

# **MAPPING THE WORLD**

## **A NEW APPROACH FOR VOLUNTEERED GEOGRAPHIC INFORMATION IN THE CLOUD**

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ISPRS Comm. VI 1-3

Workshop TU Berlin



Our motivation

# Geo-Information & Disaster Mapping

Key Question:

What can we do to assist NGOs  
managing these challenges?

# Outline

☑ Introduction/Motivation

1. Internet 4.0 & Mapping
2. OSM & Crisis Mapping
3. HOT Voluntary Mapping
4. Conclusions & Outlook

# 1. Internet 4.0 & Mapping

# 1. Internet 4.0 & Mapping

Internet 1.0: Information Server → User.

Internet 2.0: Interaction Provider ↔ User.

Internet 3.0: Smart Web, semantic artificial intelligence.

Internet 4.0: Cloud, mobile networking, interactive services, controlling cloud processes.

# 1. Internet 4.0 & Mapping

Information society → Geo-Information society  
Urban society, 74% in GER in cities.

Parts of the world still live in agricultural societies.

Primary economy is subsistence farming.

Regions: Sub-Sahara Africa, East-Asia, Latin America.

How can we measure societies/economies?

# 1. Internet 4.0 & Mapping

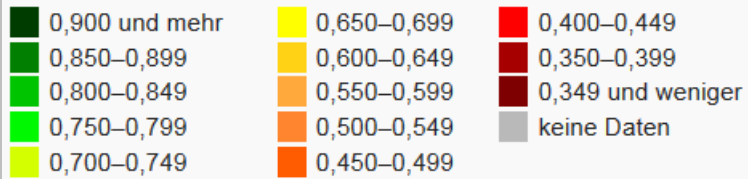
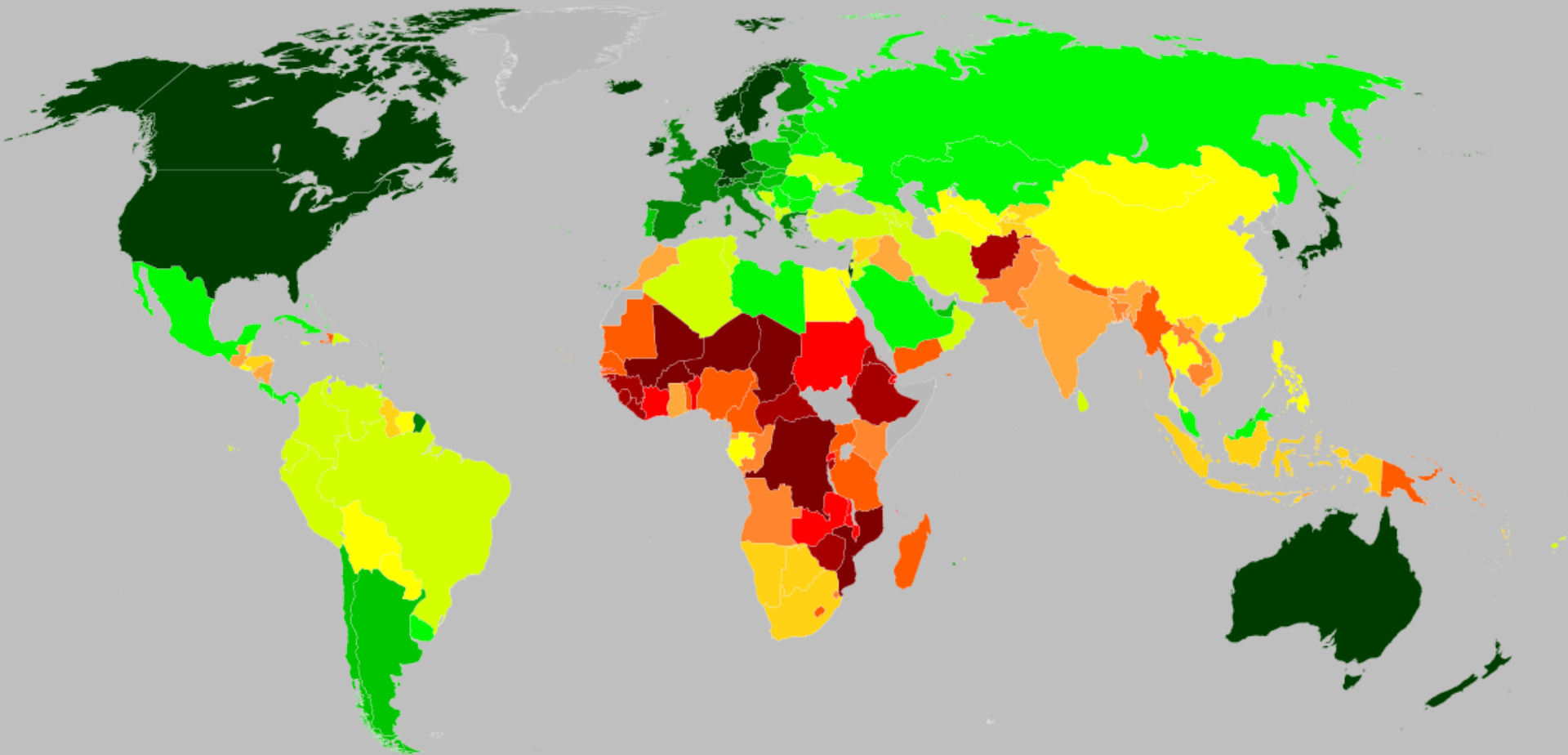
HDI – Human Development Index (UN)

