



Humanitarian  
OpenStreetMap  
Team

# Participatory Mapping Toolkit



A Guide for  
**Refugee Contexts**

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Prior to writing, an extensive literature review was done to evaluate what other similar guides existed. Inspiration was drawn from the Open Cities project, which is a collaboration between GFDRR, the World Bank, the Humanitarian OpenStreetMap Team, American Red Cross, U.S. Department of State, Humanitarian Information Unit, USAID, and Development Seed.

Additionally, the International Fund for Agricultural Development's Good Practices in Participatory Mapping, MapAction's Field Guide to Humanitarian Mapping, Pulse Lab Jakarta's From Urban Data Collection to Urban Design, and the United Nations Development Programme's Guide to Data Innovation for Development were helpful guides when composing the toolkit.

# INTRODUCTION TO THE TOOLKIT

This toolkit serves as a practical how-to guide for participatory mapping in refugee contexts. It provides organizations with the necessary **tools** and **processes** for responding to refugee situations by leveraging open and free map data for humanitarian assistance.

It is an actionable guide, aimed at a broad scope of actors interested in using mapping in their operations. The contents have been written in clear language, so that anyone can pick it up and begin to map for humanitarian purposes. In addition, each of the tools is self-contained so that users can decide which meet their goals and quickly develop the exact skills they need.


**Section One** introduces what participatory mapping is and why it is vital in refugee contexts. It gives important background information about the platform used to map and how to use the guide.

**Section Two** identifies important contextual factors that affect how organizations respond. It has been written for refugee contexts, and gives users an idea of what to keep in mind before getting started.

Finally **Section Three** is the heart of the toolkit - a series of tools and processes that offer practical solutions for humanitarians.

Today we are witnessing the highest levels of displacement on record with over 65 million people around the world forced from their homes. This guide provides new tools for addressing these crises, while drawing on best practices for refugee protection and alternatives to camps. Specifically, we have incorporated lessons from the U.S. State Department's Bureau of Population, Refugees and Migration and the United Nations High Commissioner for Refugees.


The guide has been prepared by Humanitarian OpenStreetMap Team (HOT), a non-governmental organization and global community working to map the most vulnerable places in the world for humanitarian aid and sustainable development. The toolkit is derived from knowledge learned in the field and is fundamentally responsive to people's needs.

The toolkit has everything you need to know to get started mapping. If you want to learn more, additional resources have been provided throughout for advancing your skills. For more complex steps and examples of the tools and processes presented, we recommend exploring in the  HOT Toolbox Wiki on Github.

**To access the HOT Toolbox Wiki visit:**

<https://github.com/hotosm/toolbox/wiki>

 A **tool** is a specific program used for mapping

 A **process** is a systematic series of actions used for mapping

# TABLE OF CONTENTS

## Section One: The Power of Participatory Mapping

■ <b>Maps and Geospatial Data</b> A Humanitarian Imperative.....	5
■ <b>What is Participatory Mapping?</b> A Means of Protection Mainstreaming.....	6
■ <b>Open Mapping and OpenStreetMap</b> A Movement and a Platform.....	7
■ <b>Why use OSM?</b> The Google Maps Question.....	8
■ <b>Trusting the Information</b> Reliability and Validation.....	8
■ <b>Accessing and Using the Data</b> Getting the Data and Using it.....	9
■ <b>Data Protection</b> A Human Right.....	10

## Section Two: Refugee Contexts

■ <b>Before Getting Started</b> Identifying Contextual Factors.....	11
■ <b>Factors</b> Planning and Analyzing.....	12
🏠 Political Climate	
⚠️ Crisis-type	
📱 Technology	
👤 Literacy	
♿ Accessibility	
■ <b>Community Entry</b> How do you enter?.....	14
■ <b>Participant Selection</b> Who do you work with?.....	15
■ <b>Safety and Security</b> Expanding Protection Space.....	16
■ <b>Data Usage</b> Ensuring Impact.....	17

## Section Three: Tools and Processes

<b>Remote Mapping</b> .....	19
(Digitization and Editing)	
1 iD Editor ✖️.....	20
2 Mapathon ©.....	21
3 Aerial Imagery ©.....	22
4 Tasking Manager ✖️.....	23
<b>Field Mapping</b> .....	24
(Data Collection)	
5 ODK, OMK, Kobo ✖️.....	25
6 Field Data Collection ©.....	26
7 Maps.me and OSMAnd ✖️.....	27
8 Managing Data ©.....	28
<b>Quality Assurance</b> .....	29
(Data Cleaning )	
9 JOSM ✖️.....	30
10 OSMCha ✖️.....	31
<b>Map Creation</b> .....	32
(Data Use and Analysis)	
11 Downloading Data ©.....	33
12 Export Tool ✖️.....	34
13 QGIS ✖️.....	35
14 Overpass Turbo ✖️.....	36

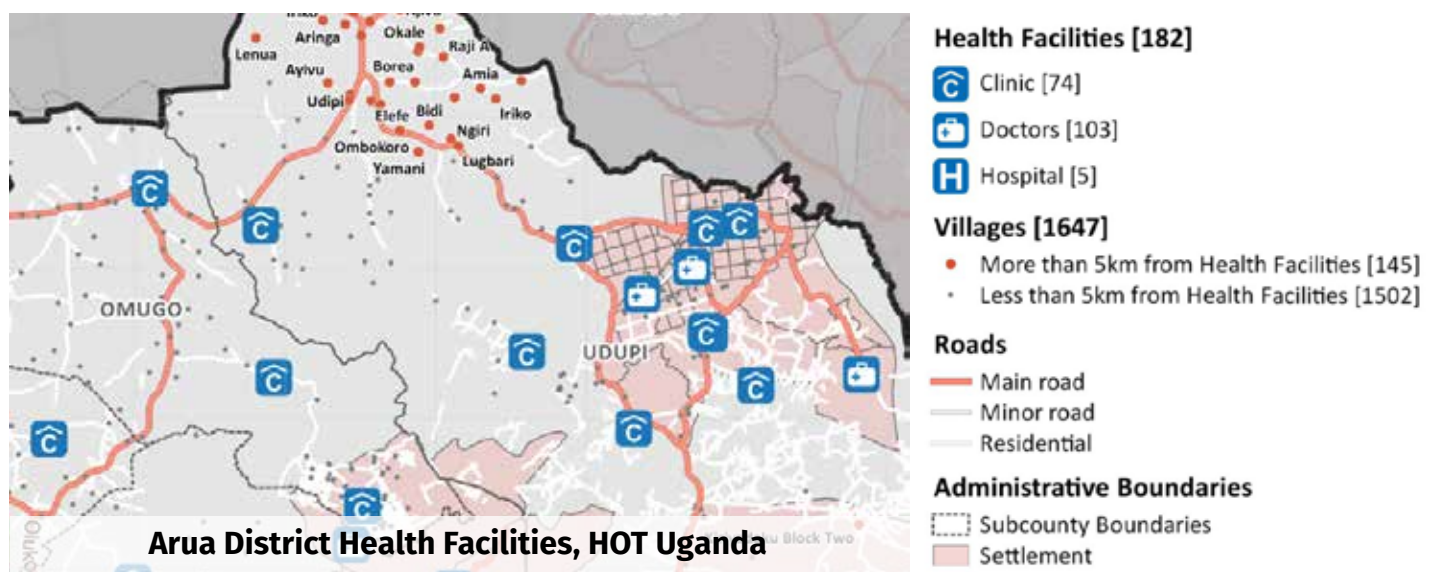
# MAPS AND GEOSPATIAL DATA

Each disaster or humanitarian crisis is unlike any other. While characteristics vary widely, as humanitarians, we often ask the same basic set of questions prior to deployment or entry into a crisis: What happened (or is happening)? Where did it occur? Who and what is most affected? Which are the areas, populations, or sectors with the greatest need? An understanding of “place” or location is at the heart of planning and carrying out a response.



Maps and map data serve as a fundamental tool in answering these questions. While fully understanding a location goes far beyond physical geography, basic maps and geospatial data can assist in developing a shared understanding among humanitarian actors in a response. Maps help us answer the question of “where” by indicating areas of forced displacement and areas where resettlement is occurring. They help us answer the question of “who”, indicating which communities and populations have been affected or are in need.

While maps often serve as a navigation tool for responders (and, more recently, refugees) navigating their new environments, they go far beyond this: in an era of limited humanitarian resources, they help us accurately prioritize, assess, and deliver. Physical geography is combined with human need to more effectively target response efforts and deliver on or exceed minimum humanitarian standards. If done right, the power of participatory mapping ensures that these standards are met, and that key protection principles are embedded within the response.



## What is GIS and GPS?

The toolkit focuses primarily on the use of geographic information systems (GIS) to achieve these goals. A GIS is a computer system designed to collect, store, edit, analyze, share, and display spatial or geographic data. It relies on a coordinate system, that defines the location of a point - such as the Global Positioning System (GPS)\*. This is a satellite-based navigation system, that can work in any weather condition, anywhere in the world, 24 hours a day. GIS therefore helps represent data from the real world in the form of an informative, understandable and accurate map with the help of mapping software.

**\*Note:** You cannot receive GPS signals indoors. GPS receivers are able to receive signals outdoors, unobstructed by trees, buildings etc. from the visible portions of the sky.



# WHAT IS PARTICIPATORY MAPPING?

Participatory mapping is the creation of maps by, and using input from, local communities. In a refugee context it is a way to incorporate **protection principles** and promote meaningful access to information.

Participatory maps are visual representations of what a community perceives as its place and the significant features within it. They are based on the premise that local communities possess expert knowledge of their environments.

Often different organizations support this process, but an emphasis is put on providing skills for the community to create maps themselves in order to represent the spatial knowledge of community members.

- 1 Prioritize safety and dignity and avoid causing harm** - by gathering information directly with and for refugees there is regular communication about the impact of interventions, minimizing any negative effects to people's vulnerability.
- 2 Meaningful access** - open data is a philosophy that advocates certain data to be freely available to everyone without barriers, enhancing access to assistance and services. This is in contrast to data sets that are collected in proprietary systems that are not easily accessible.
- 3 Accountability** - participatory mapping is a practical mechanism that can keep service-providers accountable. Refugees themselves are able to directly report on the adequacy of services and address concerns openly.
- 4 Participation and empowerment** - this is the heart of participatory mapping. Community members build their own self-protection capacities and claim their rights by being both producers and users of data. Participatory mapping itself is a tool for empowerment.



