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HOW-TO NOTES

Interactive Community Mapping:
Improving Service Delivery and
Empowering Communities



open development
technology alliance



GAC in Operations
GOVERNANCE & ANTI-CORRUPTION

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Introduction

Mapping presents a compelling way to demystify complex data and concepts into useful visual information that most people could understand regardless of language, level of literacy, or culture. With the advancement and wider availability of ICTs, digital maps can be created faster, easier, and in a more participatory manner than before. These maps can also be shared instantaneously with the world via the Internet. Interactive Community Mapping (ICM) is one method of ICT-enabled participatory mapping. It is a process that engages individuals in creating maps of their communities. In the development context, ICM can be a useful approach in helping community members, members of civil society organizations (CSOs), governments, and development partners to better picture and assess the needs and concerns of the mapped communities and adjust their development plans, activities, and policies accordingly.

Targeting task teams of the World Bank, this How-to Note is aimed at providing step-by-step guidance on the design and implementation of the ICM process to achieve an evidence-based and increasingly participatory decision-making approach for development projects. Relying on good practice examples from Kenya and Tanzania, this note seeks to provide a better understanding of how the potential benefits of ICM can be translated into tangible results. The note goes on to outline some of the available ICM technology, delineate the enabling environment for ICM, and provide step-by-step guidance on how to effectively design and implement ICM in projects.

ICM: Definition, Benefits, and Risks

ICM is one of many ways to map a community in a participatory manner. For the purpose of this note, it refers to ICT-enabled bottom-up mapping for a variety of development purposes. The core of the process is to engage individuals, such as community residents and civil society members, in creating maps of their own communities. The broader idea of ICM is to harness the collective wisdom and knowledge of these communities to become drivers of decision making in development. As part of the ICM process, local residents utilize a basic global positioning system (GPS) to locate roads, pathways, and points of interest in their communities, and then import the data into a base map in the public database, generating dynamic and editable maps. Further, the ICM process facilitates the creation of “social” maps of the community, encouraging local residents to share news, reports, and stories that are of interest both within and outside the community, making ICM valuable not only for the development of poor and marginalized communities that are often merely blank spots on traditional maps, but also for incorporating the voices of these communities in the process of development.

ICM typically aims to achieve two major development outcomes:

1. **Improved service provision.** A key objective of the ICM process is to help improve the provision of public services in communities using an evidence-based approach. By drawing clear pictures of the social and economic conditions in areas, interactive community maps help governments and service providers make better decisions about resource allocations. For example, ICM supports decision making about the types of service provision interventions that are required, what needs and areas should be prioritized, and how and where interventions should be implemented. Because community members are engaged throughout the process, ICM also encourages them to identify local solutions to challenges identified and monitor implementation processes in their communities.
2. **Capacity building and empowerment.** By its nature, the ICM process is deeply participatory—it relies on the community at all stages of the mapping process. This approach is valuable for at least two reasons:
 - “Community mappers” who volunteer to collect data and map their own communities acquire new technological skills. For example, they learn to use GPS devices and become familiar with software programs for mapping and social media. In marginalized communities with high unemployment rates among the youth, these skills can be very beneficial to local residents, opening them to potential employment opportunities in the future.
 - The “digital storytelling” aspect of ICM amplifies the voices of the poor and marginalized. It allows communities to articulate their own needs, issues, and concerns rather than relying on information from external entities like the mainstream media that often presents these personal views in a negative light. ICM allows them to put their communities and their voices on a map and gives a better perspective to outsiders of their lives and unique environments.

While the ICM approach is novel in its reliance on ICT tools, it has several **advantages** over the traditional community and participatory mapping process:

- **Speed.** It may take several months—or even years—to develop community maps in the traditional manner. The ICM process occurs at a substantially faster rate, benefiting from innovations in geospatial technology, the openness of the technology mapping platform that is provided, and access to local knowledge.
- **Dynamic nature.** While traditional maps remain static, with considerable effort required to keep them updated, interactive community maps can be continually digitally authored, shared, edited, changed, or updated.
- **Costs.** The ICM process relies on relatively inexpensive and simple technological devices (e.g., laptops, GPS devices, scanners/printers, cameras and/or video cameras, and Internet access), and it can employ free and open source software. Mappers belong to their mapped communities and bring unique implicit knowledge of their living environments to the ICM process. For the most part,



mappers voluntarily participate in the mapping process after completing basic technological training offered by ICM experts. Therefore, costs associated with ICM production are substantially lower than those for traditional mapmaking.

- **Granularity.** Most traditional mapping efforts focus on large-scale geospatial data, lacking local context. The ICM process aims to provide granular information, tapping the local knowledge of community members. The dynamic nature of the ICM process allows “zooming in” and “zooming out” according to the specific information needs and demands of the community and its stakeholders. Information provided on the map may be as detailed, localized, and contextualized as the map designers, community members, and decision makers prefer.
- **Community empowerment.** By positioning community mappers at the core of the mapping and decision-making processes, ICM provides unique opportunities for community engagement and empowerment. By offering community members the chance to become “community mappers” with technological skills, the ICM process amplifies their voices. Sometimes, the ICM process surpasses or vastly differs from the original objectives, achieving unexpected benefits for the community. In the case of Map Kibera in Kenya, for example, because of community demands, a map of safe and unsafe areas for girls was developed as part of the mapping process.¹ This type of interactive and demand-driven feature is usually absent in traditional mapping exercises.

ICM can be a powerful local empowerment tool for community members—especially among the marginalized and economically and socially disadvantaged—but it also involves **potential risks**.

- **Misuse and abuse of information.** In the wrong hands, information available for the ICM process can be misused or abused. For example, landowners located in areas that are indicated as safe on a map could use that information to raise the price of land, investors interested in grabbing safer or better developed areas could use a map to their advantage, and governments or other entities looking to resettle vulnerable communities could use maps to identify tenures with uncertain rights.
- **Data reliability and accuracy.** While larger amounts of data can be collected in shorter timeframes through the open and participatory approach of ICM, the exercise does not guarantee the quality of gathered data. In order to sustain quality standards for a map, collected data must be verified. Additionally, because of this data quality challenge, training for community members interested in becoming community mappers is key to the effective implementation of the ICM process.
- **Community representativeness.** The ICM process may be captured by community elites or certain community groups/members when insufficient attention is paid to community representativeness. Special attention must be paid to encourage participation of women, the disabled, youth, the elderly, and other vulnerable groups, depending on the local context.

