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The HOT Toolbox is designed to provide the OSM Community with a repository of training materials, complete with step-by-step guides developed by the HOT training team. The material covers everything from setting up mobile devices to exporting OSM data for quality control and analysis.

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In addition to consolidating HOT's extensive training materials, this toolbox curates a large amount of other OSM resources that support mapping projects; from software guides to guidelines on running mapathons.

How to Use the Toolbox

The Toolbox is designed to take a project manager or community through the entire mapping workflow, from planning, through initial mapping, data use and analysis. Not every mapping project is the same. Some projects involve extensive field data collection components, others might not even conduct field mapping activities but run desktop-based digitization projects instead.

The **Toolbox** has seven sections (overview below) that can be used in the order presented, or combined to suit your individual project training needs.

If you do not want to go through each section, use the left-hand navigation, or the search bar to look for a particular guide.

If you are not sure where to begin a project use the **Example Workflows** section to find an example workflow that best suits your project's goals and resources. Each example will guide you through the exact steps, while linking to the relevant sections in the Toolbox and highlighting the tools and processes used.

Overview of the Toolbox Sections

1. **Designing and Coordinating a Mapping Project** provides readers with an introduction to the components that project managers should consider and take into account before beginning their mapping projects.
2. **Digitization and Editing in OSM** provides project managers with training materials and guides on managing the digitization process and which remote mapping tools are best for a project.
3. **Field Mapping Technical Set-up** provides project managers with the technical steps for selecting which mobile data collection application is best for their project, setting up those applications (such as ODK and OMK) for use in the field, and whether or not data collection servers are necessary for their project.
4. **Field Mapping Management** provides steps and guides for field mappers and supervisors to use mobile data collection applications, as well as providing tips for managing teams in the field.
5. **Data Cleaning Upload and Quality Assurance** covers the process of taking field mapped data through cleaning and upload to OpenStreetMap while ensuring strong data quality.
6. **Data Export Tools** covers the various tools used for exporting data from OpenStreetMap and which tools are best for different use cases.
7. **Data Use and Analysis** provides an introduction to how data can be turned into effective maps for decision making.

5.2 OMK Field Data Cleaning Workflow

After field data collection with OMK, clean the data before upload to OSM. Below is an example version of the OMK Field Data Cleaning Procedure. This is provided for guidance but should be modified as needed.

Skills and Technology Needed * JOSM

Step 1. Create folders

Create the folder structure for the data cleaning process.

1. Create primary working folder: [omk_field_data_cleaning]
2. Create a container folder: [village_name]_[current-date]. For example: akweteyman_2019-01-31
3. Create a sub-folders within the container folder:
 1. Add a folder for the raw data: /01_raw_[yourOSMname]
 2. Add a folder for the working data: /02_working_[yourOSMname]
 3. Add a folder for the final data: /03_final_[yourOSMname]

Step 2. Raw Files

Supervisor or team leader will download data from the server, and select sections of data for individual data cleaners to clean up.

For Supervisor:

- Each mapper's device id (IMEI) and username should be registered, to keep track of their submissions to the server.
 - Using the filter option of the server, filter server submissions according to dates, download data for a specific data, divide it into subsections and give those to the data cleaning team.
1. Create a sub folder [server_downloads] for all downloads from the server naming downloads according to the date of download, i.e akweteyman_2019-01-31_server_download.osm
 2. While dividing out this data to the different team members, **purge** everything else except what you want to give to a specific team member, and then 'Save As...' that section. Do not copy a section of the data downloaded from the OMK server into another new file, as this will not sync while downloading data from OSM database to start cleaning field data. Read about the purge action: <https://josm.openstreetmap.de/wiki/Help/Action/Purge>
 3. Do this for every team member you are giving data to clean.

For data cleaners:

1. The file your supervisor gives you will be named as: [projectArea_name]_[current-date]_raw_[yourOSMusername]
For example: akweteyman_2019-01-31_raw_lusdavo.osm
2. Copy the file your team leader gives you to the [projectArea_name]_[current-date] → 01_raw_[your_OSMusername]_[id] folder. Format dates as YYYY-MM-DD.

