistructured, face-to-face individual interviews with GroundTruth members, seven interviews with experienced project participants from different parts of the projects (three mappers, two SMS reporters, two video journalists), and three interviews with local partners. The fieldwork was carried out in November 2011. Dr. Musyoki shared his conclusions from the self-reflection and self-assessment exercises in a report made available to the MK core team. The lead researcher and author of this article observed all the reflection and training exercises and conducted the semistructured interviews. Interview transcripts and meeting notes were analyzed thematically using a priori and emergent codes (Guest, MacQueen, & Emily, 2011). These emergent codes include the three dimensions of openness—participant motivations, product versus process, governance of localized information goods—along which the case study findings are organized.

Time constraints prevented the lead researcher from gaining a better understanding of how mappers, videographers, and SMS reporters conducted their work and liaised with community members. Nor was it possible to interview participants who decided to withdraw from MK. MK participants were more likely to voice their critiques of the project in self-reflection and assessment exercises than in one-on-one interviews, perhaps because they felt safer expressing dissatisfaction in a group setting.

A participatory development perspective was appropriate for two reasons. First, initiatives that subscribe to an open development ethos see the creation of an information commons as the means to an end: the basis for collective action and advocacy. Second, in settings such as Kibera, offline engagement is as important as online participation in recruiting and training participants and helping initiators identify opportunities for information co-creation and advocacy, in line with the realities and the needs of the people. As will become evident from the analysis of the MK case study findings, participatory development provides important lessons on both community involvement and the processes of knowledge co-creation aimed at supporting positive social change (Cornwall, 2003; Gaventa & Cornwall, 2006).

Findings

Participant Motivations

The question of what it means to be a volunteer arose consistently in all 12 interviews with MK participants and leaders. In Kibera's aid-permeated economy, being a volunteer has a specific meaning. NGOs and community-based organizations (CBOs) regularly reward participants for volunteering to take part in workshops and other events, often with small sums of money, but also with food and drink. A mapper described *volunteering* thus:

> Ok, so people here . . . we have different organization with lot of money. Most organization makes people use to getting money after every session. So after a session or a forum somewhere, people know that there must be something somewhere, like a sitting allowance. They are sure of getting something out of the session. When you call up a meeting, in fact most people believe that money will be given. If you are saying that you are not getting something, then the turn up will not be the same.

6. Samuel Musyoki is a Kenyan participatory researcher and practitioner with longstanding experience in supporting community engagement processes.

7. Mark Skipper is an information technology specialist with experience in group design, training, and facilitation.

> Interviewer: Has this been a problem, as far as you know, for the project, like people calling up and saying, "Well there is no money, I am not going to come"?
>
> Yes, in fact yesterday we had a VoK forum where we wanted to get more people on the ground reporting. And after the session people were asking, "Are we getting something or not?" In every forum we have in Kibera, people are used to getting something. In fact, that is the most normal first question, that was started by, because most of the organizations that are focusing in Kibera, whatever session held by organization, they must give people lunch and sitting allowance.[8] (FK, October 29, 2010, p. 4 in interview transcript)

Given such practices, it is unsurprising that, while MK contributors adopted such peer production values as an emphasis on the free flow of information, they wanted immediate compensation for their time and effort.

A participant explained this by pointing out that volunteer labor is a luxury in settings like Kibera, where young adults must provide not only for themselves, but also for other family members:

> Ok, you cannot just expect to be paid, but yet do nothing. So, we need to do something for us to get paid. For instance, if you find like, I personally I am self-independent. I have a brother that I am taking care of. He is 19 year, whom I am taking care of, so you need to feed, you need to pay rent, you need to eat. At the same time I am going for a college, so I am paying for that. So all these things they really need something like money for you to keep on going. So that is why I feel like as much as we like doing this, I think we should get something, at least a part of it, we should be so much determined to where we are going. (MA, October 30, 2010, p. 7)

The core team interpreted this as a distortion of the Kiberans' sense of civic duty by the aid economy (Hagen, 2011).