1. <http://www.mapkibera.org>.

- **Security.** Context matters. Particularly in fragile and conflict-affected situations, geospatial data and information collected through the ICM process can become a source of information for groups instigating physical attacks on communities or on members of donor agencies supporting the ICM process. In such contexts, careful attention must be paid on when and how interactive community maps should be widely shared with the public. For example, in sensitive situations, access to community maps on the Internet could be limited to team members until all the data are verified and until conflict situations calm down. The mapping information could still be shared with partners and other donor agencies—especially for the purposes of aid, project coordination, and decision making. During this process, maps could also be shared with communities at community meetings and the like in order to receive feedback, but only in print formats.

While the benefits of ICM generally outweigh the risks, it is important to identify potential negative implications of the ICM process at the outset, and to incorporate appropriate safeguards.

ICM Technology

There is no single technological approach for creating an interactive community map. However, to date, OpenStreetMap² (OSM) and Google Map Maker³ are the two most common mapping platforms employed for ICM purposes (table 1).

TABLE 1
Comparison of Basic Specifications—OpenStreetMap and Google Map Maker (as of April 2014)

	OpenStreetMap (OSM)	Google Map Maker
Website	http://www.openstreetmap.org/	https://www.google.com/mapmaker
Year Founded	2004	2008
Cost	Free	Free
Licensing of data produced	Open (Open database license)	Closed (licensed to Google)
Data verification process	Monitored by editors to correct, remove, and alter erroneous edits	All edits are subject to verification and approval by Google. Google Map will reflect edits after approval is granted
Speed of update	Instant	Subject to approval (instant after approval)
Mapping examples	<ul style="list-style-type: none"> • Map Kibera,^a Nairobi, Kenya^b • Map Mathare, Nairobi, Kenya^b • Map Tandale, Dar Es Salaam, Tanzania^b 	<ul style="list-style-type: none"> • Cyclone Nargis, Myanmar

a. <http://www.mapkibera.org>.

b. Project examples highlighted in this note.

Sources: <https://www.google.com/mapmaker>; <http://www.openstreetmap.org>; McDonough, 2013.

2. <http://www.openstreetmap.org>.

3. <https://www.google.com/mapmaker>.

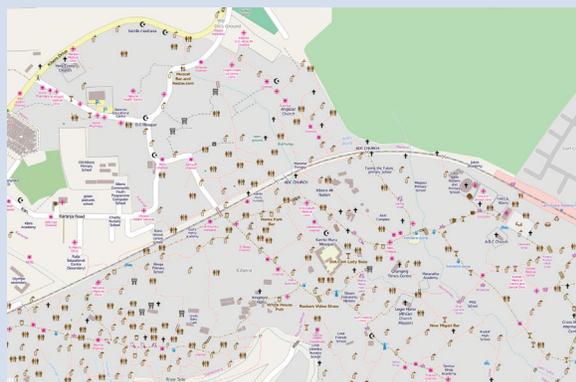


OSM is a collaborative web-based project that aims to create a free and editable map of the world, built entirely by volunteers. OSM maps rely on data collected from GPS devices, aerial photography, satellite imagery, publicly open sources of geospatial data, and local knowledge. All of the data is available for public use under a Creative Commons license that permits the downloading and use of data for any purpose, only requiring attribution. Box 1 describes one of the earliest efforts of ICM using OSM technology.

BOX 1

The Earliest ICM Effort Using OSM Technology: Map Kibera— Nairobi, Kenya

Map Kibera^a, a community information project launched by a team of social activists in October 2009, is an interactive grassroots map of Kibera, Nairobi—one of the largest slums in Africa. Although many civil society and development organizations have been present and



active in Kibera, the impoverished community has largely remained a blank spot on the map. This lack of openly available geospatial data and other public sources of information about the slum led a group of social activists to create Map Kibera.

The underlying idea of Map Kibera is that without basic geospatial knowledge, it is impossible to conduct an informed discussion about how conditions in Kibera could be improved. The Map Kibera team expected that the provision of such information would facilitate better coordination, planning, and advocacy efforts within the community and between the community and the government.

In the first stage of its operation, the Map Kibera team recruited volunteer community mappers residing in Kibera to map “points of interest” in the slum, using simple GPS devices and uploading the collected data to OSM. The mappers collected data about the location of clinics, toilets, water points, places of worship, and the like. On top of this basic geospatial information, the mappers added a “storytelling” layer, capturing personal accounts, stories, and news of Kibera residents. As part of the second stage, Map Kibera deepened its coverage of the conditions of the people living in the community, and collected more contextualized information in the areas of health, security, education, and water and sanitation. At this stage, the Map Kibera team also introduced the Voice of Kibera website—www.voiceofkibera.org—an online news and information-sharing platform for the Kibera community.

Source: Interview with Erica Hagen by Jennifer Shkabatur, October 2012; Interviews with Mikel Maron by Jennifer Shkabatur, December 2011 and April 2012.

a. www.mapkibera.org.

Google Map Maker encourages individuals to review and edit satellite imagery available on Google Maps. Google Map Maker allows three types of contributions to existing Google Maps: *placemarks* (points of interest, such as schools, local businesses, and hospitals); *lines* (e.g., roads, railways, and rivers); and *polygons* (e.g., boundaries, borders, parks, and lakes). The contributions of new users are reviewed and monitored by more experienced ones, in order to ensure accuracy. Contrary to OSM, data that is submitted to Google Map Maker is not available under open licenses for public reuse; it becomes the property of Google.