For example:

akweteyman_2019-01-31 → 01_raw_lusdavo → akweteyman_2019-01-31_raw_lusdavo_10.osm

NB: The represents project area subdivisions you are supposed to be working on.

Step 3. Add OSM Files to JOSM

Add file to JOSM

1. Open JOSM

2. Drag the .osm file into JOSM

Step 4. Sync Field Data with OSM Data

This step covers a series of checks on the data to check if there are any issues with the data.

1. You will need several *plugins* during this cleaning process. Read about plugins here: <https://wiki.openstreetmap.org/wiki/JOSM/Plugins>. Add the following plugins:
 - todo
 - opendata
 - utilsplugin2
 - buildings_tool
2. You will be using several filters during your cleaning process. Read about Filters here: <https://josm.openstreetmap.de/wiki/Help/Dialog/Filter>. Add the following filters: 'type:node untagged' 'new OR modified'
3. Prepare your data for cleaning:
 - Select field collected data using the JOSM filter: type:node untagged
 - Select all results (Ctrl+A)
 - Add the selection to the TodoList plugin. In the plugin window, click '+ Add'
 - Deselect results by clicking in the 'Map View' window
 - Download OSM data in the area of the field collected data, to ensure we merge properly with existing OSM data
 - Press '2' on the keyboard to zoom to the extents of your field collected data
 - Select 'File -> Download in current view'
 - Now save this file to your 'working folder'
 - File → Save As → [projectArea_name]_[current-date]_working/[working_yourOSMusername]_[id]
 - For example: akweteyman_2019-01-31_working_lusdavo_10.osm

Step 5. Cleaning Data

1. Select/enable the filter 'new OR modified'
2. Select only new or modified data using the JOSM filter: 'new OR modified', tick 'E' and 'I' to differentiate between field data and OSM Server data. Check if everything looks okay.
3. You are now going to clean the 'working' file in JOSM.
4. Add Imagery being used to clean data.
5. Uncheck the 'type:node untagged' filter to enable you edit features.
6. Convert all building nodes to polygons by using replace geometry feature.
7. From the ToDoList, inspect each feature (select the first one in the ToDoList)
 - Are the locations correct?
 - Convert comments into possible tags as possible else change the key to fixme
 - Are there any spelling mistakes in the attributes of this feature?
 - Are the tags capitalised correctly?
 - Are the tags fields filled correctly?
 - Are we not duplicating existing OSM data?
 - Expand all text and correct all text, examples below:
 - St. → Street
 - Ave → Avenue
 - Ltd. → Limited
 - BANK OF GHANA → Bank of Ghana
 - GOIL → Goil, etc
8. If okay, click 'Mark' in TodoList to proceed to the next item

5.1 Cleaning Apartments

Use the *Terrace a Building* tool to divide a building into the different number of apartment units that building has, then copy and paste attributes from an apartment point to the respective building terrace. If a building is 5 or more sided, manually draw the different apartments connecting them together.

5.2 Record Errors Encountered

Capture common problems that come up while cleaning data.

1. Data cleaners should record any errors and problems encountered (both while mapping and validating).
2. Please record this in a text file with screenshots if possible
3. Save edits to <projectArea_name>_<current_date>/02_working' folder.

Step 6. Save Final Files

NOTE: Some projects may require that datasets are split into public and private datasets, where the full dataset remains private, and personal/private data is removed from the partial dataset uploaded to OSM. For similar situations, use 6.1 and 6.2. For projects where all data collected is public and can be uploaded to OSM, skip to 6.2

1. Right-click the working layer and select 'Save As..'
2. You are to 'Save As..' to the final folder. Team Leaders are to review their team's data validation. If satisfied, get the Group Supervisor to double check the data.
3. Disable all filters used during data cleaning.
4. Run 'Validation' in the 'Validate Results' window. Correct any errors that are detected, and go through the warnings.
5. Notify supervisor for review.