Calculated from:

- Life expectancy,
- Education,
- Income.

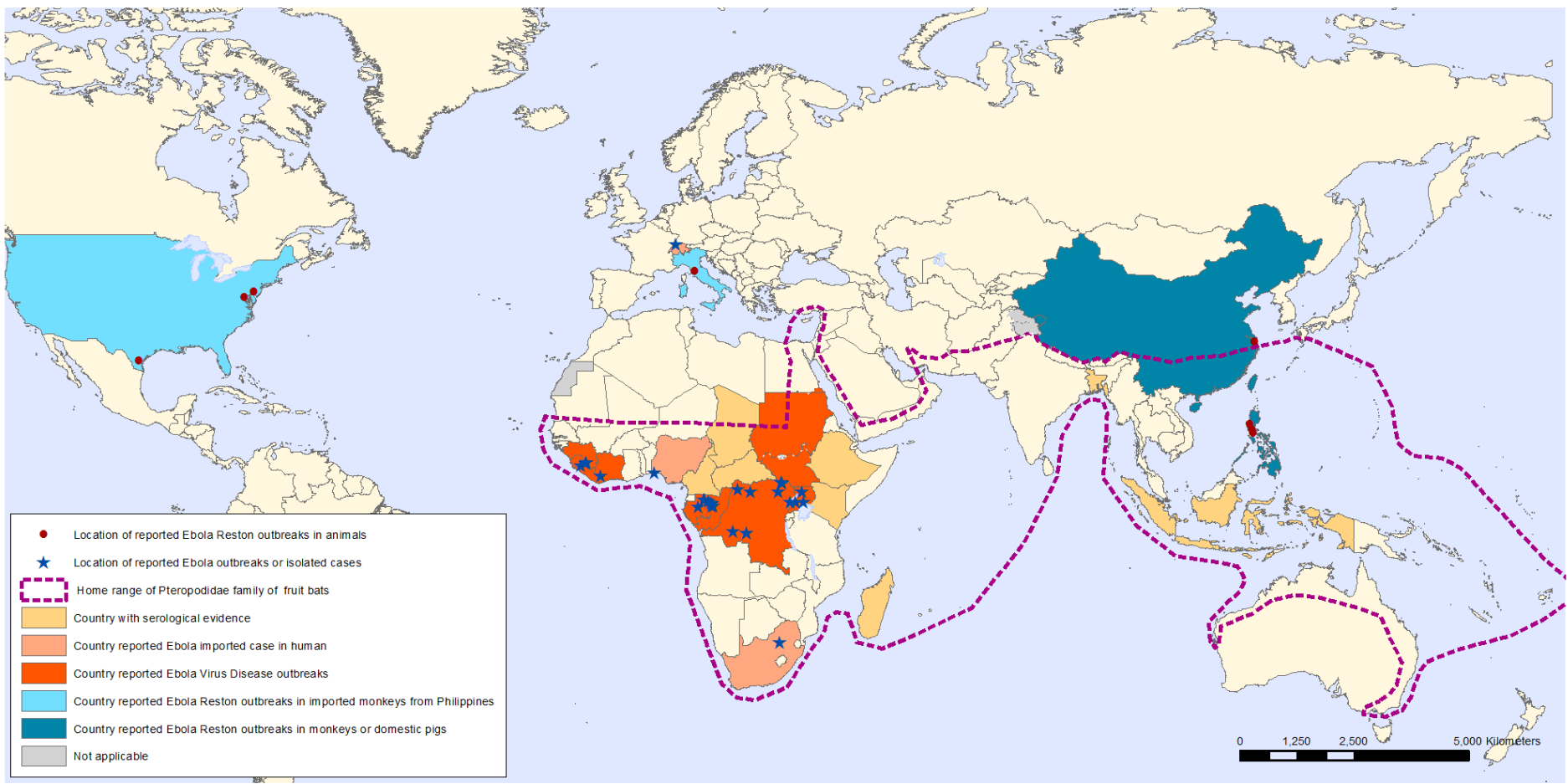


# 2013 HDI



# 2014 Ebola Outbreaks

## Geographic distribution of Ebola virus disease outbreaks in humans and animals



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization  
 Map Production: Health Statistics and Information Systems (HSI)  
 World Health Organization