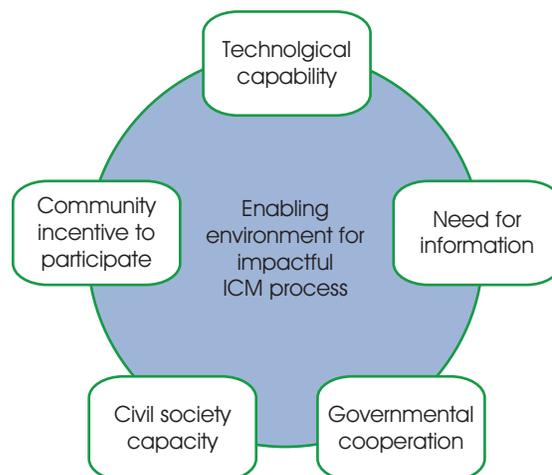
Enabling Environment for ICM

The design and implementation of an impactful ICM process requires close attention to the enabling environment and conditions that facilitate the translation of ICM into concrete development outcomes. The major drivers of effectiveness are technological capability, the need for information, governmental cooperation, civil society capacity, and community incentives to participate, as illustrated in figure 1 and described below.

Technological capability. Naturally, high Internet penetration rates and digital literacy are likely to contribute to a smoother ICM process. The availability of stable Internet access facilitates steady data transition from GPS devices into the mapping software, and widespread technological knowledge enhances the pool of potential community mappers. However, lack of Internet access and low technological capability do not make interactive community maps unfeasible; they could, in fact, even intensify the importance of the mapping process for the local community because the development benefits from the map could be considerable. Box 2 describes how Map Kibera overcame its lack of Internet access and shows that even community members who lack ICT training can become active participants of the ICM process.

Need for information. ICM would of course be most helpful in places that have not been previously mapped. However, an effective ICM process should not only target blank spots on the world map, it should also identify specific needs and demands for information as well as concrete ways in which an ICM would benefit its prospective users—community members, CSOs, public officials, development partners, and others. Thus, while a lack of previously available geospatial information

FIGURE 1
ICM Enabling Environment



Source: World Bank.

BOX 2
Overcoming Lack of
Internet Access—
Map Kibera's Experience

Lack of Internet access may make the ICM process more difficult and limit the usefulness of the resulting map to members of the community because it would not be easily accessible to them. However, Map Kibera and other ICM initiatives have managed to overcome this challenge by actively involving community members offline.

First, after the completion of the ICM process, the team of Map Kibera printed out the map on large posters, distributing them across Kibera because Internet access in the community is limited. Relying on these printed maps, the team encouraged the community to add more contextualized hand-written information. In particular, the team reached out to different constituencies to identify approximate locations on the printed map by using pins. For example, girls were asked to point out places where they felt insecure, and women were asked to identify water sources and the like. This information was then georeferenced and added to the interactive map by volunteers.

Second, the team of Map Kibera created and distributed a printed Atlas of Kibera containing the following materials: five detailed maps of Kibera focused on health, education, water and sanitation, security, and religious institutions; a large-scale map of the whole area of Kibera; and a description of the Map Kibera project. The Map Kibera team distributed the map to schools, CSOs, and government representatives, encouraging them to utilize the map as part of their activities in the slum.

Source: Hagen 2011.

is certainly a signal that an ICM could be valuable, a more nuanced assessment of conditions on the ground is necessary for an impactful implementation of the ICM process.

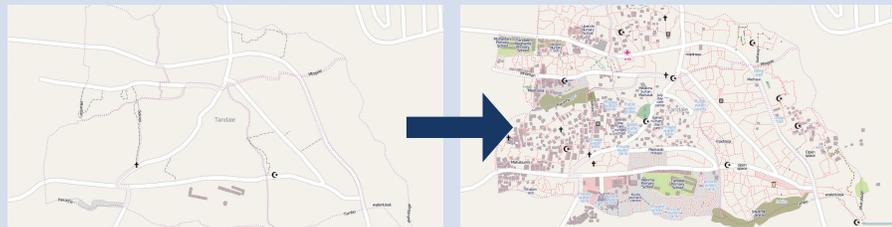
Governmental cooperation. For reasons related to service delivery effectiveness and sustainability, cooperation with governments—especially local governments—from the earliest stages of the ICM process is vital, as is demonstrated by the example in box 3.

- **Service Delivery.** Because local governments bear ultimate responsibility for the provision of public services in many countries, governmental cooperation with the ICM process at the local level is critical for its impact and sustainability. For example, based on the mapped information, public officials might allocate additional resources to particular concerns or reallocate funds that have already been assigned in order to better cope with community problems. A government's endorsement of the ICM process can also bring other stakeholders on board who can help distribute and utilize the map once it is completed. Furthermore, the ICM process is beneficial to policy makers, who gain valuable and previously unavailable information about the conditions and concerns of marginalized and poor communities under their jurisdictions.

BOX 3

Securing Governmental Support—Example of Map Tandale Project at Dar Es Salaam, Tanzania

The ICM process in Tandale—an informal settlement of 50,000 residents in Dar Es Salaam, Tanzania—aimed to improve the delivery of public services in the community and amplify the voices of community members. While Tandale’s population is rapidly growing, the unplanned settlement suffers from insufficient basic services, such as water supply, drainage systems, schools, and roads. Policy makers needed to know how to allocate resources to improve service delivery in Tandale and to understand the needs and concerns of the community. In August 2011, an array of civil society actors, policy makers, urban planners, community members, and development partners initiated Map Tandale with the support of the World Bank. The Tandale ICM process consisted of 18 community mappers and 25 students from Ardhi University who were specializing in urban planning. The mappers and students were divided into six groups of six to eight people per group, one group for each sub-ward of Tandale. Each team member specialized in one of the following areas: GPS surveying, editing, satellite image tracing, or storytelling. The maps below illustrate the amount of information collected in just 10 days.



The support of the World Bank to the Map Tandale project was exemplary in terms of acquiring cooperation from the government. The Bank acted as a “matchmaker” and networker, introducing Dar Es Salaam city officials to the ICM concept and to partners that could implement the project. It also worked with Ardhi University to embed community mapping into the curriculum of their urban and regional planning studies program and to engage students in the ICM process.