Given that there are many components of participatory mapping, it is best to think of it as a kind of lifecycle. Revolving around the Community it involves Remote Mapping, Field Mapping, Quality Assurance, and Map Creation. Although there is a general process to mapping, you can begin at different points depending on your needs.

**The toolkit enables humanitarian to mainstream protection in their operations because the principles of participatory mapping reinforce and ensure the principles of protection.**

# OPEN MAPPING AND OPENSTREETMAP

Open mapping is a global movement to create free and open geographic data. The platform used for this is OpenStreetMap (OSM) – a free, editable map of the entire world being built by its users.



You can think of OSM as the “Wikipedia of maps” – it is an online database and global community of over 4 million registered users. This community collaborates to build a free and open map of the world to which anyone can contribute and which anyone can use in their own context.

The first organized use of OSM in disaster response was following the 2010 Haiti Earthquake. As high-resolution imagery of the affected area was made available to the public, over 600 individuals from the global OSM community began digitizing the imagery and tracing roads and other infrastructure. They made what quickly became the most detailed map of Port-au-Prince in existence, which was then used by search and rescue teams to help route supplies around the devastated capital and to coordinate many other aspects of the response and reconstruction effort.

## Haiti Earthquake Damage on OSM



It became clear that open mapping could be of tremendous benefit for humanitarian purposes. The experience of OSM Haiti demonstrated that volunteers who collaborate around open data can quickly create accurate and trusted information. Now, that theory is being put into practice by HOT teams in countries around the world, and in refugee contexts such as Uganda and Turkey.

OSM allows organizations to engage in participatory mapping, creating a bridge between communities and services. Maps are simply a means of conveying information and of communication – when used in refugee contexts they can help expand the amount of protection space available to vulnerable populations.

## Getting an OSM Account

Some of the tools in this kit require an OSM account. To sign up, go to [OpenStreetMap.com](https://openstreetmap.org) and click the Sign Up button. Most people use their email to sign up, but you may also use a third party to log in. You then need to choose a user name and a password. You will then be asked where you reside in the world, and be given an option to make your contributions part of the Public Domain. Once you've read the agreement click Agree. You will be sent a confirmation email – sign in and click the link. Now you'll be taken to a welcome page with some helpful information. Now you can start mapping!



“Two Minute Tutorial: Signing up for OpenStreetMap”

<https://youtu.be/suk8uRpIBQw>

## WHY USE OSM?

The most common question people ask is: *Why would you use OpenStreetMap if there is Google Maps?* These platforms have many similarities and address the same basic human need of knowing where things are. In short, OSM represents an open approach to how data is collected and distributed, which makes it fast, free, and flexible; an ideal combination for humanitarians.



**Fast:** In the case of Haiti, the OSM community needed just a few hours to map earthquake affected areas from satellite imagery, in contrast to commercial maps that had no way of responding in such a short period. The thousands of active volunteers around the globe are what made this possible, and the fact that every update is immediately visible to all other users and is version controlled. In many cases, the OSM community has been able to achieve even higher detail than any other map source.

**Free:** The very idea behind OSM was to solve the problem of restriction by using a Wikipedia model. Each edit you make in OSM is owned by you and the community, whereas each change made in Big Name map providers is owned by them. Data in these other maps is copyrighted and so it can be subject to licensing fees and contractual restrictions. Advertising companies use geographic search results and location information for marketing purposes – they choose which data is relevant to you rather than displaying what is actually around you. OpenStreetMap is, and always will be, available for free.

**Flexible:** Finally, OSM is ready for any kind of operation. Many major organizations are choosing OSM for their maps because it allows for customization based on need. It has been used to collect functioning and nonfunctioning water facilities in northern Uganda, to map hundreds of thousands of shelters in Bangladesh, and to plan logistics for a Yellow Fever campaign in the Democratic Republic of Congo. It allows access to all of the map offline and can be formatted in local languages.

**More to the point, these features of OSM make it appropriate for a refugee context where communities and people affected by crisis should be at the center of humanitarian action. This approach has been phenomenally successful at creating maps in under-mapped places, serving critical needs.**





## TRUSTING THE INFORMATION

Perhaps the second most common question is: If anyone can access and edit data, how can you trust the information? There is both the fear that people with bad intentions will make malicious edits, as well as the fear that new mappers will enter incorrect data. These are valid concerns and the quality of data is essential to its utility.

A goal of the open data movement is that certain data should be freely available, but this does not mean at the expense of accuracy or levels of control. In order to trust information, it should be validated – it should undergo review to ensure that it is correct and useful.

Organizations can choose the degree to which they validate data, before ever uploading it into OSM or making a map. For example, after data is collected in the field it can be evaluated offline and cleaned before being uploaded. In the tools below we explain several ways of doing this.

Within OpenStreetMap changes aren't forever. Any errors can be undone, and there are historical backups of the data. All edits made to the map are recorded in the database with the ID of the user making the change along with a timestamp. Users that vandalize the map can have their editing rights suspended or removed entirely. Overall vandalism is extremely rare, and the large user base means that the OSM community is largely self-correcting.

With more participants the map data becomes better over time. Private sector companies – including some of the largest technology firms – are moving to OSM. Therefore, there is increased incentive and tools being used globally to monitor changes and correct errors. With more commercial use the map will become that much better for humanitarians.


Above all, the strength of participatory mapping is in local knowledge. Ultimately the data is coming from local communities who are best able to represent their own information and provide more accurate information than could be created by an outsider to that community.



## ACCESSING AND USING THE DATA

So now you want to get the data. There are many ways to download the data from OSM, but it is important to consider how much you want to access and which tool suits your purposes.

In theory, you have access to the entire planet - but this is a huge amount of data. You can download the full dataset by going to [Planet OSM](#), but more likely you will select a specific area for download.

For instance, you can export data directly simply by clicking the  button on OpenStreetMap. If you do this you are given the option of arranging a bounding box around the area you are interested in downloading by clicking “Manually select a different area.” This is then downloaded as an .OSM file.

There are lots of excellent export resources developed by third party providers - in the tools section we will cover three of these in depth: the Export Tool, Humanitarian Data Exchange (HDX) and Overpass Turbo. All of these allow you to make a more targeted selection of the area you would like to export data for, and export to various well-known and widely used file formats, such as ESRI shapefile and [GeoPackage](#). Once you have downloaded the data there are an equal amount of tools for actually using the data - from analysis to creating maps.

The information collected and added to the OpenStreetMap platform is distributed with the Open Database License (or [ODbL](#)). This allows anyone to freely copy, distribute, and adapt OSM data. The only requirement is that OSM be given credit in any adapted works, and if the original data is altered, the result should be made available under the same license.

### For more information

[https://wiki.openstreetmap.org/wiki/Downloading\\_data](https://wiki.openstreetmap.org/wiki/Downloading_data)

## DATA PROTECTION

The first protection principle states that organizations 'do no harm' as a result of their actions. Therefore, when collecting data and creating maps, organizations must ensure the data security for vulnerable populations.



Some data is more sensitive than others and projects may lessen the issue upfront by avoiding the collection of **personal data** altogether. Organizations cannot share someone's personal information – they do not have this right. However, even with generic data collection, organizations should be aware of the meaning of data protection and act with sensitivity.



The basis of a refugee's right to privacy and data protection is enshrined within international human rights law. Article 12 of the Universal Declaration of Human Rights *guarantees a refugee's right to protection from any arbitrary interference with their privacy.*

Refugees are especially vulnerable. Having been forced to flee persecution they remain vulnerable throughout their journeys and even when settling into a new environment. They have had their personal information digitally collected and processed many times over by humanitarian agencies. From camps, processing centers, NGO offices and programs, registration of those assisted is common practice.

If data gets into the wrong hands, it could represent a threat to refugees' safety and wellbeing. The realities of humanitarian operations are such that organizations often bend to the will of their host states, with government priorities overriding humanitarian concerns.

We recommend organizations adopt codes of conduct and operational procedures for the ethical and principled use of information, especially personal data. Perhaps the easiest way to do this is by adopting principles for the use of information in humanitarian crises.

Throughout the toolkit we keep these principles in mind. Data protection is a human right.

**For more information see the Handbook on Data Protection in Humanitarian Action**

<https://www.icrc.org/en/publication/handbook-data-protection-humanitarian-action>

**Personal Data:** Any information relating to an identified or identifiable individual, whether by a number or other factors specific to the individual.

## BEFORE GETTING STARTED

In Section Two we identify important contextual factors that should be taken into consideration before, during, and after operations. The impact of participatory mapping can be negative as well as positive, and the success of a project depends on these factors.

First and foremost, we are focusing on **refugee** contexts. A refugee is someone who, by definition, has been forced to flee his or her country because of persecution. Refugees are an especially vulnerable group, and are entitled to specific rights under international law. The application of these rights is directly connected to the contexts in which refugees live.



In the toolkit we are covering a range of refugee contexts, in both urban and rural settings. Two areas we are not particularly focused on are active conflicts and formal refugee camps. Our experience is largely related to refugee-hosting countries, but it does not mean that these tools could not be of service in other situations.



Most refugees today are not in the camps of yesterday. Over half of the world's refugees are now residing in cities. It is UNHCR's policy to pursue alternatives to camps whenever possible. For instance, Turkey is home to more than 3.7 million refugees, yet over 90% of them live outside of camps.