Another point of contention between project leaders and contributors, and a common theme across all seven interviews with participants, was the youth's continuous access to training. The mappers believed that their training could lift them out of poverty. The scholarship that one talented mapper obtained to learn ArcGIS[9] and to travel abroad, combined with the interest that the program attracted from international media, convinced Kiberan youth that the project could improve their lives. Indeed, the mappers saw the videographers and citizen reporters who joined the project at a later stage as a threat to their relationship with the core team and their position in the project.

Insecurity over continuing access to training has never been an issue in open-source software development, where the emphasis has been on the abilities of new contributors to pick up the necessary skills and information through informal learning, based on how-to guides, advice/explanations from electronic mailing lists, and feedback on their contributions, for example. The mappers were not only unfamiliar with proactive, self-reliant learning, they also (rightly) perceived the project as a space of limited resources.

One way to understand participants' desire for immediate compensation is to consider the costs of the project's demands on people's time. The MK mappers (young people in their early 20s) had to learn how to use the GPS units. They participated in meetings with other community stakeholders to decide what kinds of data they should capture and they spent hours in the alleyways and streets of Kibera collecting the data. Then they had to learn how to upload the data on the OSM platform and how to use the platform to create custom maps and perform analyses. Those with experience in working with computers and the Internet in poor countries are aware of how slow and frustrating it can be. Uploading and downloading data can take hours, even in the absence of electricity shortages. Citizen reporters spent a great deal of time chasing, writing, and editing stories as well as recruiting other reporters and editing their material so that only credible, nonsensitive, unbiased information was posted on the website. KNN videographers had to learn the principles of objective reporting and editing. As the project grew and the core team encouraged participants to take over the reins, demands for capacity building grew exponentially.

Volunteer participation as a key aspect of development practice and as the basis for digital co-creation has

8. A sitting allowance is a fee paid by some NGOs and CBOs for participation in workshops and events.
9. ArcGIS is a commercial, cloud-based mapping platform.

been questioned in both the participatory development (Banerjea, 2011; Jenkins, 2009; Neysmith & Reitsma-Street, 2000) and peer production literatures (Berdou, 2011; Fosfuri, Girratana, & Luzzi, 2008; von Krogh et al., 2012). A study of the recruitment of poor women as volunteers for a health improvement program in a Calcutta, India slum argued that volunteering practices need to be rethought because of the unrealistic assumptions, such as the unlimited time of poor women, on which they are based (Banerjea, 2011). Two recent studies highlight how paid and volunteer community health workers in Kenya, Ghana, and Malawi are burdened by the costs of using their mobile phones to bridge gaps in health care provision (Hampshire et al., 2016; Oliver, Geniets, Winters, Rega, & Mbae, 2015).

Numerous studies have demonstrated the importance of paid labor in F/OS software projects. As part of her PhD study (Berdou, 2007), the author examined how community dynamics shifted when volunteer developers were employed by companies that used F/OS in their products. Numerous surveys report that up to 40% of contributors are paid to work on F/OS (Hertel, Niedner, & Herrmann, 2003; Lakhani & Wolf, 2005; Luthiger & Jungwirth, 2007). It is not only direct pay that is important to the success of peer production. It has been argued that the development of Wikipedia is subsidized largely by universities since many of its administrators are faculty members and graduate students (Baytiyeh & Pfaffman, 2009).

Conditions of Co-Creation: Product and Process

Consistent with the open-source model of development, the MK core team interviewees emphasized the need to "get something really useful really quickly" for the project to gain momentum and demonstrate the merit of their approach to the community and donors.

Although the MK core team had a genuine interest in involving people from all walks of life, their methodology at the time of the study was not well developed. With limited funding and little experience in participatory methods, they were not investing the time required to "identify appropriate community entry points and important tasks such as building trust/rapport with local institutions, analyzing community power dynamics, negotiating and leveling expectations of different players, developing a shared vision and purpose and agreeing on responsibilities" (Musyoki, 2010, p. 3). This lack of preparation was compounded by the core team's relative inexperience in working in a context such as Kibera, where often they were perceived as "outsiders," just another group of development tourists out to make a name for themselves.