Sources: Iliffe 2012; GroundTruth Initiative—<http://groundtruth.in/blog/>; Mapping: (No) Big Deal—<http://mappingnbigdeal.wordpress.com/>.

- **Sustainability of interactive community maps.** The ICM process should not be considered a one-time activity. When maps are updated as community development projects are implemented and service provision improves, they can serve as monitoring tools that continuously inform policy makers, not only on the status of service delivery but also on development policies and plans. Institutionalizing an ICM approach in the decision-making mechanisms of a government could contribute to the sustainability of ICM activities in communities.

Public officials, however, are not always aware of these benefits and might initially fail to cooperate with the process. They might also regard any collected geospatial data as government property that can be sold to generate government revenue, and challenge the ICM process from a copyright perspective. Therefore, they might be reluctant to cooperate with a process that seeks to create geospatial data openly or freely. The implementers of ICM projects should pay close attention to these potential obstacles and facilitate the ICM process by bringing local public officials on board and conveying the benefits of the map to them.

Civil society capacity. Typically, the creation of an interactive community map is the easiest part of the ICM process. The map itself can be accurately developed by external parties who recruit community members to map their living environments and transfer the gathered data into an ICM technology platform. However, in order to ensure that the map is used by the relevant stakeholders and that actual development outcomes are achieved, local civil society—e.g., nongovernmental organizations (NGOs) and other types of CSOs, academia, and research institutions—should play key roles in the process. Local CSOs and social activists are the main stakeholders of any effective ICM endeavor, assuming responsibility over community outreach and engagement efforts, helping recruit and engage community mappers, arranging the logistics for the process, publicizing and distributing maps once complete, and utilizing them for their own activities. The presence of local civil society and its capacity to perform these activities are central to the creation and impactful use of a map.

Community incentive to participate. The incentives of local community members to participate in the ICM process can be tricky, as it requires a dual commitment: to take part in the initial data collection and mapping and, once the map is complete, to continue participating in decision-making processes and follow-up activities.

- **Incentive to participate in initial data collection and mapping.** Volunteering for a common cause is not a natural decision for people in poor communities—many are unemployed and in urgent need of incomes. Engaging committed volunteers may be impractical in many slum areas. However, payment for ICM work can contradict the basic idea and principles of the whole ICM process, which is supposed to be done by and for the community. The incentives of community members to take part in the ICM process should, therefore, be carefully considered. In some cases, the free technological training that community mappers receive as part of their participation in ICM suffices to keep them engaged in mapping activities. More frequently though, some payment or reimbursement to encourage the continuing commitment of community mappers is required.

Designing and Implementing ICM: Step-by-Step Guidance

- **Incentive to continue to participate in decision making.** An interactive community map is not normally a goal in itself but rather the first step to a broader engagement by community members in decision-making processes affecting their daily lives. Nevertheless, if a map is created and reactions from government officials or service providers do not follow, community members can quickly become disillusioned about the ICM process and lose interest in it. For this reason, ensuring the participation of and responsiveness from the government and/or service providers are crucial for incentivizing continuous community involvement and interest in the ICM process.

This section introduces the step-by-step process for designing and implementing ICM. Figure 2 illustrates six steps that task teams can follow.

STEP 1: Articulating the Objective and Demand-Driven Strategy

The technological aspects of creating an ICM are usually the easiest. The more difficult and challenging factors are community engagement, government cooperation, sustainability, and impact. To maximize the chances that the outcome of the ICM process will satisfy community needs and that relevant stakeholders will use the map, the objective and design of the ICM process should be as demand-driven as possible. While the objective can change and evolve as the ICM process progresses, establishing a clear objective at the onset of the planning stage helps to encourage a demand-driven strategy. This can be accomplished by asking three basic questions: (1) Who will use the map? (2) What information is required? and (3) How will the map be used?

FIGURE 2
Six Steps to Design and Implement ICM



Source: World Bank.

Who will use the map? The initiator of the ICM varies—it can be initiated by the government, CSOs, service providers, donors, or others. The users of the map can also vary depending on the purpose of the map. It is tempting to think that if previously unavailable geospatial data reaches the public arena, it will be well utilized, but this is only rarely the case. As the experience of Map Kibera in Kenya demonstrates, a map that is designed for general use that does not satisfy the concrete needs and demands of a community and relevant stakeholders will be underutilized. The initial goal of the Map Kibera team was to develop an accurate map of Kibera, because this type of information had been previously unavailable. It was assumed that interested parties would then begin to use the map for a variety of purposes. This assumption proved incorrect as the team discovered that their data had in fact remained largely untouched. The situation changed only after the team began collaborating with local CSOs, and when the mapping data corresponded to their concrete needs. An effective ICM process should, therefore, begin with the identification of prospective users and targeted audiences of a map. Typically, users include the following:

- **Community members.** An interactive community map represents each community's living environment, but members of poor and marginalized communities are unlikely to access—let alone use—them in online formats. Therefore, targeting this audience requires a series of offline activities to make the maps more accessible and understandable. For example, printouts of maps can be distributed at community meetings and displayed in public places (see box 2), and information about the maps can be shared via community radio. This outreach process not only informs community members about the status of their communities, but also allows them to provide feedback and suggestions for further data and story collection as well as community development.
- **CSOs.** These are the most likely users of maps. They may be interested in using them as part of their development and advocacy activities, project monitoring, and coordination with other CSOs and aid agencies in the area. An ICM process that targets this audience should be structured around the information needs of the CSOs and the resulting map should be presented to them in a way that is most helpful for their strategies, activities, and focus sectors.
- **Government and service providers.** Local governments and service providers may be the most impactful users of interactive community maps, especially when the purpose of ICM is to improve service provision at the community level. Maps that target governments and service providers as their audience therefore require the understanding of governmental needs and priorities, along with close collaboration with public officials throughout the ICM process (see box 3).