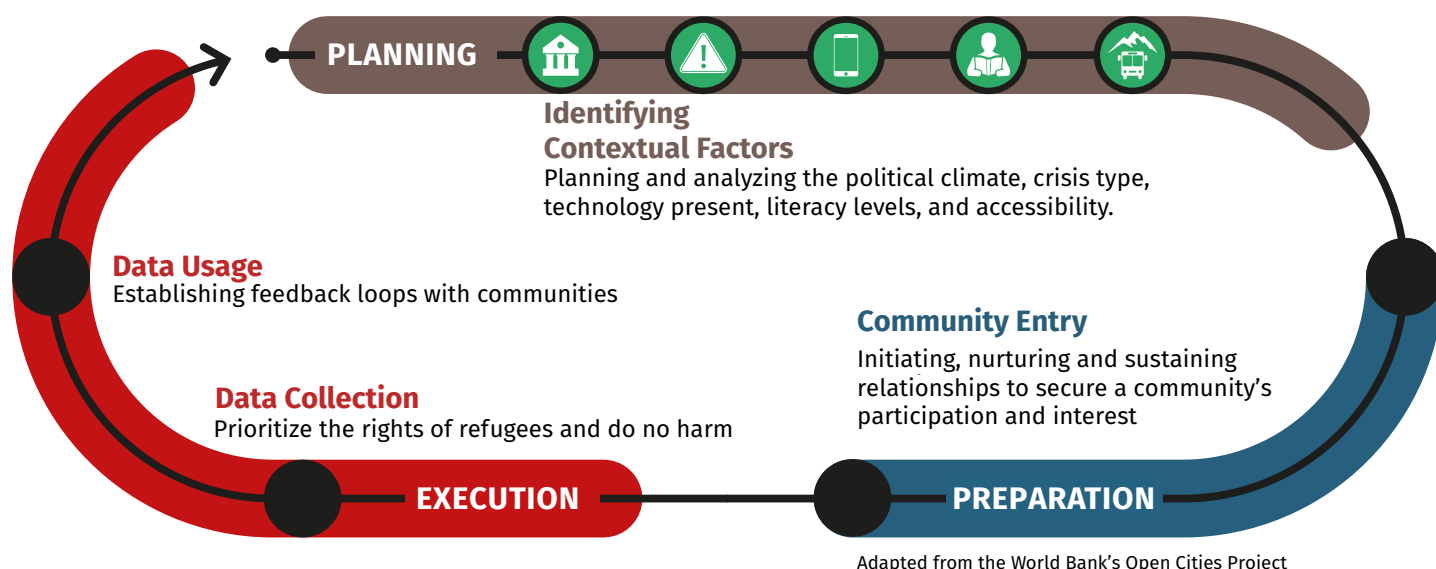


Even though policy has shifted towards alternatives to camps, crises inevitably lead to camp-like settings. In Uganda, for example, the country grants refugees land to build a home and gives the right to travel and work. Yet, this has still led to the creation of Bidi Bidi Settlement, said to be one of the largest refugee camps in the world hosting nearly 300 thousand refugees.

These two contexts are vastly different, and require unique approaches. How an organization engages in participatory mapping always depends on a series of interacting factors. Some are beyond the control of any organization, while some can be influenced in the project phases and by the tools and processes used.

Next we discuss important factors, how to work with communities and to organize your mapping project. The aim is to benefit refugee populations, so we also emphasize the need to keep refugee communities involved in the process along with humanitarian actors.

## Mapping Process Diagram



**Political Climate** - One of the most significant factors for a mapping project is the political climate in which it takes place. A hostile climate can make it extremely difficult to carry out operations. Governments may either support or oppose refugees and humanitarian organizations within their country.

- **An enabling or disabling environment** - Is the government receptive to the refugees it is hosting? Are they cooperating or constraining humanitarian organizations?
- **Legal framework** - Is there legislation established to protect the rights of refugees? Are there laws allowing citizen data collection?
- **Socio-economic conditions** - What is the level of economic development and how does this affect the society?
- **Host community acceptance** - What is attitude of the citizens towards the refugees they are hosting?



**Crisis Type** - An important related factor is the type of crisis you are working in, and what phase of emergency it is. The most basic question an organization needs to ask is whether or not it is a secure environment. The toolkit does not give guidance on active conflict areas.

- **Phase of emergency** - The lines are not always clear, and on the ground things are much blurrier. Still, there are at least four main phases of an emergency situation, each with distinctive features. These include:
  - **The Preparedness Phase** - the period before the humanitarian crisis, where use of early warning signals can help avert crisis or prepare the response
  - **The Acute Phase** - the outbreak of a crisis with massive destruction of lives and property, along with population displacements
  - **The Chronic Phase** - prolonged crisis, displaced populations are settled in temporary locations, whether camps or within host communities
  - **The Post-Crisis Phase** - a return to (relative) peace and security, a period of reconciliation, recovery, resettlement, and reconstruction



## FACTORS



**Technology** - Most of the tools and processes are connected to computer-based Geographical Information Systems, therefore the availability and state of technology is important to consider.

- **Infrastructure** - Is there a foundation of technology that supports an organization? This can be related to actual hardware, software, networks, data centers, or the presence of electricity.
- **Imagery Available** - Is there good quality, high-resolution imagery available, from satellites or other sources? Using aerial imagery as a background layer is considered to be the easiest way to map, particularly when many buildings need to be digitized.
- **Internet Access** - Is there an Internet connection? What is the amount of bandwidth or level of connectivity? Many of the tools rely on Internet access. If you don't have an Internet connection, POSM may be a potential solution.
- **Smartphones** - Does the community have smartphones? Though not essential by any means, mobile data collection is a recommended method of field mapping and is done using smartphones.



**Literacy** - Spatial, or map literacy, isn't universal. Communities understand space differently, and organizations should not assume that people understand maps. Despite this, spatial literacy is fundamental and is an important skill to bring to communities.

- **Map Literacy** - Are communities aware of the basic conventions of maps, can they read them, and do they use them?
- **General Literacy** - Does the community have the ability to read and write? Higher educational levels can assist the mapping process.



**Accessibility** - Being able to reach populations affected by crisis is not always easy. It is, however, a basic prerequisite to effective operations, and having difficult terrain or lack of transportation can make a mapping project more complicated.

- **Terrain Accessibility** - Are areas you want to map physically accessible?
- **Transportation** - How will you reach the site? Is there public transportation or do you need to hire vehicles?

**Other:** Beyond these categories there are other factors you might want to consider:

**Culture:** How can you approach the local community with cultural sensitivity?

**Partners:** Who is there to work with? Are there other organizations on the ground and open to collaboration?

**Gender:** What is the best way to promote gender equality in your operations and support all people affected by crisis? Identify the specific needs, capacities and priorities of women and girls, men and boys.

**Urban or Rural:** Are refugees in one place with access to resources, or are they dispersed in a more rural setting?

## COMMUNITY ENTRY



Community entry is the process of initiating, nurturing and sustaining a relationship in order to secure a community's participation and interest in a program. Here we are speaking mainly of the refugee community\*, but equal attention should be paid to the host community.

A few practical questions can guide us: How can you involve a refugee as part of a project? How do you enter a community for the first time – and do you need permission?

The most important thing to keep in mind is how refugees can be part of the work as members of projects. They must be given **ownership**. Before starting a project, objectives and strategy should be shared with community members. They should give feedback, and this should be incorporated. If refugees are not given roles in the project, both in terms of strategy and implementation, you will face problems down the road.

Refugees are used to seeing new projects with skepticism, and for good reason. Many organizations and individuals use humanitarian crises as opportunities to exploit people – whether deliberately or through incompetence. It is crucial to build **trust** and **respect** between the organization and community.

Though protected under international law, refugees in host countries are subject to municipal and national authorities. The presence of refugees can put pressure on host communities, which often fuels prejudice. Therefore, the final aspect of successful community entry is taking into account the host community's concerns. Permission should be sought from local authorities – they may or may not endorse the project, but should not be ignored.

### Tips:

- Have a consultation meeting to gather feedback from refugees
- Include a community member as part of the team
- Create a WhatsApp group to communicate quickly
- Articulate benefits to host community
- Work through partners

\*However, no community is homogenous. It would be more accurate to refer to refugee and host communities.

## PARTICIPANT SELECTION

So, how do you select the right individuals to work with?  
There are three basic principles:

### Community

Active participation by the affected population is essential to providing assistance that best meets their needs. The first criteria for participant selection is being from the local community.

### Motivation

Participants should have strong reasons for working. Motivations vary, but one of the strongest factors is being emotionally invested in a project. Feeling like you are making progress in meaningful work is a powerful motivator.

### Non-discrimination

Non-discrimination – no one should be discriminated against on any grounds of status, including age, gender, race, color, ethnicity, sexual orientation, language, religion, disability, health status, political or other opinion, national or social origin. None of these should be criteria in determining participants.

Traditionally the term “beneficiary” has been used only to describe those affected by a crisis. Now it is widely recognized that beneficiaries should also be active participants in determining their own fates. This is also the core of participatory mapping – beneficiaries should be actors and partners in humanitarian projects.



**Payment** As a general rule it is good practice to cover costs of active participants. For example, if volunteers join your team as field mappers they should be paid per diems to cover transportation and food. Projects rely on the data these volunteers collect, so it is an integral part of the work and should not be treated lightly. Of course unpaid volunteers can and should also be active participants, but organizations must judge when the line is crossed into work to avoid exploitation. Lastly, be mindful that even seemingly small payments can affect power dynamics in refugee communities and households.



**Gender** Organizations should be sensitive to gender but avoid using it as criteria to determine participants, aligned with the non-discrimination principle. Within families, paying one member but not another can have unintended consequences – either positive or negative.

### Tips:

- Establish a “refugee council” who can help to represent the community – people you can trust who have deep cultural knowledge
- Take into consideration pre-existing social, cultural and political dynamics or practices that may marginalize or exploit certain groups

## SAFETY AND SECURITY



In accordance with the first protection principle – do no harm – organizations must prioritize safety, especially of refugee populations. In non-camp situations one of the key goals is expanding the amount of protection space available.

The idea of ‘protection space’ does not have a legal definition – it is a concept that means the extent to which a conducive environment exists for the internationally recognized rights of refugees to be respected and their needs to be met. In most refugee situations, protection space is not static, but expands and contracts over time according to changes in the political, economic, social and security environments.

Each context is so different that it is difficult to make specific recommendations for safety. Organizations should establish contingency plans to address the different types of security incidents that may occur. Staff should coordinate all responses to such incidents so as to safeguard the rights and well-being of refugees, and ensure that staff members and volunteers are not put at risk.

For operations, the key to effective safety and security management is the creation of a culture of security. Each staff member and volunteer has a responsibility for their own safety and security, and that of other team members.

It is possible that in a conflict situation making a community visible will do more harm than good. At the end of the day, each organization must determine whether they should be mapping at all.

### Tips:

- Know the emergency services numbers for the country of deployment
- Always have access to a first aid kit; teams should have someone trained as well
- Let people decide where they work and feel most safe in
- Avoid performing field work alone
- Always obtain relevant permits, licenses, permissions, and visas for work
- Develop a country specific security plan; and incident and suspicious activity reports
- Establish a process for regular monitoring and review of hazards
- Sign up for travel alerts from your embassy



## DATA USAGE: ENSURING IMPACT



Beyond all of the various factors one must keep in mind when engaging in mapping projects, organizations should never lose sight of their original goal. The first humanitarian principle states that, “The purpose of humanitarian action is to protect life and health and ensure respect for human beings.” More to the point, data is only impactful insofar as it is used – ensuring that it actually benefits refugees should always be kept foremost in mind.

However, this is much easier said than done. Within the humanitarian community there is no accepted definition of ‘impact’. At the same time, its importance has moved up the agenda in recent years. Donors expect you to demonstrate results even when assessment of impact is, in fact, consistently poor. There is also the problem that when attempting to measure impact it can restrict the focus to the intended effects of an intervention, rather than incorporating the wider indirect and unintended consequences.