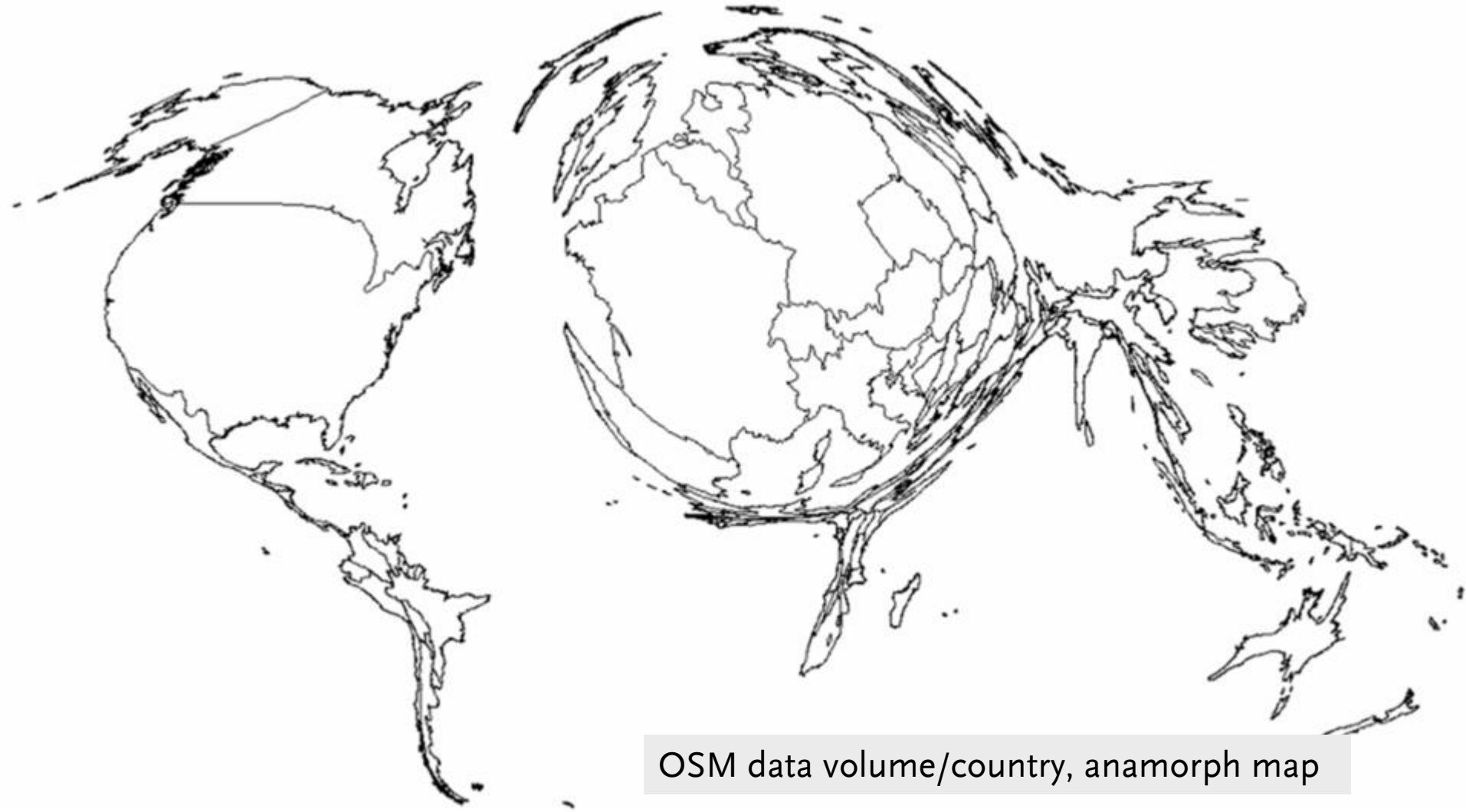
© WHO 2014. All rights reserved.