- **Other users.** Possible other users may include the private sector, international organizations, bilateral and other donors, and researchers that are already engaged or intend to engage in the community and aim to improve their effectiveness or enhance the scope of their activities. As with other ICM users, an ICM process should target and engage them as early as possible in the design process and be structured around their information needs and demands.

What information is required? Since local stakeholders, such as community members, CSOs, and local representatives, know best what information is required and how it will be used, they should be at the center of determining the types of geospatial data that are collected in the ICM process. For this reason, it is important to understand what types of geospatial data would be most useful to them and establish clear data collection objectives at the outset. Of course, different users will need different types of data. For instance, a local CSO that attempts to address the water and sanitation needs of the community, a public official who works on citizen security issues, and a group of community volunteers who collect trash would each need different types of information. The ICM process should seek to satisfy the needs of all potential stakeholders, directly engaging them in deciding what information should be collected (see box 4). One of the advantages of an interactive community map over a traditional map is its dynamic nature, so the initial identification of the required types of information should not be regarded as conclusive. As long as community mappers remain available, additional data can be collected and imported into the map at any time.

BOX 4

Collection of Thematic Geospatial Data—The Kenyan and Tanzanian Experiences

As ICM experiences evolve, different approaches are emerging for articulating information needs. For example, Map Kibera, one of the first ICM exercises in the service delivery field, experimented in matching information demand and need in two phases. At the first phase of implementation, the designers of the ICM process guided individual community mappers to include “points of interests,” thus granting them discretion to decide what pieces of information should be part of the map. The points of interest that were chosen included clinics, toilets, water points, NGO offices, electric streetlights, and some businesses. After one week of mapping, the mapping team compared the individual points of interests collected and decided which of them should be part of the map.

The second phase of Map Kibera took a more contextualized approach, focusing on four specific areas: health, security, education, and water and sanitation. Mappers gathered detailed information on each of these topics. In the area of health, for instance, they collected information about the working hours of clinics and the services provided by them. This information was added on top of the original ICM layer, which only showed the location of the clinics.

(continued)



the services of health clinics, or fixing broken pathways. The pursuit of each of these goals requires a slightly different design and implementation strategy for the ICM process. Articulating specific purposes will also help teams identify relevant stakeholders that should be contacted.

- **Mapping format follows function.** A map format will depend on its audience and the goals it aims to achieve. An ICM may result in an online interactive map accessible on a designated website, spreadsheets that contain non-encoded geospatial data, printouts of maps presented as posters in public places, or all of the above—the most frequent option. Determining the map format can also guide a team as it starts thinking about technical preparations⁴ and timelines. This is discussed in more in detail in *STEP 4: Creating the Map* on page 17.

STEP 2: Engaging Stakeholders

To a large extent, the effectiveness of ICM depends on the cooperation of local communities. To ensure that the mapping will be used, sustained, and further developed after its initial completion, local CSOs, governments, service providers, community members, and other groups should serve as entry points for the map's creation. These local community participants should sense that they “own” the ICM process from its inception. Consequently, the ICM process should rely on robust and constructive partnerships with groups and organizations that are permanently active in the target community. Such partnerships are important at all stages of the ICM process.

Planning phase. In the beginning, local CSOs, governments, service providers, and civil society activists can help identify the information needs and demands of communities and offer guidance regarding implementation within particular local contexts. Box 5 gives an example of this effort with Map Mathare in Nairobi, Kenya. Local government committees that deal with development matters as well as service delivery can be particularly instrumental during the ICM process.

Throughout the ICM process. Local partners can help by engaging and mobilizing the community to take part in the ICM process, organizing community forums, triggering public interest in the platform, and helping to recruit community mappers and support them throughout the mapping process. Such local partners can be local CSOs, youth groups, or universities and research institutions.

After completion of the map. Once a map is completed, local partners can serve as its “hosts,” ensuring its utilization, further development, and updating.

4. Technical preparations have cost implications for projects because equipment needed for ICM process should be provided by the project or trust funds. For World Bank-supported projects, task teams should keep in mind that procurement could take up to six months.



BOX 5
 Building Partnerships—
 The Example of Map
 Mathare in Kenya

Map Mathare, an interactive community map of the Mathare slum in Nairobi, is the creation of GroundTruth Initiative (www.groundtruth.in), an enterprise built off the work of Map Kibera. Map Mathare consists of all major roads and pathways in Mathare as well as major points of interest—e.g., schools, clinics, worship places, markets, and businesses. In the months prior to the official project launch, the GroundTruth team engaged in an extensive partnership-building effort. They met with local youth groups, community leaders, CSOs, and government representatives. As a result, they created partnerships with a number of local community groups—Community Cleaning Services, Cooperazione Internazionale (COOPI), and Community Development Center Huruma. These groups undertook the responsibility for much of the ICM outreach efforts, organizing a large open forum to present the ICM idea to the community, and helping to recruit volunteer community mappers. Almost 130 Mathare residents attended the open forum, and between 45 and 70 took part in the training.

Source: Based on blogs about Mathare, GroundTruth Initiative—<http://groundtruth.in/blog/>.

STEP 3. Reaching Out to Target Community Members

The core of the ICM approach is community engagement and empowerment, and thus local communities should be aware of the ICM process as early and as much as possible. In order for a project team to effectively engage with communities, communications and outreach strategies that can be incorporated into the ICM initiative strategy should be developed and implemented.

Communications. Clear and transparent communications with community members from the outset of the ICM process can become the basis of a trust-based relationship with a local community. It is important to reach out to community members to acquire their support and participation in the process, particularly at the beginning of the ICM process. Establishing a communication strategy in order to systematically and strategically reach out to the community is recommended.