Despite these complexities the best way to ensure impact is to directly involve refugees within projects. Ideally they will be involved at all stages of the project cycle, but if this is not feasible they should at least be consulted beforehand and shown the products of the data afterwards. The following are some tips for doing this:

### Tips:

- Consult with refugees from Day One
- Refugee voices should help design the data model (what information is collected)
- Be mindful of language barriers – a great potential use of OSM is in providing information in the native language of refugees
- Establish regular feedback loops with refugees by visiting community centers to share mapping products
- In terms of information dissemination, participatory mapping projects should aim to develop strong networks with refugees

**Read the Northern Uganda Case Study to learn about how refugees were incorporated into a participatory mapping project to ensure impact in Northern Uganda.**



In Section Three we introduce fourteen tools and processes that can be used in participatory mapping projects. The diagram above shows the different categories of the mapping toolkit. It is divided into four different phases, which flow into one another but do not have a required order.

## REMOTE MAPPING (***DIGITIZATION & EDITING***)

Remote mapping is the process of modifying or adding in new data to areas from a distance. Usually it involves the use of a software program, tracing information from satellite imagery, and then uploading the results so that it can form part of the map data. Using imagery to draw points, lines and shapes on the ground is also called **digitizing**. Some people also simply call this process ‘armchair mapping’ because you can contribute without leaving your chair.

The objective of remote mapping is to cover a large area quickly, obtaining a high-level overview of what is actually on the ground. It allows people to directly contribute to a humanitarian project even if they cannot be physically present in the field. This also means that it is an entirely safe process, since it can be conducted from any location with the necessary technology.

In general, the first step is often identifying an area that needs to be mapped. Then it is important to determine if there is suitable imagery. A project can be created covering a certain area, and the level of detail required and urgency should be specified. The work is divided by remote mappers who each map a part of the overall area. This is checked by a second remote mapper who makes sure it is correct – a process called **validation**.

While there are many advantages of remote mapping, there are also some disadvantages. Data accuracy tends to be less when users do not physically visit the places they are mapping, favoring quantity over quality. If you are contributing to an area where data already exists in OpenStreetMap, and where local people have been contributing, you can even undo the hard work of field mappers if you do not follow instructions. The last problem is mitigated by following some basic guidelines:

- Learn to recognize valuable data – figure out who has done what, and avoid changing data that is accurate
- Specify what sources you are using – you can do this by adding the proper `source=*` tag in the changeset comment
- Remember imagery can be wrong – it can either be misaligned from reality in one particular direction. Rather than moving the data, realign your background imagery layer to match
- You can leave a `fixme=*` tag on elements, or a `note=*` tag to make a comment for validation
- When in doubt, assume that existing data has been mapped by local people on the ground
- In general, you can be more relaxed about remote mapping in areas of the world which are more remote, or otherwise have less pre-existing data

“

There are no perfect mappers and although you – and everybody else – will do your best to avoid mistakes, mistakes are inevitable.

”

### For more details:



Remote Mapping at LearnOSM (<http://learnosm.org/en/coordination/remote>)

# 01 iD EDITOR



## A simple in-browser editor for OpenStreetMap

### Key Steps For Using iD Editor:

1. Open your Internet browser, and go to the OpenStreetMap website at <http://www.openstreetmap.org>
2. Log in using your OSM account  
click the  button the top right corner
3. Go to the place you want to edit – either by entering the location in the search box, or by panning and zooming to the area you wish to edit. You can pan by holding the left mouse button and dragging the map to your desired area.
4. Click on the small arrow next to . Then click **Edit with iD (in-browser editor)**
  - a. For first-time users there will be a prompt for a walkthrough that begins inside the editor – it is helpful practice for learning the basics, and learning new words and concepts (it is always accessible through the **Help** icon)
5. You can add **points**, for example, placing a well or latrine in your area entering in relevant known details. You can draw **lines**, for example adding a road that hasn't been drawn. Or you can draw **areas**, for example tracing a building that hasn't been digitized.
6. Note: nothing will be uploaded to OSM until you click the **Save** button. You can enter any comments about your edits, and if you are uncertain there is also the option "I would like someone to review my edits" for extra validation.
7. Now you are ready to edit the map!

#### For more details:

Learn iD Editor (<https://learnosm.org/en/beginner/id-editor/>)  
iD Editor Wiki (<https://wiki.openstreetmap.org/wiki/iD>)

### Short Summary:

The iD editor is a user-friendly tool that allows you to directly make changes in OpenStreetMap.

### Skills and Technology Needed:

- Computer
- Internet connection
- OSM account

### Contextual Factors:

The iD editor can be used in most situations. One area of concern, however, is making sure not to enter any information which could be potentially harmful to refugees. For example, sensitive information about nationality, religion, or gender should not be uploaded into OSM.



# 02 MAPATHON



## A coordinated mapping event

### Key Steps for Hosting a Mapathon:

1. There is no one right way to organize a mapathon. It may depend on what resources you have available, as well as what your priority is – do you simply want to add data to the map, or introduce people to a project?
2. Once you have determined your priority, it is helpful to find a co-organizer as a well-run mapathon requires preparation beforehand. It can be helpful to work with other groups, and include them in the process.
3. Pick a location, whether a university, library, or an office. Keep in mind it is important to have a strong internet connection at the location to avoid connectivity issues.
4. Do outreach with local organizations and the community to invite people. Use email lists and social media to get the word out about the event. It is helpful to ask for RSVPs so you can have any idea of how many people will be attending.
5. At the event introduce OpenStreetMap and the project you will be assisting with. Give an example of another case where a mapathon has had an impact to help motivate people. Often you will have new mappers who have no background, and mapathons can be positive experiences for building a community of mappers.
6. Register new users on OSM, and teach the basics of the tools the participants will be using.
7. Get mapping! Be ready to answer questions and help out. It is best to create an open environment where mappers share challenges and solutions.

**There are excellent in-depth guidance materials on hosting and managing a mapathon online, see below.**

#### For more details:

- Missing Maps (<https://www.missingmaps.org/>)
- Manage a Mapathon (<http://learnosm.org/en/coordination/mapathon>)

### Short Summary:

A mapathon is an organized gathering of people to add data to OpenStreetMap. It is usually held inside but can also be outside. It can be a project to improve the map in your local area, or to help response teams on the ground during an emergency, or a Missing Maps Project for ongoing or future humanitarian responses. Hosting a mapathon is relatively simple and requires no special skills or previous mapping experience.

### Skills and Technology Needed:

- A coordinator who can train the participants
- A space that fits your group, tables and chairs
- Computers for every participant, mice
- Wi-Fi

### Contextual Factors:

A mapathon can quickly digitize an area for response, giving humanitarians a better idea of where a community is and what is on the ground. It does rely on the presence of technology – at least computers and an internet connection. Additionally, there needs to be imagery available in order to map effectively. It also requires advanced planning, to coordinate and prepare for the event.

# 03 AERIAL IMAGERY

## Finding, assessing and using imagery



Satellite imagery highlighting the differences of urban and rural settings, from Istanbul, Turkey; PTP Camp, Liberia; Mvepti, Uganda and Cox's Bazaar, Bangladesh.

### Short Summary:

Aerial imagery is a term used to describe photographs that are taken from the sky. This can be done from airplanes, drones, helicopters, or even kites and balloons, but the most common source of imagery comes from satellites orbiting the Earth. These photos can then be manipulated so that they can be used in GIS software.

### Contextual Factors:

One of the most basic questions to ask in a humanitarian context is what is the state of the available imagery? Do you need up-to-date imagery? If there has been a rapid evolution of the situation on the ground, for instance with the emergence of refugee camps, new imagery needs to be obtained. If there is not satellite imagery available, does the host country have legislation allowing UAVs, and what permissions are required?

**Finding:** The easiest starting point is to check for imagery in iD Editor. Simply click on Background Settings to see what imagery is available. The imagery is provided for free and is licensed. Another option is to look at Discover, DigitalGlobe's imagery search tool. If you need other sources of imagery another option is to either capture it yourself using a drone, or by finding aerial imagery uploaded by others.

**Assessing:** It is important to assess what is the best imagery for your purposes. Experiment between imagery to see which is better, some may be out of date and not reflective of the current situation on the ground. You need to use your own personal judgement to determine which sources best match your needs.

**Using:** There are many different ways you can use imagery, as well as different tools that rely on imagery. For instance, in Cox's Bazar humanitarian are using drones to assist with site planning and management.

#### Common Sources of Aerial Imagery:

- Bing Aerial Imagery
- DigitalGlobe Imagery
- Esri World Imagery
- Custom (drones)



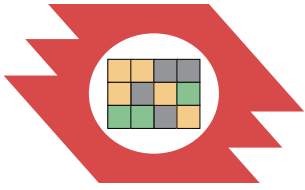
OpenAerialMap is a set of tools for searching, sharing, and using openly licensed satellite and unmanned aerial vehicle (UAV) imagery. OAM offers a worldwide “canvas” on which various organizations can contribute to a patchwork of imagery. Open imagery can be critical for responding to crises – OAM makes it easy to host and access imagery for humanitarian response, which is custom and up-to-date.

#### For more details:

- Aerial Imagery at LearnOSM (<http://learnosm.org/en/josm/aerial-imagery>)
- Discover by DigitalGlobe (<https://discover.digitalglobe.com>)
- OpenAerialMap (<https://map.openaerialmap.org>)
- GEOSS Portal (<http://www.geoportal.org>)
- USGS Earth Explorer (<https://earthexplorer.usgs.gov>)
- Map Compare (<https://tools.geofabrik.de/mc/> or <https://mc.bbbike.org>)

# 04 TASKING MANAGER

## A tool for collaborative mapping



### Short Summary:

The Tasking Manager is a mapping tool designed to divide up a mapping project into smaller tasks that can be completed rapidly with many people working on the same overall area. This also avoids conflicts or duplication of people working on the same project. It shows which areas need to be mapped and which areas need to be validated. The tool allows monitoring of the overall progress and helps improve the consistency of mapping. It can be used either by an administrator who manages a project, or by mappers working to complete an area.

**Note:** To request project manager permissions, send an email to either [info@hotosm.org](mailto:info@hotosm.org) or [mapper-support@hotosm.org](mailto:mapper-support@hotosm.org) and they will make sure you get set up.