6.1 Private Data

If full data set includes private/personal information: 1. Save to the final layer: [projectArea_name]/[current_date], for example akweteyman/2019-01-31/03_final_lusdavo folder. * File name: akweteyman_2019-01-31_final_lusdavo. 2. From the saved file to be uploaded to OSM, remove the private/personal attributes before uploading to OSM (enable the type:node untagged and new OR modified filters). * For example: * building:population * building:sleeping_spaces * building:rooms * Building:rooms_painted

NOTE: Do not overwrite the _private file. These changes will be saved to a new layer in step 6.2.

6.2 Public Data for upload to OSM

1. Save to the final layer: [projectArea_name]/[current_date]/03_final, for example akweteyman/2019-01-31/03_final_lusdavo folder.
 - File name: akweteyman_2019-01-31_final_lusdavo_10.osm
2. Notify supervisor for review

Step 7. Upload to OSM

If Supervisor authorises, upload the validated data to OSM

1. Add the **source** tag to all field data. At minimum, Field Survey
 - Example: source= Open Cities Accra - Field Survey
2. Disable the 'type:node untagged' and 'new OR modified' filters

3. With your OSM Username and Password added to JOSM preferences, upload to OSM adding the appropriate tags for the project as a changeset comment.
 - Example: #OpenCitiesAfrica #OSMGhana #MobileWebGhana #HOTOSM Specify the data source for change as survey.

Step 8. Quality Assurance using OSMCha|QGIS|JOSM|Osmose

This is intended to be used by supervisors to ensure data quality

Once data is cleaned and uploaded to OSM, several tools will be used to monitor Quality Assurance. * OSM Cha: Will be used to monitor the edits made by users uploading data to OSM, Filters will be made using UserIDs of data to give a summary of modified, deleted, added nodes, which the QA person will review and either flag as bad or good, sending feedback to the person who uploaded the data. Example of filtered changesets * JOSM: JOSM Validation tools, filters and customised MapCSS will be used to flag data quality issues, then give feedback to the data entry people for improvement. * Osmose

For more information, see Quality Assurance Tools.

5.4 Quality Assurance and Quality Control Tools

Overview

Quality Assurance and Quality Control is the process by which mappers, and OpenStreetMap contributors in general, check data to ensure that all information uploaded to OSM meets high standards for usage and to prevent vandalism. As OpenStreetMap is a free and open platform that anyone can use and edit, it is critical to the sustainability of open data and OSM that everyone participates in the quality assurance and quality control process – from field data collection to data cleaning to long-term maintenance of existing OSM data.

While Quality Assurance and Quality Control should be performed at all stages of a mapping project, the following tools will help ensure that data uploaded to OpenStreetMap meets high quality standards.

The following are Quality Assurance tools commonly used in the HOT workflow. A detailed overview of these and other QA tools can be found at the Quality Assurance Tools Wiki. Different tools check for different errors and issues. If you want to:

- Check for attribute completeness, use MapCampaigner.
- Check for potential vandalism, use OSMCha.
- Check for contributions and upload issues by individual user, use OSMCha.
- Check for tagging issues, use Osmose AND JOSM Validation.
- Check for geometry issues, use Osmose AND JOSM Validation.

HOT Training Presentation:

Quality Assurance Tools ***

MapCampaigner

MapCampaigner is a tool developed by HOT to monitor attribute completeness for predefined areas of interest (AOI). Based on your data model, the tool checks and highlights any map features that are missing pre-defined tags within your AOI, and allows team validators to download and fix those features.

Skills and Technology Needed

- Computer with
- Internet connection
- Recommended: computer mouse

How to use MapCampaigner

To navigate an existing campaign:

1. Navigate to <https://campaigns.hotosm.org> in the Google Chrome or Mozilla Firefox internet browser.
2. Select one of the Projects in the landing page or use the search bar to look for a particular project. *Note: You may need to change the status menu from “Active” to “All” projects if you are not finding a project.*
3. Once a project is selected, scroll down to the feature details. Change the feature type by selecting a feature from the drop-down menu on the left.
4. For each feature type, the percent of features with 100% completeness will be shown on the left panel.
5. On the map, features are colored by the percent of attributes completed. Select each feature to view the existing tags and missing attributes. mc_monrovia