Eric Raymond (2001), an open-source software evangelist, advocates the importance of early and frequent releases of software into the public domain—encapsulated in the motto "Release early, release often"—as a way to create a continuous cycle of testing and improvement. The rationale is that early release of a software product, even if riddled with problems, can help avoid critical missteps by allowing developers to identify problematic assumptions, which, if left unchecked, would lead to significant losses of time and energy. Frequent releases are seen as helpful in sustaining a sense of momentum and signaling to other developers that this is a serious project worthy of their attention. This applies also to other domains of peer production where having a prototype—a serviceable rough-and-ready core of contributions—is essential for coordinating the collective effort and mobilizing participation. In the field of crowdsourcing and peer production, it is important from the outset to have multiple contributors.

Although some early participatory methodologies propose a quick and dirty approach to data collection and community involvement, subsequent, more well-thought-out approaches stress the need for careful preparation and broad community engagement that take into account power relations and the researchers' positionalities throughout the engagement process. *Positionality* refers to the inadvertent biases, expectations, and assumptions attached to class, ethnicity, gender, education, material standing, and professional identity that researchers and practitioners bring to their projects. The nonreflexive application of participatory methods provides valuable lessons on how researchers can reproduce many of the inequalities within the communities in which they intervene. One critique highlights how the public character of many participatory events provides stages in which people perform certain roles that conform to the expectations of the researchers and attending elites, rather than being a way to reveal genuine issues and concerns (Mosse, 2001; Probst, 2002).

Attention to the conditions of participation—how different spaces, rules, and assumptions shape the context in which people articulate their views—is central to a participatory agenda for two reasons. The first

is that the process of participation can change the awareness and/or the worldview of the people involved. For this to happen, the purpose of information production needs to be broadly defined as enabling participants to set the agenda and priorities of the inquiry and helping participants analyze what they have discovered and decide how to use it in the future. Thus, the process of creating the information—of generating the insights that are translated into the data that constitute maps, databases, and documents—is only a small part of the overall engagement.

The second reason so much emphasis is placed on the conditions of participation and the process of information production is that, like other social science fields, participatory research considers information to be socially embedded: It does not exist in a void, but is produced by someone for a particular purpose. These ideas are explored further in the following subsection.

Is the fast-paced, product-oriented view of open source and peer production fundamentally at odds with the more immersive and longer-term view of participatory development? Although, in principle, it can be seen that these two approaches could be combined, the MK core team acknowledged that the project's relationship between the social goals and the technical goals was often uneasy. Two reasons were proffered. The first concerned the main purpose of the project, whose original framing defined it as a data-gathering exercise, albeit with a strong community component. As one team member put it: "Data attracts the people who are interested in data and technology, rather than people who are interested in participation." The second and related reason concerns the practical limitations set by the project's tight timeframe, which left little time for meaningful community engagement in all stages of participation.

The Character and Governance of Localized Global Goods in Economically Resource-Poor Settings

At the core of commons-based peer production lie the values of transparency and the free flow of information. However, not everyone values such openness in the same way, least of all the poor people who repeatedly are asked to participate in surveys and other research activities. They often receive little or no compensation for their time and effort or little information about how their responses will be used. In Kibera it seemed that the right to withhold information had as much, if not more power than providing information.

Interviews with participants and focus group discussions revealed that requests by mappers and videographers for information and geotagging frequently were challenged by other residents who wanted to know more about the reasons for the data collection. Teachers were reluctant to share information on the number of students they taught, and informal pharmacists did not welcome the idea that their stores would be geolocated, especially since it was unclear who was going to use the information and to what ends. This is how one mapper responded when asked about this reluctance to contribute information:

> I think it will not be easy for us. Maybe some that are legal they will be fine, but the other ones that are operating illegally it won't be easy for us, because maybe they fear that we are trying to expose them out. In one way or the other, they might not open out for us. They feel insecure, saying, "Why are you doing this? Why are you doing that?" (MA, October 25, 2010, p. 4)

Because they had not, at the time, assumed ownership of the project and had little idea of how the maps would be used, the mappers felt they lacked authority to collect the data and respond to residents' queries.