- **High-profile endorsements.** Public endorsements by high-profile community leaders and politicians can be valuable for sparking initial public interest and drawing attention to the ICM process.
- **Communication of benefits.** Communicating the benefits of ICM initiatives while managing expectations—especially in communities with low technological capabilities—can be challenging, largely for two reasons. First, the map is mainly available online and most community members do not have access to the Internet. Second, community members often feel that they do not need a map because they know how to get around their neighborhood without one. Particularly in these situations, it is important to convey to community members the benefits of

the ICM process by highlighting the importance of acquiring technological skills, placing their community on a map to consequently help improve the provision of public services in partnership with other stakeholders, and using the map to enable the amplification of the presence and voice of a community. Sharing ICM examples from other areas or countries can help capture the interests of community members. While communicating about the benefits of ICM, it is important to avoid inflating community expectations too much. Clear and transparent communication on the purpose, scope, timeline, expected partners or stakeholders, anticipated benefits, and how community members can be involved in the process may help manage community expectations.

Outreach. At the beginning of the ICM process, it can be helpful for a team to identify the specific purposes of outreach activities and target groups that may require additional outreach efforts.

- **Infomediaries.**⁵ Initial outreach efforts should focus on potential “infomediaries” — local community leaders, social activists, and citizen journalists who can spread the word, mobilize local residents to participate, and sustain community interest in the ICM process. Early in the process, it is important to identify potentially committed infomediaries and keep them as informed and engaged as possible throughout the process. Infomediaries should be engaged in organizing community open forums that serve as effective entry points to the ICM process and help in the recruitment of community mappers. Community mappers who

BOX 6

An Example of a Community Outreach Effort—Map Mathare in Kenya

To strengthen the sustainability of the map and ensure that it responded to the concrete needs and demands of community members, the Map Mathare team attempted to hold a constant dialogue with them. To this end, the venues for trainings and meetings with community mappers rotated between different villages, allowing different parts of the community to participate, ask questions, and provide feedback. This approach allowed the team to recalibrate the project according to the needs and demands of the community. As part of the community feedback, for example, the Map Mathare team learned about the community’s issue with water and sanitation. In response, they created a detailed water and sanitation map of Mathare, focusing on four villages where the need for such information was particularly acute.

Source: Interview with Erica Hagen by Jennifer Shkabatur, October 2012; Interviews with Mikel Maron by Jennifer Shkabatur, December 2011 and April 2012.

5. The etymology of the term “infomediaries” is “information” and “intermediaries.” This concept was first suggested in the Harvard Business Review article “The Coming Battle for Customer Information” (Hagel and Rayport 1997).



have been recruited can also function as informediaries to bridge communications between the community and other stakeholders and to translate data into easily understandable information on maps, so it becomes relevant to the community members.

- **Outreach to marginalized groups.** A special effort should be made to reach out to underrepresented and marginalized community groups that can be considerably empowered by participation in the ICM process. These groups may include women, youth, the elderly, indigenous people, the disabled, migrants, and immigrants. For actual mapping activity, it may be particularly valuable to engage young women, thereby offering them skills that can be valuable for future employment pursuits. Including female community mappers can also make other women and girls in communities feel comfortable providing feedback and input.
- **Persistent outreach.** Outreach and mobilization efforts should not cease once a sufficient amount of community mappers have been recruited. The ICM process should remain visible and welcoming to new participants. A persistent outreach approach is important for two reasons: (1) it can help participants better understand the needs and concerns of the community, allowing them to adjust the ICM process accordingly; and (2) it can increase the chances that the resulting map will be widely used by the community and other stakeholders.

STEP 4. Creating the Map

When creating an interactive community map, the preliminary tasks are: establishing a timeline, making technical preparations, obtaining existing imagery and maps, training, and—ultimately—mapping. These five processes are described below.

Timeline. The timeline for the creation of an interactive community map varies from one community to another, depending on the size of the area, the number of participating community mappers, weather conditions, access to the Internet, and so on. In the cases of Kenya with the maps of Kibera and Mathare, the mapping process lasted an average of three to four weeks. The creation of Map Mathare took 17 days, with 15 community mappers working 5 hours per day on average. As part of this process, the following data were collected and put on the map: 750 points of interest, 41.3 kilometers (25.1 miles) of roads and paths, 24 villages in 3 square kilometers (32.3 square feet), and 138 buildings.

Technical preparations. The ICM process, which mainly targets marginalized and poor communities, cannot rely on sophisticated and expensive technological tools. Therefore, the ICM toolkit is basic: GPS units, laptops, digital cameras, videocameras, a printer/scanner, batteries and chargers, and a pelican case. The overall cost of this toolkit is US\$4,000–5,000, typically provided by the sponsors of the project. It is also necessary to find a space where community mappers can be trained and work with the mapping software and equipment.

Obtaining existing imagery and maps. Relying on existing maps of the terrain substantially facilitates the mapping process, although the ICM process ultimately calls for a new map to be built from scratch. Before the actual mapping begins, it is important to obtain existing imagery and maps of the area and to structure the ICM building process around them. Satellite imagery can be obtained from a variety of sources. In the case of Map Mathare in Kenya, the American Association of Advancement of Science (AAAS) donated the imagery of the relevant parts of Nairobi. Bing (Microsoft) provided the satellite imagery for Map Tandale in Tanzania.

Training. The time required for training community mappers is usually two to three days. During this time, community mappers should be trained on how to use GPS devices, collect and edit geospatial data, use camera and video equipment, and work with the mapping platform (e.g., OSM), and other relevant software. For digital storytelling purposes, community mappers are also taught how to use social media and blogging platforms (e.g., WordPress).

Mapping. The actual mapping—and then editing—exercise can be broken down to the following six steps: (1) dividing the geographical area, (2) ground surveying, (3) tracing satellite images, (4) thematic mapping, (5) storytelling, and (6) validating the data on the map. A summary of the six mapping and editing exercise steps is provided below.