To create a new campaign: Follow the instructions under the resources tab found here: <https://campaigns.hotosm.org/res>

OSMCha

OSMCha, or the OpenStreetMap Changeset Analyzer, is a tool designed to review uploads and changes to OSM data, largely to prevent vandalism and bad edits made 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 with
- Internet connection
- OpenStreetMap Account
- Recommended: computer mouse

How to use OSMCha

1. Navigate to <https://osmcha.mapbox.com> in the Google Chrome or Mozilla Firefox internet browser.
2. To use OSMCha, you will need to sign in with your OpenStreetMap account and grant permission. `osmcha_signin`
3. Once logged in, a left-hand panel will appear with changesets. Each changeset shows:
 - OSM username
 - Time of upload
 - Changeset comment
 - Changeset ID
 - Flags (if any) - such as "Possible Import"
 - Number of ways added (highlighted in green), ways modified (highlighted in yellow), and ways deleted (highlighted in red) `osmcha_viewingchangesets`
4. With OSMCha, you can create highly focused filters to monitor you and your team's contribution to OSM. Clicking on 'Filters' on the left-hand panel will open the **Filters** menu.
5. In this menu, unique filters can be applied such as OSM username, date range, locations. `osmcha_filters`

Practice creating a filter

1. Click 'Filters' on the left-hand panel.
2. Set filters for:
 - Start Date: 01/01/19
 - Your username
 - A location
 - One additional filter
3. Click apply.
4. Click on any of the changesets that appear on the left-hand panel. Do any changesets have flags or warnings?
5. Click on 'Filters' again to modify and/or add more filters.
6. To Save a Filter for later use, click on 'Filters' on the left-hand panel. In the upper-right, click 'Save' to choose a name for this Filter.
7. The exact filter can now be accessed using the URL or in the 'My Saved Filters' option after clicking on your username.

Osmose

Osmose is a tool that monitors multiple quality control issues in OSM. These include issues with feature geometry (such as overlapping buildings/nodes, incomplete features, and duplications), and also common tagging issues (such as missing, unsuitable or poorly formatted tags). More information about Osmose can be found at the [Osmose OSM Wiki Page](#).

Note: to properly use this tool and view errors, you will need to use the Google Chrome internet browser. Firefox, Opera, Safari, and other browsers may not display the information correctly.

How to use Osmose

1. Navigate to <http://osmose.openstreetmap.fr> in the Google Chrome internet browser.
2. Use the zoom, pan, and search features on the map to navigate to your area of interest.
3. Use the left panel to toggle common issues on and off.
4. Identified issues will appear in the map as pins matching the icons from the issues panel. Click on each pin to learn more about the object and associated issue(s).

osmose_monrovia

To fix issues identified in Osmose

1. Open JOSM on your computer.
2. In Osmose, locate the 'Export' button at the top of the page. Click 'Export', then 'JOSM'.
3. Fix the issues identified then re-upload to OSM.

JOSM Validation Tool

JOSM 's built-in validation tool that checks for common errors and inconsistencies in OSM data relating to both geometry and tagging.

How to use the JOSM Validation Tool

1. In JOSM, download data for your AOI.
2. Open the Validation Results tool. If the Validation Results tool is not activated, select 'Windows' from the top menu and select 'Validation Results'.
3. In the Validation Results tool, click 'Validation'.
4. Go through each warning/error produced. *Note: some warnings can be disregarded, some can be automatically fixed by clicking the 'Fix' button, and others will have to be manually fixed. For more information on specific warnings and errors, read the Validator wiki.*
5. Re-run the validation tool to confirm warnings/errors have been fixed.
6. Once all warnings/errors have been fixed, re-upload to OSM.

JOSMValidation

For further details on using the JOSM Validation Tool, review Section 3.5 Validation with JOSM

6.0 Data Cleaning, Upload, and Quality Assurance

Data Cleaning, Upload, and Quality Assurance is a critical step in any mapping workflow. This process covers cleaning raw field data for errors and mistakes, uploading clean data to OpenStreetMap, and using various quality control tools to monitor data that has been uploaded. Regardless of how (and if) you are collecting field data, any project that results edits in OpenStreetMap should have a quality assurance and control plan.