Another way that information sharing proved problematic was revealed in discussions on how participants could use the information they had gathered to create products and services for which, eventually, they could be paid. The self-assessment exercises conducted by Musyoki during fieldwork revealed that mappers and videographers were unclear about the implications of open licensing schemes: the rules and norms covering the use and reuse of videos and mapping data. Although commons-based information production does not preclude the involvement of commercial interests—many businesses use peer production and openness as an integral part of their strategies—the revenue models that it supports are not obvious. Thus, for MK participants, understanding what it meant to collaborate and make a living from an information commons required grappling with demanding technical and legal concepts.

The largely informal governance structure typical of peer production was inadequate for MK's purposes.

At the time, informal leaders who had proved themselves by developing a high level of expertise and a substantive body of contributions had yet to emerge from the growing, but still nascent group of mappers, videographers, and citizen journalists. Participants were keen also to clarify roles and responsibilities, both on the part of the project leaders and within the Kiberan community.

Consequently, the core team of mappers, videographers, and citizen journalists worked to formalize the project's structure. What is now known as the Map Kibera Trust aimed to put participants at the helm of the initiative, while allowing the founders to have some say over its development. The Trust's creation was seen as key to the project's sustainability and, more specifically, to its capacity to raise funds. Interestingly, some local partners were cautious about its creation, seeing it as another actor competing for donor resources.

It was mostly the MK participants who appeared to desire a more formal governance structure that clearly delineated roles and responsibilities. The desire for a more bureaucratic structure was a common theme across individual interviews with participants and the self-assessment and reflection exercises. Kreiss, Finn, and Turner (2011), who employed Max Weber's ideas on bureaucracy to critique the social basis of governance of peer production, argued that

> Voluntary forms of peer production involve a host of other forms of regulation that are less transparent than bureaucratic forms. Moreover, precisely because it is voluntary and usually temporary, peer production may not support the institutions upon which its own continued success depends. (p. 250)

Questions of ownership and authority take on a new significance in the context of commons-based digital production, where the outputs of the collective effort are accessible to a global audience, and maps and data points are perpetually evolving works-in-progress, which can be edited and re-edited by anyone. In the participatory GIS tradition, maps, especially those used for rights advocacy such as land tenure, are usually one-off affairs (Poole, 2006). The uploading of data points on a global open platform such as OSM has the distinct advantage of ensuring their curation. The map will be neither lost nor controlled. However, this openness poses two challenges. In addition to the question of who has authority to decide what types of information get published on the Internet, the maps' open character may pose a challenge to coherence.

For example, a scenario can be envisioned in which contradictory information is presented as a consequence of divergent interests and perceptions. Commons-based projects have developed ways to deal with such problems. In Wikipedia, for example, it is expected that controversial issues will be discussed extensively. The records of these discussions and the related edits are available online. Special categories of vetted users, called administrators, have the authority to block users who misbehave and to protect or unprotect pages from editing. However, could a lack of coherence based on the open character of contributions pose difficulties to rights-based advocacy? Processes of validation and verification of the submitted information, such as that envisioned in the context of Ushahidi, a popular crowdsourcing platform used in election monitoring and humanitarian crises, come at significant cost (Okolloh, 2009).

The process-oriented character of participatory development enables participants to identify and coalesce around commonly defined goals and to develop a unified voice. At times this is problematic since views and opinions can be suppressed or forgotten in the service of an overriding goal. From this perspective, open digital collaborative production can add to the transparency of the participatory process as it supports the recovery of tensions, blind spots, and voices that normally would be erased in an offline co-creation process. In open production this can be achieved by researching the history of the revisions to the commons and by allowing the coexistence of conflicting views such as whether a community space is characterized as safe or unsafe.