### Skills and Technology Needed:

- Computer, Internet connection, OSM account
- How to create a GeoJSON (optional)
- How to create a JOSM Preset (optional)

### Contextual Factors:

Here we are specifically referring to the HOT Tasking Manager, which is only used for emergency situations that are in the preparedness or acute phases. The goal of this is to focus on the most urgent crises, most of which involve displacement. The steps below describe what to do if you are an administrator managing a task.

### Key Steps for Creating a Task:

1. Open your Internet browser, and go to the Tasking Manager at <https://tasks.hotosm.org>
2. Log in using your OSM account – click the Login button the top right corner, which will ask you to authorize access to your OSM account – click Grant Access
3. Now that you have logged in click on the arrow next to your username and select Create new project
4. Define your Area of Interest on the map, either by drawing it, importing a file, or using an OSM file; you should be familiar with the geographical area of the task
5. Choose Tasks Type – either select a square grid or arbitrary tasks
6. Set Task Sizes – split the area into larger or smaller tasks. You will need to decide an appropriate size, depending on the amount of features that need to be mapped.
7. Trim Project – cut the task grid to only the Area of Interest, this is optional
8. Review – here you will be able to see what your project looks like and how many tasks you have created
9. Now you have created a project! You can now enter a detailed description and instructions and then publish

#### For more details:

- OSM Tasking Manager Wiki ([https://wiki.openstreetmap.org/wiki/OSM\\_Tasking\\_Manager](https://wiki.openstreetmap.org/wiki/OSM_Tasking_Manager))
- Learn How to Use the Tasking Manager (<https://tasks.hotosm.org/learn>)



## FIELD MAPPING (*DATA COLLECTION*)

Field mapping is a survey technique to capture the details of one's physical surroundings. Usually this involves going out to map a level of detail that cannot be seen from aerial imagery. This is necessary for creating a detailed and accurate map.

There are many different situations for which this could be useful. For example, you could collect data on where the hospitals and clinics are located in a certain area, and identify which ones specifically offer maternal care.

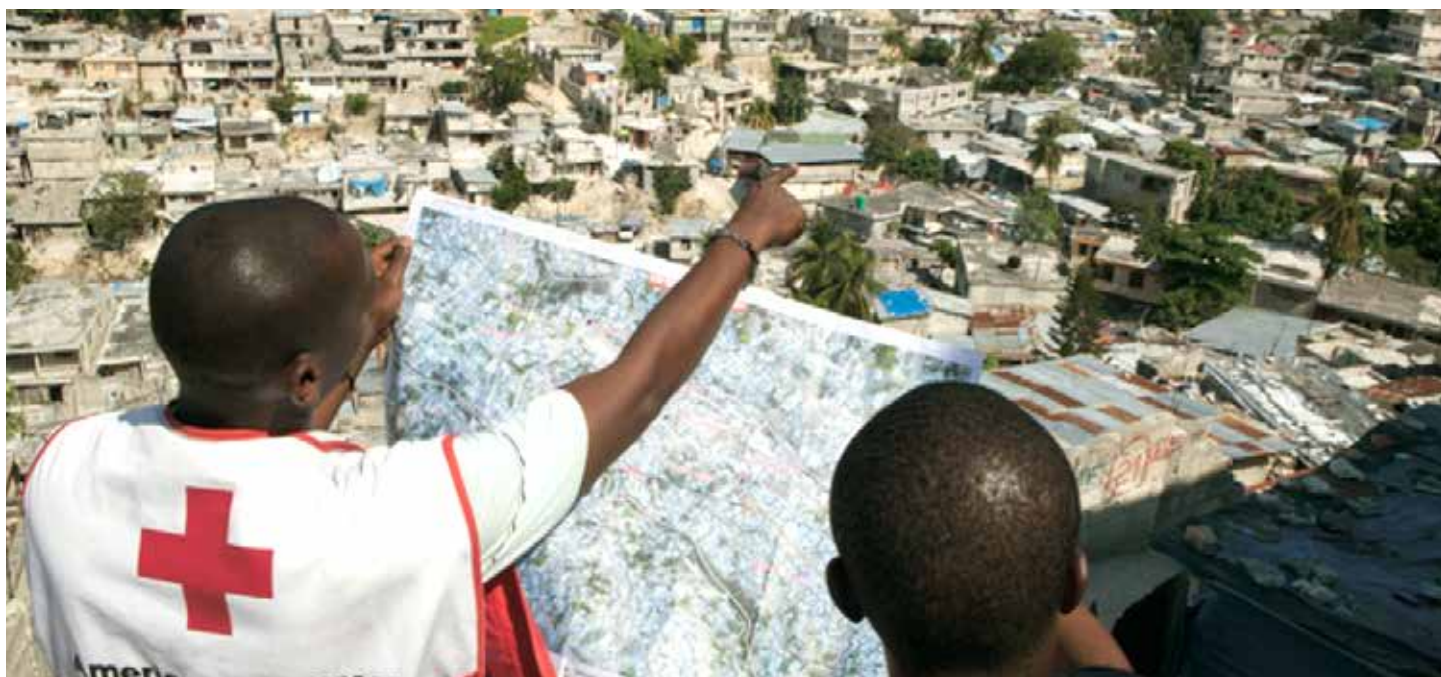


Or you could collect the waterpoints and households in an area to find out which households are more than 1 km away from a potable water source. You could even collect the names of streets to ease navigation for your logistics.

The goal is to examine and record an area's features so as to create a map. By going in person you are “ground truthing” the data, which means that you are directly observing it, ensuring its accuracy.

1. Decide what data you plan to collect. What data do you need to solve or improve the problem you're working on?
2. Define the area for your field mapping. If applicable, divide it between mapping teams.
3. Prepare materials for the field: reference map, GPS or mobile phone and mobile data collection tools, notepad and pen.
4. Go to the target area and collect the data you need.
5. Return to your computer and input the data into OSM. In the Field Data Collection process, we will go into more specific steps and details to consider for mapping fieldwork.

There are a variety of tools to use for field mapping, including GPS and even paper-based methods. In the toolkit we focus on using smartphones. We prefer OpenDataKit, OpenMapKit, and KoBoCollect for data collection, and recommend Maps.me and OSMAnd for navigation.







### Short Summaries:

**Open Data Kit (ODK)** is a free an open-source set of tools which help organizations author, field, and manage mobile data collection solutions. ODK Collect is part of ODK and is an Android app that replaces paper forms used in survey-based data gathering. It supports a wide range of question and answer types, and is designed to work well without network connectivity.

**OpenMapKit** is an extension that launches directly from within ODK Collect when the OSM question type is enabled in a standard survey. It is what allows you to browse OSM features, and to create and edit OSM tags.

Finally, **KoBoCollect** is in almost all ways similar to ODK Collect, and is built on top of the ODK platform. Kobo also has prebuilt analysis tools and is another popular option.

### Skills and Technology Needed:

- Computer
- Internet Connection
- OSM Account
- Server

### Contextual Factors:

ODK Collect can be used in almost any setting, it is very versatile. Once forms have been downloaded it does not depend on the internet until uploading.

### Key Steps to Setting up ODK:

**1.** Install the ODK Collect on your phone – it can be downloaded from the Google Play Store

\*(For OSM compatibility, install OpenMapKit from the Google Play Store)

**2.** Generally organizations first fill out a form and then upload it to a server.

\*One way to do this is by creating a form online with ODK Build, though you can also build a form in Excel.

**3.** To download the form, open ODK on your phone and go to General Settings, then click Server.

**4.** Enter in your server information, return to the home screen and select Get Blank Form, then select your form.

**5.** In order to begin taking a survey select Fill Blank Form - now you're ready to collect data!

#### For more details:

OpenDataKit (<https://opendatakit.org>)

ODK Guide (<https://docs.opendatakit.org/collect-intro>)

ODK Build (<https://build.opendatakit.org>)

Another Option for Building ODK Forms

(<http://xlsform.org/en>)

OpenMapKit (<http://openmapkit.org>)

KoBo Collect (<https://www.kobotoolbox.org>)



# 06 FIELD DATA COLLECTION

## Your Field Mapping Playbook

**There is no one way to collect data in the field and it will vary by context – but the following steps cover the essential steps you should take.**

### 1. Coordinate with the local administration of the area you will be mapping

- This entails identifying and contacting partner organisations working locally in the area that you are planning to map.
- Contacting these can be done via email, however, a letter or document detailing your intent weighs much more.

### 2. Obtain authorization from district and other officials

- It's important to inform and get authorization from district officials. Write to the appropriate local official, copying relevant district-level authorities.
- Once you receive a letter of authorization, copy it to have on hand and distribute to higher-level authorities to make them aware of your project.

### 3. Prepare relevant field data collection tools and guides

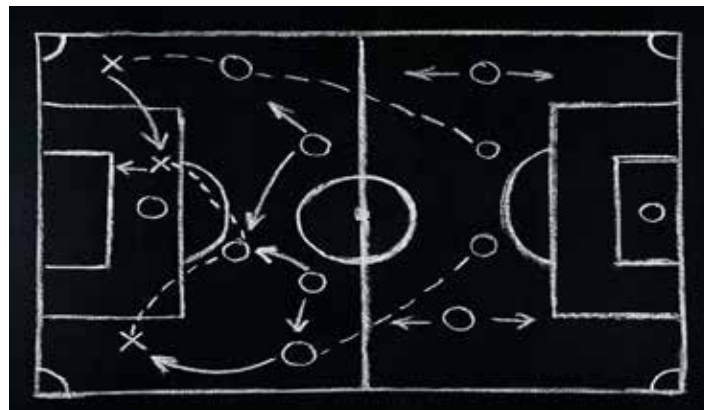
- To collect good data you need to employ a well-defined data model. A data model reflects the information you want to capture.
- After establishing a solid data model, it is important to create logical Field Data Collection Forms that capture the data you are looking for in the best way.

### 4. Recruit mappers

- Mappers will in most cases be drawn from community members, refugees, students or partner organisation staff.

### 5. Train mappers

- It is useful to create a training schedule. Usually two days are enough time to cover data collection and discuss the community's needs. This is also an opportunity to select your field mappers.



### 6. Find transportation

- This can also be an opportunity to match the refugee and host community together. In Uganda motorbike riders provide a much-needed element of local knowledge, complementing the actual field mappers. Work with mappers or local partners and stakeholders to recruit motorbike riders.

### 7. Field Mapping map guides (maps production)

- Strategically organize and subdivide the area to be mapped.
- Using QGIS, prepare relevant guide maps that mappers will use in the field.

### 8. Field mapping – guide participants during data collection

- Mappers should be well equipped with mobile phones having all the relevant tools and accessories to facilitate field mapping.
- Mappers move to the field with a mission order for their safety and comfort operating in these communities.
- Mapped data is sent to the server.