- **6.1 Management of Collected Data** covers the best practices and recommend workflows for managing data that is collected in the field.
- **6.2 Data Cleaning and Validation Workflows** provides examples of technical workflows used by HOT in the field for various types of projects.
- **6.3 Data Cleaning in JOSM** covers the process and steps required to clean field data and the uploading process using JOSM.
- **6.4 Quality Assurance Tools** provides a guide to tools HOT uses for monitoring and checking data quality of data uploaded to OpenStreetMap.

If your project...

- Involves field data collection using OpenMapKit and/or OpenDataKit, start with section 6.1.
- Does not involve field data collection using OpenMapKit and/or OpenDataKit, jump ahead to section 6.4.

5.3 Data Cleaning with JOSM

Overview

Data collected in the field should always be cleaned for errors and rectified with existing OSM data before upload. There are a lot of OSM data editors available, but in this module the OSM data editor used is JOSM. JOSM has a lot of useful tools and plugins, making OSM mapping a lot easier but most importantly, it is the easiest tool and best tool for maintaining quality OSM data while importing batches of field data into OSM.

to-do list in JOSM

JOSM Data Cleaning Tools

There are tools built into JOSM, as well as additional plugins that can assist with data quality control during the upload process.

- **Filters** is a built-in tool that allows you to disable, hide, select, and highlight specific groups of objects based on flexible custom parameters. This tool will help you to spot and avoid common mistakes, and review data.
- The **Validation Tool** is another built-in tool that will review and search for common errors as well as provide warnings about potentially problematic data.
- The **ToDo List** plug-in allows users to systematically review data that is to be uploaded, and monitor progress of data cleaning work. The “ToDo List” plug-in, needs to be downloaded before it can be used. Visit this page to learn how to install plug-ins in JOSM, then download the “ToDo List” plug-in.

Adding OSM Survey Data into OSM Using JOSM

Following a field data collection activity using JOSM, use the following step-by-step guide to clean and upload data to OSM. By following these steps, you will be able to:

- Install plugin Utilsplugin2
- Merge all survey data
- Save .osm file using JOSM
- Download OSM data
- Add satellite imagery layer on JOSM
- Add and edit OSM data using JOSM
- Upload changes into OSM
- View changes of OSM data in OSM website

Skills and Technology Needed

- Computer
- Internet Connection
- JOSM Installed
- Basic JOSM skills
- Survey data

I. Installing plugin Utilsplugin2

Before adding or editing OSM data using JOSM, install plugin you'll be using first. JOSM has a plugin called utilsplugin2 whose one of the functions is makes copying preset/tag easier. To use this plugin, you have to install the plugin first since it is not installed by default. These are the steps to install plugin utilsplugin2:

- Open **JOSM**
- Click menu **Edit → Preferences**
- Select menu **Plugins** to install new plugin. If you haven't downloaded available plugins, click **Download List** first to download it. Make sure that you are connected to the internet.
- After downloading plugins, search the **utilsplugin2** by typing it in the search box. After you found it, give a check on the checkbox next to utilsplugin2.

Installing plugin utilsplugin2

Installing plugin utilsplugin2

- Click **OK** and wait until the installation process is finished. If the plugin has successfully installed, there will be **More tools** menu on your JOSM.

More tools menu on JOSM

More tools menu on JOSM

Note: Sometimes JOSM ask you to Restart JOSM after installing new plugin to apply newly installed plugins. However, not all newly installed plugin needs JOSM restarting to be used after installation process finished.

II. Importing Field Data

a. Merging OMK Survey Data *Note: if your data is in a different format, skip to b. Importing Survey Data (non-OMK).

If you have finished conducting survey using field data collection toolkit such as ODK Collect and Open-MapKit, you can use the survey data as the reference to add object's information when mapping it in OSM. Survey data file format from OpenMapKit is .osm. The number of .osm files from OpenMapKit will be the same amount as the surveyed objects since information of one object will be saved in one .osm file. Merge all .osm file to make it easier to use the survey data as mapping reference by following these steps:

- Go to **File Explorer** to where you save .osm file from **ODK Collect** and **OMK**.