- 1. Dividing the geographical area.** The first step is to decide which areas will be covered and how they will be organized. This exercise is important in order to plan the mapping process effectively and to assign each of the areas to community mappers most familiar with them. Many slums consist of villages, as is the case for Kibera and Mathare in Kenya. Determining the location of these villages is important for ICM planning purposes because all villages must be represented; teams of community mappers can be assigned to map their own villages—the places they know best.
- 2. Ground surveying.** Using a GPS device, roads, streets, and points of interest are mapped during this step. As part of this exercise, community mappers survey and locate the relevant areas “with their feet” or collect all geospatial data that they observe around them. The GPS surveying process is complemented by “walking papers”—detailed reprints of relevant sections of the existing OSM map. Community mappers use these papers in the field to draw new features, annotate existing data, and take notes that will complement the GPS data and help with its importation. After the completion of ground surveying, community mappers import the collected data from their GPS devices into the Java OSM software, add metadata such as detailed names and descriptions of places, and upload the information to the OSM database.



3. **Tracing satellite images.** Relying on satellite imagery, this step involves tracing buildings and the natural terrain (e.g., rivers and mountains) and uploading the information into the OSM database. After satellite images are fed into the database, they should be corrected and contextualized. As part of this process, the satellite images are printed out, and community mappers go from one building to another in the mapped areas, checking and fixing the shapes of the buildings, deleting redundant structures, writing down the types of materials the structures are composed of (e.g., brick, corrugated iron sheet, or wood stalls) and the purposes of the buildings (e.g., school, private house, local business, or clinic). A similar method can be implemented for land usage in the mapped area.
4. **Thematic mapping.** At the same time that a general map of the area is being created, community mappers can also collect more detailed and contextualized information on selected priority issues. The general map provides only a broad representation of the area, but this contextualized information responds to the concrete needs and demands of the intended ICM users (see the examples in box 4).
5. **Storytelling.** The ICM process goes beyond mapping in the geographic sense alone. It also empowers residents to amplify their voices and share local news and stories, creating an enhanced visual and contextual view of the community to the outside world. Community storytelling can occur during the ICM process as well as after the completion of the formal community mapping. As part of the ICM

BOX 7

Storytelling Examples: Voice of Kibera and Voice of Mathare

After the completion of the interactive community map of Kibera, the team of Map Kibera established *Voice of Kibera* (www.voiceofkibera.org) to allow local residents to speak for themselves about current events and issues and to create a digital community around local information. This online community for Kibera is constantly updated by the Map Kibera team with videos, photos, and stories that represent daily life in Kibera. Similarly, Map Mathare has its own online community, "Voice of Mathare" (www.voiceofmathare.org), which aims at picking up the voices of community members in Mathare. These voices are also geotagged and presented on an Ushahidi-powered map.^a

Source: Hagen 2011.

a. Ushahidi (<http://www.ushahidi.com>) is a free and open source platform for information collection, visualization, and interactive mapping. In the case of the Voice of Mathare, the Ushahidi platform is being used to geotag and crowdsourcing stories.



STEP 5: Promoting the Use of the Map

The ICM process can be used in a variety of ways to improve service provision in a community and provide citizens a platform from which they can articulate their issues and needs. However, the working assumption of the ICM process should be that the map will be used by its stakeholders only if it complements their existing strategies and if it can be seamlessly integrated into their ongoing activities. With Map Kibera, for instance, after the completion of the mapping exercise, the team partnered with the United Nations International Children's Emergency Fund (UNICEF) and several local CSOs interested in collecting information about the security of girls in Kibera. The community mappers of Map Kibera returned to the field to map the relevant data. Promoting usage of a map with both existing and new stakeholders and sustaining bottom-up engagement with community members must be a continuous effort.

- **Existing stakeholders.** In a best-case scenario, stakeholders that have been involved in the creation of a map since its inception will incorporate it into their activities (e.g., using the information on water and sanitation provided by the map for advocacy purposes with the aim of improving its provision).
- **New stakeholders.** The process should always encourage the further broadening of ways in which a map can be used and its network of stakeholders expanded. The team leading the ICM process should work with community members, local CSOs, government representatives, and service providers in communicating the advantages and the value added from using a community map.
- **Technology versus non-technology uses.** The map should be available in both online and paper versions so that interested stakeholders will not be limited by a lack of technological capacity and accessibility. In communities with little access to ICTs, paper versions of the map should be printed out and widely distributed. The Atlas Kibera, which made the map of Kibera available on- and offline, was an exemplary initiative for disseminating the printed map to a wide constituency without access to the Internet or other necessary communications technology. In communities with higher Internet access rates or mobile penetration, data provided on the map have a greater potential for enhancing interactions between community members and service providers. For example, a mobile application allows residents to track and monitor solid waste collection and the supply of water and sanitation services or to report on service provision problems they observe in their communities, geotagging them to specific locations on the map.

STEP 6: Ensuring Sustainability and Sailing-Up

Sustainability is one of the most challenging aspects of ICM. While a detailed map can be created within several weeks, updating and sustaining it requires long-term strategic planning and commitment. Initial mapping efforts are usually supported by development partners and tend to spark public interest, but it can be difficult to sustain this initial enthusiasm after a map is completed and once the external partners leave the community. There are two possible approaches to ensure sustainability and scale-up: relying on existing stakeholders or identifying and establishing a partnership with new stakeholders.

- **Relying on existing stakeholders.** The most effective way to ensure the sustainability of a map is to have a local CSO or public office “host” it—to develop and safeguard their ownership. In so doing, a host will use the map as part of their daily activities in the community and further develop it. Partnerships with potential hosts should be formed as early as possible in the ICM process to allow for the incorporation of their particular needs and demands into the creation of the map. Of course, some stakeholders will be more effective than others. Established community organizations, universities, and other educational bodies are well positioned to take ownership over interactive community maps and sustain them over time. For example, in the case of Map Tandale in Tanzania, Ardhi University in Dar Es Salaam incorporated the ICM process into its curriculum in urban and regional planning studies. This model of engagement encourages urban planning students to participate in the ICM process, acquire skill sets, and collaborate with community mappers as part of their education.
- **Identifying new stakeholders.** In addition, new hosts for the map can be found after its completion. Outreach events should be conducted to present the map to policy makers; community leaders; and international, regional, and local CSOs. Awareness-raising of the ICM process and its results will help new stakeholders figure out how to incorporate mapping into their ongoing community activities.