### 9. Field Data Cleaning and upload to OSM

- Following the field data cleaning workflow, all collected data is cleaned and uploaded to OSM. Reviewing the data before upload ensures that the quality is good before it is shared.

### 10. Schedule follow-up at a later date

- It is good to meet after field data collection activities to review the challenges faced in the field. This could take the form of a mapathon.

# 07 MAPS.ME & OSMAND

## Offline maps and navigational tools



### Short Summary:

These are two open source mobile applications that can be used with iOS and Android devices that provide offline maps, especially useful for navigation. They get their data from OpenStreetMap. The beauty of both apps is that the maps work with no connectivity– all they need is your phone's GPS.

### Skills and Technology Needed:

- Mobile phone
- Internet Connection (for initial download)
- OSM Account

### Contextual Factors:

In situations with low levels of internet these can be especially useful offline maps. The simple interface also means they are easy for anyone to learn and use. Because they are user-friendly they can be used for crowdsourced data collection, expanding humanitarian mapping beyond the staff of any project into the wider community.

#### For more details:

Maps.me Support

<https://support.maps.me/hc/en-us>

OSMAND Help Pages

<http://osmand.net/help/HowToArticles.html>

#### Key Steps for Maps.me:

1. First download Maps.me from the Google Play Store
2. Maps.me has maps for every country in the world. There are at least three different ways you can download these
  - Zoom in to the area you are interested in until a Download button appears.
  - Tap the country/city name on the world map and then tap the download icon
  - Find a map in the list of countries (Menu → Download Maps)
3. Now you have access to this map offline. To zoom in, use your fingers or double tap the screen. To see information about a feature simply tap its icon. If the map is upside down just tap the compass icon. To determine your current location, tap the geolocation button in the lower left corner (make sure location services are enabled on your device first)
4. To search for something on the map simply tap the search icon and then type the name into the search bar. You can also search by keyword or even by typing in the exact coordinates (Ex. 43.9775, 15.3854)
5. To create a route choose your destination then tap the route icon at the bottom of the screen. You can select either a pedestrian route or a car route and then select Start.
6. Perhaps one of the most useful features of Maps.me is the built-in map editor. You can add new places to the map or edit existing ones. In order to have these changes available to others you should open the app settings, go to Profile, and log in with your OSM account.
7. To add a new place to the map you can go to the menu and then press Add a place to the map. Select the correct location of the object and then press Done in the top right-hand corner. You can then fill in other details. These will then be automatically uploaded to OSM within a few hours.

#### Key Steps for OSMAnd:

The app can also be downloaded from the Google Play Store. When opened it will determine your location and suggest a map to download. As with Maps.me, you can zoom in, search for points of interest, and use the GPS to find your location. One of the most useful features of OSMAnd is recording tracks. To enable this, go to the menu, then Maps & Resources, then Plugins at the bottom, make sure Trip recording is active. To start recording your tracks, press the GPX button in the top right corner.

# 08 MANAGING DATA

## Organizing and Maintaining Data Processes

After collecting data, you'll need to get the data from the devices. Sometimes, it works to simply collect and process data directly from the data collection devices. However, this does not scale well when you get more people collecting data, and also means your data is not backed up - if you lose the device, you can lose the data. Prior to data collection, it is important to have a data management strategy that is suited for your operations.

### Server Management

A server is a central repository that manages access to data in a physical (offline) or cloud (online) location. Servers can ease operations with higher numbers of data collectors and to reduce the risk of losing data. Using a data collection server allows for much better management of forms and deployments, collection and aggregation of responses, and can offer additional features for viewing, analysing and exporting data. Use of a server may be restricted by available resources (cost of a physical server) and/or internet connection (access to cloud server). The most used options are:

#### OpenMapKit server / POSM

POSM is a physical server that contains a set of OpenStreetMap tools, including OpenMapKit server. POSMs allow multiple users to connect and upload data from data collection devices to a central location without the need for internet access. This data can then be aggregated using the OMK Server and synced with OSM directly or downloaded for analysis and processing. More information about acquiring and using POSM can be found here:

<http://posm.io/>



#### ODK Aggregate

ODK Aggregate is an online application (local options possible) that stores, aggregates, and allows users to perform basic analysis on ODK data. More information on ODK Aggregate can be found at:

<https://docs.opendatakit.org/aggregate-intro/>

#### KoBo Toolbox

An online application that allows users to build Kobo/ODK surveys as well as store, aggregate, and perform analysis of Kobo/ODK data. Several organizations offer hosted instances for humanitarian use, such as UN OCHA at

<https://kobo.humanitarianresponse.info>

### Server-less Management

If the use of a server is not available to you, it is still possible and crucial to store backups of data. In this case, data will need to be downloaded or otherwise shared with a central location, such as a laptop computer, and cloned to a secondary location such as a hard-drive or second computer. For more information about a server-less data management workflow, visit: <https://github.com/hotosm/toolbox/wiki>

### Data Security

If collecting personally identifiable information (PII) or other sensitive data, especially when working with refugees, it is crucial to take additional steps for data security. All data collection and storage devices (i.e. mobile phones, laptops, servers) should be password protected to prevent unauthorized users from accessing data. Data should only be transferred across private and secure networks, and cleared from devices after data back-up.

## QUALITY ASSURANCE (DATA CLEANING)


Quality assurance is the maintenance of a desired level of quality in a product. The higher quality your data is the more useful it is, so it is essential to manage the process along the way. OpenStreetMap is often more up-to-date and of a higher quality than other commercial maps, but this requires mappers to be actively cleaning the data.



In refugee contexts, having high quality data is even more important as it can mean the difference between being able to access a service or not. It is also extremely important when dealing with personally identifiable or sensitive information - as OpenStreetMap is publicly available, not all data that is collected may be appropriate for upload. This process can ensure that only data meant for OpenStreetMap is uploaded.

While validation and quality control can be and should be performed at all stages of mapping, the main objective is to catch any mistakes in the data before uploading it or using it for any maps. As there are many different possible workflows for data collection, there is no one way to perform validation and quality control. There are several tools that assist with this process following field data collection as well as tools for monitoring data after upload. These tools help validators find and fix common issues such as misspelled or improperly formatted place names and incorrect tag usage.

There are many tools to help you achieve better quality OSM data. Some report bugs or errors, and some allow you to spot inaccurate changes and edits. Here we will go into more detail on Java OpenStreetMap, a great tool for editing OSM data. We will also introduce OSMCha which can help team managers monitor uploaded data for quality and monitor progress of data cleaning.

**One of the simplest ways to report errors is using the Notes  feature on the OpenStreetMap website. Just press the “Add a note to the map” button, and then you can let other mappers know about any mistakes or missing information.**

**For more details:**

[https://wiki.openstreetmap.org/wiki/Quality\\_assurance](https://wiki.openstreetmap.org/wiki/Quality_assurance)



# 09 JOSM




## A feature-rich editor


### Key Steps for Setting up JOSM:

1. Open your Internet browser, and go to the installation websites for Java and JOSM


■ Java - <https://java.com/en/download/>

■ JOSM - <https://josm.openstreetmap.de/>

2. Once download and installation is complete, open JOSM. You will need to connect JOSM to your OSM account to enable data uploads. To do so, access the preferences window by clicking the 'Edit' menu and selecting 'Preferences'. Click the  Connection Settings sub-menu, enter your OSM credentials (username and password) and select authenticate.


3. You can download data from OSM by clicking on the download button  and selecting an area of interest.

4. You can add aerial imagery as a background (if your internet connection is strong enough) by clicking on the 'Imagery' menu and selecting an option such as "Bing".

5. Just like in iD Editor, you can add points, lines, and areas using the add node tool . The difference is that these edits can be made while offline.

6. You can also use JOSM to edit GPS, field papers, or data collected in the field (i.e. ODK/OMK data) before uploading to OSM.

7. You should go through all data individually to check for spelling mistakes, incorrect tagging, and PII. To assist with the data cleaning process, you can use the validation tool, filters, and JOSM plug-ins including todo list.

8. When you're done, you can either save your work for later upload or for review, or immediately upload changes to OSM by clicking on the upload  button.

9. Recommended: Have an experienced JOSM user serve as data quality manager, reviewing all data prior to upload.

#### For more details:

■ LearnOSM - Getting Started with JOSM:

<https://learnosm.org/en/josm/start-josm/>

■ JOSM Wiki Guide:

<https://wiki.openstreetmap.org/wiki/JOSM/Guide>

### Short Summary:

JOSM (Java OpenStreetMap Editor) is an open source editor for OpenStreetMap data. JOSM allows you to create new data and edit existing data for OSM. To edit existing data in OSM, you will need to download data first with an internet connection. After downloading an area, users can work offline to edit data before re-uploading the data to OpenStreetMap.

### Skills and Technology Needed:

- Computer
- Installation files for JOSM & Java
- Internet Connection (for download and upload)
- OSM Account
- Recommended: computer mouse

### Contextual Factors:

While there are several ways to edit OpenStreetMap, JOSM allows users to work offline as well as make higher quantity and more detailed edits in a single sitting. While JOSM can be more intimidating to low-tech and new users, the program is best suited for field operations and areas where internet is unreliable.

We highly recommend that installation files for Java and JOSM are downloaded before operating in areas of low-internet accessibility if possible. These files can then be shared and installed offline.

As with iD editor, it is important to not to allow any information which could be potentially harmful to refugees be uploaded to OSM. For example, sensitive information about nationality, religion, or gender should not be uploaded into OSM.

# 10 OSMCha

## Visualizing and analyzing edits

# OSMCha BETA

*Validation tool for OpenStreetmap*

### Short Summary:

OSMCha, or the OpenStreetMap Changeset Analyzer, is a tool designed to review uploads and changes to OSM data, largely to prevent bad edits and vandalism to map data. This tool allows users to filter by username, location, dates of upload, and other metadata features. OSMCha is useful for monitoring the progress of data cleaning and upload teams.

### Skills and Technology Needed:

- Computer
- Internet Connection

### Contextual Factors:

While errors and bad data should be caught prior to uploading to OSM, these mistakes happen. OSMCha allows managers to check the contributions of others for any missed errors and to provide feedback on their data quality checks. This feedback is especially important for mappers new to using JOSM so that mistakes are caught early and mappers can improve their quality assurance skills. OSMCha provides an additional opportunity to ensure no sensitive information is wrongly uploaded to OSM.