File directory for .osm file from ODK Collect

File directory for .osm file from ODK Collect

- Search all .osm file by typing "osm" in the **Search** box. Select all .osm file from the search results.

Search results for keyword "osm"

Search results for keyword "osm"

- Drag all selected .osm file to **JOSM**.

Layers Windows after .osm file from ODK and OMK dragged into JOSM

Layers Windows after .osm file from ODK and OMK dragged into JOSM

- Select all those .osm layer by **selecting the uppermost .osm layer, then pressing Shift and then selecting the lowermost .osm layer**
- **Right click on one of the .osm layer**, then click **Merge**. **Select target layer Windows** will appear, you do not have to change the target layer, click **Merge**.

Merging all survey data layer

Merging all survey data layer

- Save the merged layer and change the name by **right-clicking on the merged layer**, select **Save As**, change the layer name and then click **Save**.

Saving the merged survey data layer

Saving the merged survey data layer

- JOSM provides a plugin named **to-do** to help you mark the mapped or unmapped object from the merged survey data layer. You can refer to **Using to-do list on JOSM** module to learn how to install and how to use **to-do** plugin in details. If you have already installed **to-do** plugin and activated Todo list Windows, select all objects nodes in the merged layer using **Select object icon**, then click **Add** on the Todo list Windows.

Adding objects into Todo list

Adding objects into Todo list

b. Importing Survey Data (non-OSM) You will need to convert your data into a .geojson, .shapefile, or .osm file before beginning data cleaning. We recommend merging and converting files in .QGIS, then open the merged file in JOSM.

III. Downloading OSM Data

After successfully merging all survey data, you need to download existing OSM data. Downloading OSM data aims to discover which objects already mapped and which objects have not already mapped on OSM. These are the steps to download OSM data using JOSM:

- Click menu **File → Download Data**
- **Download Windows** will appear. It will show you tab **Slippy Map** by default.

Download Windows on JOSM

Download Windows on JOSM

- If the map is not displaying your mapping area, slide the map by **right clicking and hold** your mouse and then **drag the map** to your mapping area. Draw a box at your mapping area by **left clicking and hold** your mouse and then **move** your mouse until a pink box cover the entire mapping area. Then click **Download**.
- If it is quite hard to find your mapping area by sliding the map, you can click tab **Areas around places** and type the name of your mapping area in the **Enter a place name to search for** box then click **Search**. The search result will show you names of your mapping area. **Click on one of the names** then **go back to tab Slippy Map**. The map on the tab **Slippy Map** will be directed to your mapping area. **Draw a box** covering your entire area of mapping, then click **Download**.

Note: Do mind the amount of existing OSM data in your mapping area. If there is already a lot of existing data, you should download it part by part since JOSM can not download an enormous amount of data at once.

Tab “Areas around places” at Download Windows

Tab “Areas around places” at Download Windows

- After finished downloading OSM data in your mapping area, there will be a new layer in the Layer Windows that will also be your editing layer to add or edit OSM data. Make sure that you **only add or edit data in the clear area, not in the shaded area**. The shaded area is not your downloaded area. And make sure your entire survey area is already downloaded. After downloading OSM data, your JOSM will look like this:

Downloading OSM data on JOSM

Tab “Downloading OSM data on JOSM” at Download Windows

- If you already downloaded OSM data in all your area, merge your downloaded OSM data layer with your survey data layer. Select those **two layers** then **right click**, select **Merge**. Save on your survey data layer. Then click **Merge**.

Merging downloaded OSM data with survey data layer

Merging downloaded OSM data with survey data layer

IV. Adding Satellite Imagery

- Add satellite imagery as another reference for mapping by clicking menu **Imagery** → **choose one of the available imagery you want to use, such as DigitalGlobe Premium Imagery**. After successfully adding satellite imagery, it is time to add OSM data. Your JOSM will look like this:

Adding satellite imagery on JOSM

Adding satellite imagery on JOSM

- You can adjust the display of the satellite imagery. Select the satellite imagery layer, then click icon **Change visibility of selected layer** and adjust its display by sliding the blue button left or right.