The ICM process is, by nature, granular and contextualized. It taps the implicit knowledge of local communities and attempts to strengthen the sense of ownership community mappers have over the course of the participatory process. While this approach can be effective at the local level, it can also be translated to regional and national levels to scale. ICM can have applications in the areas of natural resource management, climate-resilient development planning, disaster risk management, and so on. For example, World Bank-supported projects in São Tomé and Príncipe and Samoa combined satellite and community-based mapping to develop participatory plans and to guide decision makers about where to install future social infrastructure (e.g., roads, schools, and health centers), while at the same time increasing community resilience to natural disasters and climate change. World Bank-supported practices highlighted in box 8 are exemplary examples of how ICM might be scaled up.



BOX 8Examples of ICM in
World Bank-Supported
Projects

In **Indonesia**, ICM is used for disaster preparedness. Various governmental agencies in Indonesia attempt to estimate the impact of potential disasters (e.g., flooding and earthquakes) on local populations and infrastructure. Informed estimates are crucial for local governments and other stakeholders to prepare for future disasters and to strengthen community resilience. The development of these estimates requires accurate data, but access to such data is often limited. The Humanitarian OpenStreetMap Team (HOT), through a World Bank-supported project, seeks to fill this void. HOT leads community-mapping efforts to collect exposure data in Indonesia in an attempt to improve emergency preparedness in disaster-prone areas.

In urban areas, HOT engages and trains university students to map government offices, fire stations, police stations, schools, sports facilities, health facilities, religious facilities, and other points of interests. In rural areas, it collaborates with partners already working on data collection and mapping, supporting their efforts and providing training in OSM techniques. The data collected by HOT is fed into *Risk-in-a-Box* (impact modeling software offered by Trading Screen) to determine the effects of potential disasters on the mapped communities.^a

In **South Sudan**, the lack of accurate maps is a recurring problem. Absence of geospatial data on basic infrastructure makes it difficult for government, civil society, and development partners to initiate development projects and respond to a number of development challenges. In April 2011, the World Bank and Google organized a “mapathon,” attracting over 60 members of the South Sudanese diaspora. Participants learned to use Google’s online mapping tool, Google Map Maker, to map their home regions and add social infrastructure (e.g., schools, hospitals, and local businesses) that they were aware of. This remote ICM is expected to help the South Sudanese government and its development partners improve the provision of public services in the country.^b

a. For a full discussion, see Shkabatur 2014.

b. World Bank 2011.

Sources: Shkabatur 2014 and World Bank 2011.

Conclusion

The ICM process offers powerful and unique development opportunities to improve service delivery in poor and marginalized communities, to provide citizens with valuable skills, and to amplify their voices. From the perspective of governments and service providers, the ICM process not only allows them to better allocate funding through improved targeting and prioritization, but also enables them to use the interactive community map as an interface or entry point for constructive citizen engagement. The creation of an ICM can be considered a short cut on the otherwise long road toward improved service provision and empowerment. Thoughtful design and implementation of ICM optimizes the chances of successfully reaching desired development outcomes.

Useful Resources

- OpenStreetMap:** <http://www.openstreetmap.org>
- OpenStreetMap Wiki:** http://wiki.openstreetmap.org/wiki/Main_Page
- OpenStreetMap Blog:** <http://blog.osmfoundation.org/about/>
- OpenStreetMap Meetup Groups:** <http://openstreetmap.meetup.com/>
- Map Kibera:** <http://www.mapkibera.org/>
- Voice of Kibera:** <http://voiceofkibera.org/>
- Google Map Maker:** <https://www.google.com/mapmaker>
- Google MapUp:** <https://sites.google.com/site/mapyourworldcommunity/mapups>
- World Bank GeoCenter Geographic Information Systems (GIS) Unit:**
<https://geowb.worldbank.org/portal/home/> (internal link)
- World Bank GeoCenter Spark Group:** <https://spark.worldbank.org/groups/geocenter> (internal link)

Useful Resource at the World Bank

At the World Bank, the GeoCenter's GIS team provides support to task teams on ICM. For example, targeting World Bank practitioners, it periodically provides training on ICM and mapping in general (information is made available on the Spark page: <https://spark.worldbank.org/groups/geocenter>). The GIS team also provides technical support ranging from capacity building of community mappers to other types of implementation support on a cross-support basis. For details, check out the GeoCenter's GIS team's internal website: <https://geowb.worldbank.org/portal/home>.

References

- Hagel, John III, and Jeffrey F. Rayport. 1997. "The Coming Battle for Customer Information." *Harvard Business Review* (January).
- Hagen, Erica. Interview by Jennifer Shkabatur. October 2012.
- Hagen, Erica. 2011. "Mapping Change: Community Information Empowerment in Kibera (Innovations Case Narrative: Map Kibera)." *Innovations* 1 (6): 69–94.
- Iliffe, Mark. 2012. *Mark's Brain* (blog). <https://markiliffe.wordpress.com/tag/tandale/>.
- Kovačič, Primož. 2011. *Mapping: (no) big deal: Making the Invisible Visible* (blog). <http://mappingnobigdeal.wordpress.com>.
- Maron, Mikel. 2014. *GroundTruth Initiative* (blog). <http://groundtruth.in/blog/>.
- Maron, Mikel. Interviews by Jennifer Shkabatur. December 2011 and April 2012.
- McDonough, Meghan. 2013. "Google Map Maker vs. OpenStreetMap: Which Mapping Service Rules Them All?" *Digital Trends* (blog), July 28. <http://www.digitaltrends.com/computing/google-map-maker-vs-openstreetmap-id-editor/#!MP7Uo>.
- Shkabatur, Jennifer. 2014. *Interactive Community Mapping: Between Empowerment and Effectiveness*. Washington, DC: World Bank.
- World Bank. 2011. "World Bank and Google Support Development in South Sudan with Diaspora-driven 'Mapathon.'" Press Release 2011/461/AFR, April 28. <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:22902389~pagePK:34370~piPK:34424~theSitePK:4607,00.html>.







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