### Key Steps for Viewing Changesets:

1. Open your Internet browser, and go to <https://osmcha.mapbox.com/>
2. Click on 'Filters' in the left-hand menu.
3. Set a filter specific to your mapping project to sort data. Common filters for monitoring include setting:
  - a. Dates
  - b. Comment
  - c. Location
  - d. OSM Username
4. Click 'Apply'.
5. OSM changes (or changesets) meet your filter requirements will appear in the left-hand menu.
6. Click on any changeset to view it on the map as well as learn details such as data changes (added, modified, removed), user information, and any flags, or suspected errors, associated with the upload.

#### For more details:

- OSMCha Guide - <https://osmcha.mapbox.com/about>
- Mapbox: Using OSMCha for Inspecting Changes in OSM <https://github.com/mapbox/mapping/wiki/Using-OSMCha-for-inspecting-changes-in-OpenStreetMap>

## MAP CREATION (DATA USE AND ANALYSIS)



Geospatial information collected or gathered in previous processes can help create maps that assist with resource management, operations, decision-making, advocacy, and communication. Examples of maps that might be useful include locations of services in a district, known WaSH facilities in a refugee camp, and average distance to educational facilities.

### Static Maps

Traditional maps that are either printed or displayed digitally as image files. These maps can show specific topics (i.e. educational facilities, WaSH) and geographic focuses (i.e. camp, district). Static maps are best for displaying no more than a few topics, information that has temporal stability, and for users with low-access to technology and internet.

### Dynamic Maps

Interactive, digital maps allow users able to pan and zoom as well as change what information is displayed depending on preferences and functionality. Dynamic maps are best for displaying several types of information, information that is best viewed across different scales, and most importantly, for users with access to technology and strong internet.

As a participatory mapping process, it is crucial that final products are presented to and accessible by the community that participated in and facilitated the mapping. One of the best ways to do this is to present communities with maps in community centers, clinics, or other areas that are useful for refugees and host community members.

There are several tools that can turn geospatial information into final map products, both static and dynamic. In most cases, geographic information system (GIS) programs are the most robust tool for analyzing, managing, displaying, and creating maps. In this toolkit, we'll cover downloading data from OpenStreetMap using the HOT Export Tool, Humanitarian Data Exchange, and QGIS Plug-ins; QGIS for analyzing data and creating static maps; and Overpass Turbo for creating and displaying dynamic maps.

# 11 DOWNLOADING DATA



## Short Summaries:

**The Humanitarian Data Exchange (HDX)** is a platform designed for humanitarian organizations and actors to easily share and use humanitarian data for analysis. The growing platform, managed by UN OCHA, contains datasets for over 200 countries and territories. Humanitarian OpenStreetMap data, such as buildings and roads, are regularly exported and uploaded to the database.

**QGIS** is an open source GIS program discussed in Section 13, and has several ways to download and use OpenStreetMap data in data analysis and map creation. Several plug-ins, such as QuickOSM, allow users to download OSM data by area and by specific tags or attributions.

**The Export Tool** is an online-based tool for downloading OSM data for use offline. It allows you to create customized extracts of up-to-date OSM data in various file formats. See Section 12 for more information about the Export Tool.

## Skills and Technology Needed:

- Computer
- Internet Connection
- OSM Account (HOT Export Tool only)

## Contextual Factors:

The correct tool to use depends on what data you need and how you plan on using it. HDX allows users to download data outside of OSM data and non-geospatial data. The HOT Export Tool is useful for downloading specific data, such as matching a data model using YAML, and allows users to download OSM data for use in various geospatial applications. QuickOSM and other QGIS plug-ins are best for users working in QGIS with more general needs for OSM data.

## Different ways to get the data

### Key Steps for HDX:

1. Open your internet browser and go to

<https://data.humdata.org/>

2. Start by searching for data around a key term or location (i.e. refugee, WaSH, Bangladesh) or click on 'Data' to browse through all existing datasets.

3. Each dataset will have a title, uploading organization (i.e. UNHCR, RedCross), upload date, dataset date, description, and available file types.

4. Once you've selected a dataset that you would like to download, click on the appropriate file type and begin the download process.

### Key Steps for QGIS Plug-ins and QuickOSM:

1. First, if you are unfamiliar with QGIS, read Section 13 - QGIS.

2. Open QGIS on your computer.

3. To download the QGIS Plug-ins, you will need internet access.

4. Click on the 'Plug-ins' menu and select 'Manage and Install Plug-ins'.

5. Search for 'QuickOSM', click on the option in the menu and select 'Install'.

6. Once installed, to use the Quick OSM Plugin, go to the 'Vector' menu, open 'Quick OSM', select 'Dock', and click 'Quick Query'.

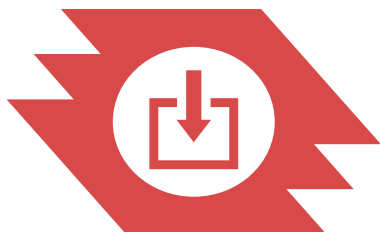
7. Enter a key and value, such as 'place' and 'town' respectively.

8. Select an extent - either the extent of a map layer or extent of the map canvas.

9. Click 'Run Query'.

**Note:** if the query is unsuccessful and does not download data, it is likely that either there is an issue with the key/value or the extent is too large for the download capacity.





**Short Summary:** The Export Tool is an online-based tool for downloading OSM data for use offline. It allows you to create customized extracts of up-to-date OSM data in various file formats.

#### Tools and Technology Needed:

- Computer
- Internet Connection
- OSM Account

#### 1. Key Steps for Downloading Data:

Go to the Export Tool (<https://export.hotosm.org>). Start by logging in using your OSM username and password, by clicking the red “**Log In**” button in the top right-hand corner. Then you will need to confirm your email address.

2. After logging in, click “**Create**” or “**Start Exporting**” to begin working on your first export.

3. On the map to the right define your Area of Interest (AOI). You can do this by selecting the area you wish to export data from. You can search, draw a box or polygon around your AOI, or simply export everything you are currently viewing. You can also upload a GeoJSON file by pressing Import.

- The size of an export is limited by the amount of data in your area of interest, too many features will cause our server to fail.

## How to download the data

4. On the left-hand side will be a number of tabs, use these to create the parameters of your export.

- **Describe** Fill out a name and description of the project
- **Format** Choose your GIS file format. Shapefile is the default option though Geopackage is becoming more commonly used and has certain advantages
- **Data** Select which features you want to query and include in your download package
- **Summary** Download your files by clicking “Create Export” - your export may take some time to run depending on the size of your area and how many feature types are in your query.

5. Download your file by clicking on the highlighted link, it should be the name of your project and the format you decided. This appears as a .zip in your computer’s downloads folder. (It will also automatically send a link to the file in your email.)

6. Import – Browse to your computer’s downloads folder, right click and “Cut” the .zip file. Browse to the location where you want to keep your files and paste. Right click .zip file and extract the file.

7. Using data

- If you downloaded shapefiles, common applications to work with the data are JOSM (which needs a plugin to import shapefiles) or
- QGIS, which you then import via the Add Vector button. You should be able to view exported data within the map. See QGIS tool for more details.

8. Now you have your data!

#### For more details:

- Export Tool Guide  
<https://export.hotosm.org/en/v3/learn>
- LearnOSM  
<http://learnosm.org/en/osm-data/geofabrik-and-hot-export>





### Short Summary:

QGIS (or Quantum GIS) is a free and open source geographic information system (GIS) program. GIS programs allow users to display, manage, and analyze geospatial information on the computer, and create map products. Data that can be used in GIS includes aerial imagery, GPS data, and spatial datasets.

#### Tools and Technology Needed:

- Computer with
  - Windows, Mac, or Linux operating system
  - Sufficient free disk space (approx 10GB) and administrator rights to install software
- Geospatial data  
(see Section 12 - Downloading Data)
- Recommended: computer mouse

### Contextual Factors:

QGIS allows for the transformation of data collected in the field into maps that can assist with field operations, resource distribution and management, and communications to name a few applications. As a free and open source program, QGIS allows organizations and users to create map products and analyze geospatial data without the heavy costs of proprietary programs.

**Downloading:** QGIS can be downloaded and installed offline using a previously downloaded installer or directly from the QGIS website (<https://www.qgis.org>). It is highly recommended to download software directly from the QGIS website whenever possible. This ensures that you have the most up-to-date version of the program. The QGIS file is larger than 300MB and may take a long time to download, depending on your internet connection.

**Using:** Any GIS file type can be used in QGIS (i.e. shapefiles, geoTIFF, geoJSON). Files can also be downloaded from the Humanitarian Data Exchange and OpenStreetMap using the HOT Export Tool or the QuickOSM plug-in in QGIS.

**Analyzing:** Users can use QGIS to analyze data for particular needs such as finding water points within walking distance of camps or the density of educational facilities in target areas. Many plug-ins have been created to help users assist with analyzing geospatial data such as InaSAFE, which helps users assess, plan, and mitigate for disasters using GIS.

**Producing:** Maps and atlases can be produced using the QGIS Print Composer. Atlases allow for a large number of maps to be generated for areas of interest, such as districts, wards, and other administrative areas, with the same style and layout. An example of an atlas created in QGIS for the purpose of assessing flood risk can be found at: <http://ramanihuria.org/data/>

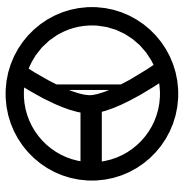
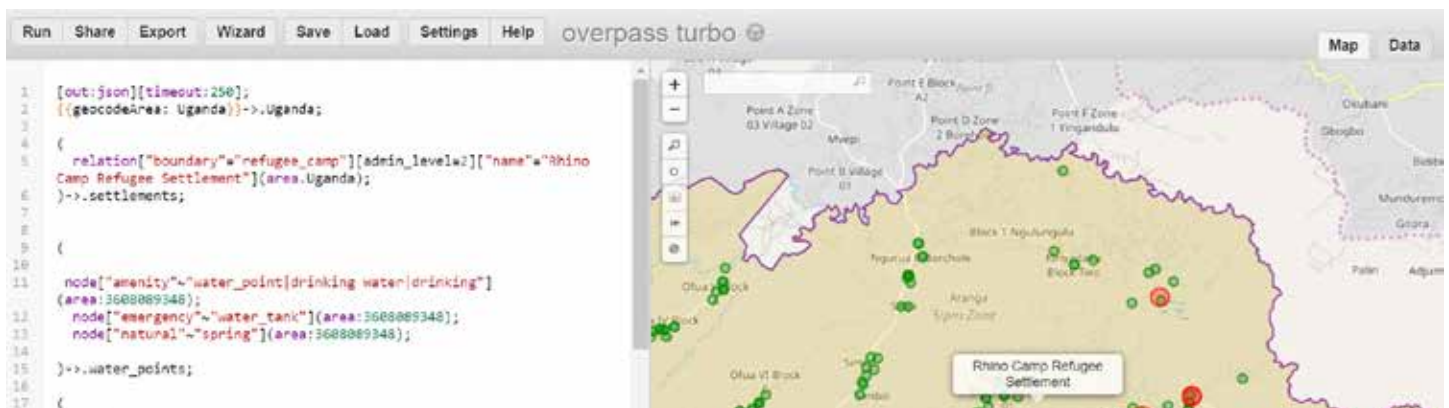
#### For more details:

- QGIS Training Manual:  
[https://docs.qgis.org/2.18/en/docs/training\\_manual/](https://docs.qgis.org/2.18/en/docs/training_manual/)
- QGIS Tutorials:  
[https://www.qgistutorials.com/en/docs/learning\\_resources.html#land-hot-export](https://www.qgistutorials.com/en/docs/learning_resources.html#land-hot-export)

Plug-ins are tools created by QGIS users that extend the functionality of QGIS. These are downloaded from an online repository.