Changing the display of satellite imagery

Changing the display of satellite imagery

- If you use **DigitalGlobe Premium Imagery** as your reference, sometimes it has two versions of display when you zoom it in or zoom it out. Usually there is only one version of display aligned with the existing OSM data. Inactivate **Auto Zoom** feature so that the satellite imagery display won't change when you zoom it in or zoom it out. To inactivate Auto Zoom feature, **right click on the Satellite Imagery display** → **click Auto zoom** so that the checkmark next to Auto zoom disappear.

Inactivating Auto zoom for satellite imagery

Inactivating Auto zoom for satellite imagery

V. Editing OSM Data Using JOSM

Now you are ready to add or to edit OSM data using JOSM. You can draw new objects or you can edit the existing objects using the tools mentioned in **Using JOSM** module. Here are the steps on how to add or edit OSM data using survey data, downloaded OSM data and satellite imagery that you already added before on JOSM:

- After successfully following the steps mentioned in the previous sections, there will be two layers on your JOSM: **satellite imagery layer** (in the picture below, the layer meant is DigitalGlobe Premium Imagery layer) and **merged survey data with downloaded OSM data layer** (in the picture below, the layer meant is *hasil_survey_jakut.osm* layer). It will look like this:

Satellite imagery layer and merged survey data with downloaded data layer

Satellite imagery layer and merged survey data with downloaded data layer

- You can use **Filter** feature on JOSM so that you don't accidentally make changes on other objects such as administrative boundaries. Administrative boundaries in OSM is a delicate objects, so if there are already administrative boundaries mapped on your mapping area then it is better to utilize the **Filter** feature. To use this **Filter** feature, activate the Filter Windows by clicking menu **Windows** → **Filter**. There will be Filter Windows in the right panel. Click **Add** in the Filter Windows, type **boundary=administrative** in the **Filter string** box and click **Submit Filter**. New filter will appear for the administrative boundaries. To turn off the filter, simply uncheck the checkmark on the left of the filter. You can find out more about **Filter** feature on JOSM in the **Using Filter on JOSM** module.

Filter Windows on JOSM

Filter Windows on JOSM

Adding filter string in the Filter Windows

Adding filter string in the Filter Windows

Newly added filter in the Filter Windows

Newly added filter in the Filter Windows

- Start mapping by zooming in to an object, select one object in the Todo list Windows and then click **Zoom**. After selecting and zooming in one object, you can copy the tag from the selected object to the downloaded OSM objects. Select the downloaded OSM object that aligns with the selected survey object, then click menu **More tools** → **Copy tags from previous selection** or press **Shift + R** on your keyboard. Make sure you selected the aligned survey object right before copying its tags to downloaded OSM object. Also make sure that the copied tags are consistent with OSM mapping guidelines and suitable for the object type. For example, in the picture below, a clinic located in a shophouse complex, mapped as a point and only have tags suitable for point object. While the building related tags added to the shophouse building where the clinic is located. When you finish copying tags for one object, click **Mark** to identify that it is just already mapped on OSM. Repeat until all of the objects mapped on OSM.

Using Zoom dan Mark feature on the Todo list Windows

Using Zoom dan Mark feature on the Todo list Windows

Tags suitable for point object

Tags suitable for point object

Copying building related tags using Shift + R

Copying building related tags using Shift + R

- Example given above is for point object. When you find an object that is supposed to map as a polygon, such as school complex which has more than one building inside, how to map it on OSM? Select the school object in the Todo list Windows and then click **Zoom**. Select the point object on the map. Copy the tag to the building polygon aligned with the point object by selecting the building polygon and then clicking menu **More tools** → **Copy tags from previous selection** or pressing **Shift + R** on keyboard. After copying the tags, delete tags that are not related to building and left only building related tags. Draw a polygon covering all school area using **Draw nodes**, then copy tags that are suitable for school area (tags that you deleted before in the building polygon) like amenity, name and addr:full. After that, delete the school point from the survey data since it has just been mapped as a school area polygon.