Questions about who translates data into information and information into action, and who decides which knowledge to codify into data and how to do it are central in work on participation and governance. Jonathan Fox (2007), who has made substantial contributions in this field, argues for the need for a distinction between fuzzy and clear transparency. *Fuzzy transparency* "involves the dissemination of information that does not reveal how institutions actually behave in practice, whether in terms of how they make decisions, or the results of their actions" (Fox, 2007, p. 667). Fox points out that, usually, significant investment is needed to render raw public data into meaningful and actionable information. *Clear transparency,* on the other hand, "refers

both to information-access policies and to programs that reveal reliable information about institutional performance, specifying officials' responsibilities as well as where public funds go" (Fox, 2007, p. 667).

The social embeddedness of most or, some would argue, all forms of information (Brown & Duguid, 2000) presents a significant challenge to open development and the open data movement with regard to communicating the social context of the data that are being incorporated into a global digital commons and to managing conflicting views and conflicting data when using co-created information for collective action and advocacy.

Conclusion

This article aims to address the question of whether the dynamics of commons-based peer production undertaken in poor settings are the same as those at work in affluent societies. Bearing in mind the characteristics of the MK effort, from the discussion of the empirical findings in this article, it would seem that they are not the same, insofar as the view of commons-based production adopted for the comparison is predicated on normative, value-based explanations of the successes of distributed commons-based collaboration.

More specifically, the MK case study provides a number of insights with regard to peer collaboration dynamics in materially deprived societies. First, in relation to participant motivations, the largely unremunerated character of commons-based production is often impractical in a context where day-to-day survival is at stake. Material concerns and, in particular, immediate compensation for the effort and continuous access to training, travel, and employment appeared to be more prevalent among MK participants than is suggested in the literature on F/OS. For mappers, videographers, and journalists, taking part in MK represented a significant investment with important opportunity costs. Furthermore, participant attitudes challenged the normative conceptions of the core team about civic duty and what it means to be an "ideal citizen" (Cornwall, 2005). This finding invites donors, project initiators, and proponents of open development to rethink how they engage contributors and incentivize long-term participation. The MK example indicates that it may be preferable to invest in people, those striving to create local communities of contributors and participants themselves than one-off initiatives that seek to address a particular information gap.

Second, and with regard to the relationship between product and process, the study reveals that the tensions between the social and technical goals of initiatives involving hyperlocal information are not easily reconciled. Demands to get the data collection effort underway in order to attract interest and to develop a solid basis for collaboration in developing the information commons were generally at odds with the process of community engagement. This tension is not unique to commons-based peer production. Practitioners in participatory mapping often face similar dilemmas (McCall, 2003, 2006; Rambaldi, Chambers, McCall, & Fox, 2006). What appears to be different in open development is that, from the outset, scale is important, meaning that initiatives that succeed in attracting a large base of user/contributors early on are more likely to survive in the long run than are projects that may adopt a more incremental approach to engagement. Contributing to existing commons, such as those instituted by OSM, may mitigate these network effects.

Third, the governance of commons-based peer production in materially deprived settings cannot be based solely on distributed, socially based authority, not only because such structures require time to emerge but also because of the risks resulting from the increased visibility of groups and individuals in the digital commons. Interestingly, MK participants regarded bureaucratic forms of accountability and decision making, such as that afforded by the Trust, as equally, if not more desirable than the bottom-up forms of decision making favored in peer production.

Free information sharing, another value espoused by open development and commons-based peer production, was seen as problematic by many community members to whom the mappers turned for information. Teachers and informal pharmacists were suspicious of transparency, fearing it could make them vulnerable to government action. Such concerns highlight what openness means in contexts where the relationship between citizens and the state is characterized by distrust and resentment. The embeddedness of information in social and political interests and struggles frames commons-based peer production in materially deprived areas in very different terms from the way it is usually conceived. Commons-based peer production supports

important opportunities for these different perspectives to become part of the discussion, rather than being swept under the rug in favor of unproblematic representations of community knowledge.

The lessons emerging from the MK study highlight the enduring importance of power relations for understanding how technology, information co-creation, and community dynamics intersect. Taken together, these insights point to the need to rethink the universality of the values and principles of commons-based peer production and to support re-politicization of the processes of information gathering and data use. ■

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