# 14 OVERPASS TURBO

## Querying and Visualizing



### Short Summary:

Overpass Turbo is an online application that allows users to query, download, and visualize OpenStreetMap interactively. Some data can be difficult to represent in a static map due to distance, type of data, or the need to compare data at various scales. Overpass Turbo solves this issue by allowing users to query data and create a map that can be panned and zoomed to better communicate a dynamic context.

#### Tools and Technology Needed:

- Computer
- Internet Connection

### Contextual Factors:

As Overpass Turbo requires strong internet connection to run queries and visualize data, it is less intended for field operations and better suited for presenting data and progress to partners, donors, and other stakeholders in situations that allow for internet connection.

### Key Steps for Overpass Turbo:

1. Open your Internet browser, and go to <http://overpass-turbo.eu/>
2. On the right-hand side is the map view. Locate your area of interest by zooming and panning or search for the area in the map search bar. This will be the bounding box for your query.
3. On the left-hand side is the query builder. You can build a query manually using the query guides below, or use the Wizard tool in the top menu.
4. When your query is built, click 'Run' in the top menu. This process will take time dependent on the amount of features in your query result.
5. This query can then be exported as data files, maps, or as a standalone query. Click on 'Export' in the top menu. To download the query data, select 'Data' and the file type. To export as a map, select 'Map' and then select either a .png (image file) or interactive map.
6. The interactive map option creates a unique url that can be shared with other users to view and interact with the query that you generated, as well as embed into websites and other applications.

#### For more details:

- Overpass Turbo Wiki:  
[https://wiki.openstreetmap.org/wiki/Overpass\\_turbo](https://wiki.openstreetmap.org/wiki/Overpass_turbo)
- Overpass Query Language Wiki:  
[https://wiki.openstreetmap.org/wiki/Overpass\\_API/Overpass\\_QL](https://wiki.openstreetmap.org/wiki/Overpass_API/Overpass_QL)
- MapCSS Wiki or styling:  
[https://wiki.openstreetmap.org/wiki/Overpass\\_turbo/MapCSS](https://wiki.openstreetmap.org/wiki/Overpass_turbo/MapCSS)



Another great free tool for visualizing is **uMap**, which lets you create online interactive maps with OpenStreetMap layers within a minute!  
<https://umap.openstreetmap.fr/en>

## Case Study:

# Liberia - Field Mapping PTP Refugee Camp



PTP Refugee Camp was established to accommodate Ivoirians fleeing conflict in Côte d'Ivoire in early 2011. It is spread over 655 acres, and although many have been repatriated it is still home for thousands of refugees.

Many of the previous structures in the camp have been torn down or are now empty. Thus, a major need for service providers was to have a more accurate picture of the camp's status – especially as organizations were making plans for the future of the camp.

HOT mobilized a team to collect data using ODK, and within a day and a half mapped water and sanitation points, service delivery points and existing structures. At the same time, they removed 1,600 structures that were no longer in existence.

In a relatively short time, HOT was able to train staff with new tools and carried out a thorough mapping of the camp, effectively updating the picture with local knowledge. This is just one story from Liberia, where administrative boundaries and service delivery infrastructure was also mapped, allowing for a decentralization and assisting in governance and urban planning.

### Tips:

- To express gratitude, increase the likelihood of future participation in mapping activities, and maintain positive relationships, HOT recommends that participants are presented with a certificate of completion for training and field data collection.
- HOT also recommends identifying and securing permissions for strategic sites within an appropriate timeframe to maximize volunteer time for field mapping. Partners and local authorities should identify and secure resources for any potential security needs, such as high crime communities and market areas.
- When notifying citizens of an active project in their city or community, outreach strategy should also understand that not all residents listen to radio and rural areas require special attention or strategies for sensitization and communication.



## Case Study: Northern Uganda

### Local People, Local Tech, ‘just add knowledge’



Since 2013 over two million South Sudanese refugees have fled their borders, with over a million of those refugees seeking shelter in Northern Uganda. In both camp and non-camp settings, the region is host to farmers, cowherders, and other rural dwellers from South Sudan, most of them women and children, the men and boys often forced into conscription as they try to leave South Sudan. Refugees are provided for by multiple agencies, however, many do not know what the other is doing.

HOT trained refugees and host community members on mobile data collection tools such as OpenDataKit Collect to create an accurate map which addresses presence of WASH, Education, Health, and Cash-Based Intervention amenities in relation to both host and refugee communities in the district. The low-tech nature of ODK allows refugee mappers and host community mappers to often use their own mobile devices for data collection.

By mapping the region, refugees and host community members are interacting and working alongside each other. Mappers are paired with community motorbike drivers (bodas) who provide hyper-local knowledge of the area and can translate for refugees outside of settlement areas. At the same time, boda drivers are encouraged to learn and participate in the mapping as they navigate the expansive camps and host communities.

Not only are refugees and local community members involved in the data collection process, they are now seeing the results of their hard work. In Northern and Western Uganda, HOT has distributed maps of 117 (sub)counties to the communities that helped create these maps, ensuring they also benefit from their effort longer term. In many cases, this is the first time local councils have held an accurate, up-to-date map of their own county.

# Case Study: Turkey

## Building Istanbul's Needs and Assistance



The Syrian conflict is one of the worst humanitarian crises of our time. One of the places Syrians have fled is Turkey, which has hosted more refugees than any other country in the world the last several years. With over 3.5 million refugees, 94% of them live outside of camps and they are a largely urban population.

Such a large influx of people strained Turkey's services, and the need for coherent and open data sets on these non-camp communities became clear early on. Refugees face many challenges adapting to a new culture, learning a new language, overcoming stereotypes and seeking work. At the same time, refugees have an incredible knowledge of the informal systems, facilities, and infrastructure that exists where they live.

Therefore, HOT in partnership with a local Turkish organization worked with refugee communities to build base map data and create a comprehensive refugee-specific map that would lead to more effective navigation, service delivery, and response planning. The project collected over 13,000 service points in several districts of Istanbul and used mapathons for digitization and Syrian field mappers for ODK data collection.

Three big successes stand out. First, the project collected a substantial dataset in both Arabic and Turkish. Second, the team worked with local organizations to apply this information – for example, by creating a service map so Syrian parents can effectively register their newborns for temporary protection (providing domestic legal status from the Turkish government.) Third, workshops and events contributed to the understanding of open data and its humanitarian benefits - laying the groundwork for a strong OSM community and resulting in the establishment of the first [Youth Mappers](#) chapter of Turkey.

The project also faced serious challenges that should serve as lessons learned for organizations seeking to work in a developed, urban context. They are:

- Highly developed countries are sometimes less inclined to work with OpenStreetMap data as they have pre-existing specific data sets, though they are often in closed systems.
- Bureaucracy, either from the government or organizations can greatly inhibit potential collaboration and utilization of data.
- Lack of empathy between the host and refugee community is a serious barrier to participatory mapping projects – political sensitivities can hinder data collection and its application.



# RESOURCES

[Comprehensive Refugee Response Framework](#) – Set out by the New York Declaration, the CRRF lays out a vision for a more predictable and comprehensive response to refugee crises. It calls for greater support to refugees and the countries that host them. At the heart of this approach is the idea that refugees should be included in the communities from the very beginning.

[Handbook on Data Protection in Humanitarian Action](#) - This handbook builds on existing guidelines to suggest how data protection principles should be applied by humanitarian organizations.

[Humanitarian Icons](#) - The United Nations Office for the Coordination of Humanitarian affairs (OCHA) has created a set of 500 freely available humanitarian icons to help relief workers present emergency and crisis-related information quickly and simply.

[Humanitarian Principles](#) - These four principles provide the foundations for humanitarian action, and govern the way humanitarian response is carried out. They are humanity, neutrality, impartiality and independence.

[Policy on the Protection of Personal Data \(UNHCR\)](#) - This policy lays down the rules and principles relating to the processing of personal data of persons of concern to UNHCR.

[PRM Principles for Refugee Protection in Urban Areas](#) - Core principles that guide the U.S. government's response to the needs of refugees in urban areas. Drawing on best practice, the principles focus on diplomacy that seeks to ensure the status and legal rights of refugees, integration efforts, building self-reliance, and strengthening existing local structures.

[Protection Mainstreaming](#) - The process of incorporating protection principles and promoting meaningful access, safety and dignity in humanitarian aid.

[Sphere Handbook](#) - A recognized set of common principles and universal minimum standards for humanitarian response.

[The Grand Bargain](#) - An agreement between donors and humanitarian organizations to improve the effectiveness and efficiency of humanitarian action - aims to get more means into the hands of people in need. It commits organizations to providing 25 percent of humanitarian funding to local and national responders.

[The Humanitarian Charter](#) - The cornerstone of the Sphere Handbook. It captures both the ethical and legal foundations of humanitarian action, and lays the ground for the Protection Principles, Core Standards and minimum standards.

[UNHCR Alternatives to Camps](#) - UNCHR's policy is to pursue alternatives to camps, whenever possible, while ensuring that refugees are protected and assisted effectively and are able to achieve solutions.

[UNHCR Information Management Toolkit](#) - This toolkit is structured to present UNHCR information and data management advice and tools meant to inform a coordinated humanitarian response during the first two to four months of a refugee emergency, but the guidance provided is relevant and useful in a broader range of operational settings.



Gift of the United States Government  
Bureau of Population, Refugees, and Migration - US Department of State