School point from survey data

School point from survey data

Tags suitable for school building

Tags suitable for school building

Tags suitable for school area

Tags suitable for school area

VI. Saving Changes

- If you have already done mapping using JOSM, save changes to OSM server because the newly added objects are saved only in your computer. To save the changes you've made, click menu **File** → **Upload Data**.
- If you encounter warning/error after clicking Upload Data, it is better to fix warning/error first. You can find out more about fixing warning/error and common warning/errors found in **Survey Data Validation Using JOSM** module. However, if you don't have the time to learn how to fix warning/error, you can just go ahead and click **Continue Upload**. Upload Windows will appear.
- If there is no warning/error, Upload Windows will appear. On the Upload Windows, type a brief comment for the changes you've done in the comment box and specify the source(s) in the source box. Type the name of the satellite imagery and survey in the source box. If you want other contributors to review your edits, give a checkmark next to **I would like someone to review my edits**. Then click **Upload Changes**.

Upload Windows on JOSM

Upload Windows on JOSM

Note: You need to periodically upload your edits when mapping so that there won't be a hefty amount of edits to upload. The more edits you want to upload, the more time it takes to upload. If you already mapped a lot of edits and haven't done any upload, you can upload it by chunk. You can do it by clicking tab **Advanced** and select **Upload data in chunks of objects** in the Upload Windows. Type the **Chunk size** with how many changes you want to upload per chunk, such as 500. This can be done to avoid incomplete upload, especially when your internet connection is unstable that resulted in object duplication.

VII. Saving .osm File

- You can also save your editing layer by **right clicking** on your editing layer and click **Save**. **Save OSM file** Windows shown below will appear. Type the name of your file, then click **Save**. Your file will be saved in .osm format.

Save OSM File Windows on JOSM

Save OSM File Windows on JOSM

Note: If you haven't finished mapping your area and you want to continue mapping it later, you can save your work as .osm file then you can continue mapping it later. You can open your saved .osm file by clicking menu File → Open, choose the file you want to open and click Open. After opening it, update the OSM data first by clicking menu File → Update Data and you can go ahead to continue mapping.

VIII. Viewing Changes in the Map

- You can view your changes by checking it on OSM website and directing it to your mapping area. Keep in mind, new changes can be viewed a while after uploading it to OSM server.

OSM map before and after mapping process

OSM map before and after mapping process

SUMMARY

If you can apply and follow through to all of the steps mentioned in this module, then you are able to go through OSM mapping process using JOSM successfully. You are able to do OSM mapping process, such as downloading OSM data, adding satellite image, editing OSM data, uploading changes, saving OSM data as .osm file and viewing changes. You can upload your changes periodically, such as by region or by village. If you already have finished conducting survey in one region or in one village, you can upload it directly to OSM. This shall be done so that your survey data is not piled up and others can perform data validation for your edits.

Data Cleaning, Upload, and Quality Assurance

Data Cleaning, Upload, and Quality Assurance is a critical step in any mapping workflow. This process covers cleaning raw field data for errors and mistakes, uploading clean data to OpenStreetMap, and using various quality control tools to monitor data that has been uploaded. Regardless of how (and if) you are collecting field data, any project that results edits in OpenStreetMap should have a quality assurance and control plan.

- **6.1 Management of Collected Data** covers the best practices and recommend workflows for managing data that is collected in the field.
- **6.2 Data Cleaning and Validation Workflows** provides examples of technical workflows used by HOT in the field for various types of projects.
- **6.3 Data Cleaning in JOSM** covers the process and steps required to clean field data and the uploading process using JOSM.
- **6.4 Quality Assurance Tools** provides a guide to tools HOT uses for monitoring and checking data quality of data uploaded to OpenStreetMap.

If your project... * Involves field data collection using OpenMapKit and/or OpenDataKit, start with section 6.1. * Does not involve field data collection using OpenMapKit and/or OpenDataKit, jump ahead to section 6.4.