# 1. Internet 4.0 & Mapping

**HDI & Ebola outbreaks are spatially correlated.**

## 2. OSM & Crisis Mapping

## 2. OSM & Crisis Mapping



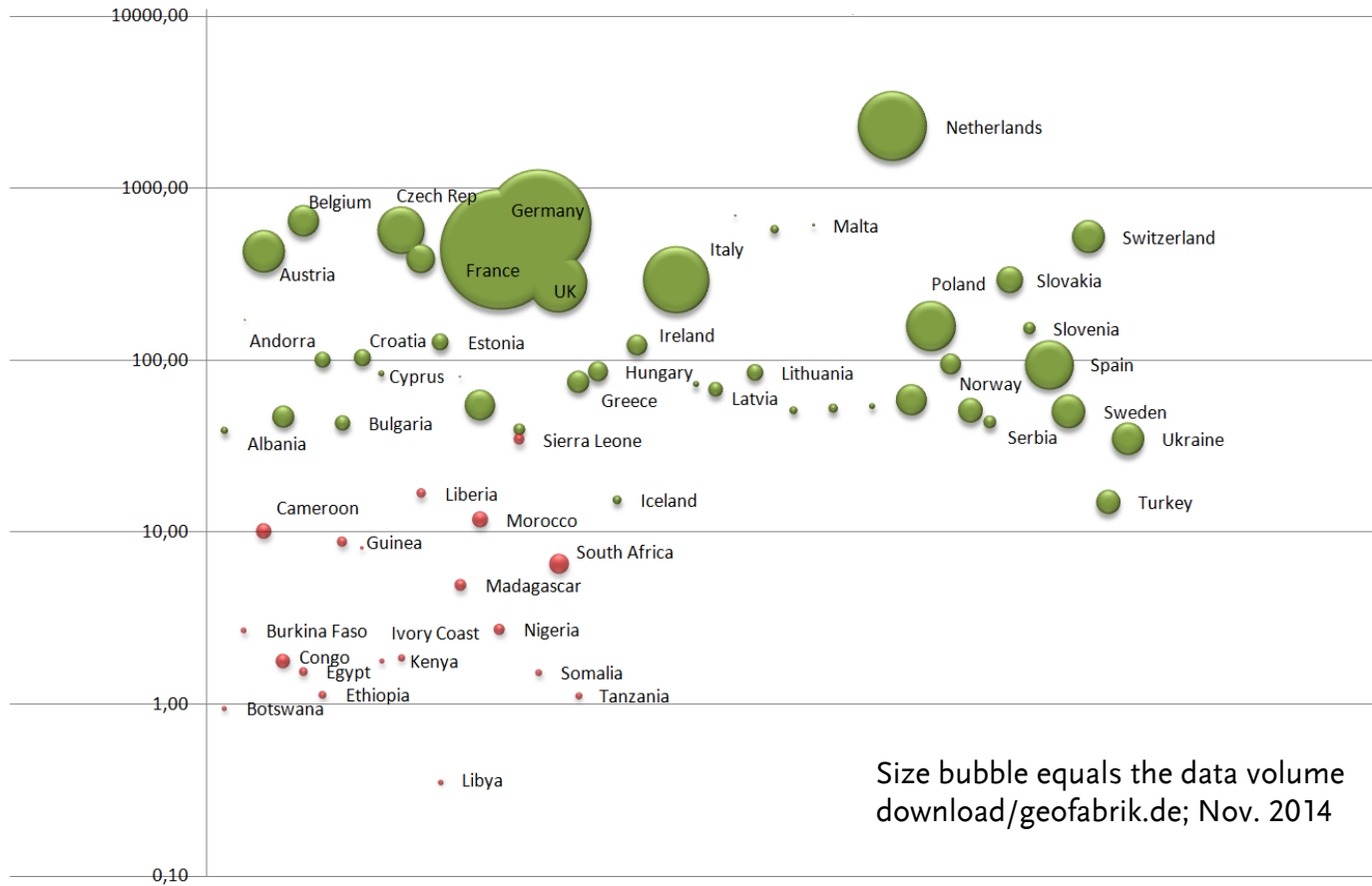
OSM data volume/country, anamorph map

## 2. OSM & Crisis Mapping

- OSM – Area Index; (OSM-F).
- Calculated from:  
OSM data volume / Area  
  
→ Lybia: 0,36; Germany: 616;  
Netherlands: 2267; Monaco: 10000 (November 2014).
- OSM-F: Indicator for the voluntary OSM mapping activity.

# 2. OSM & Crisis Mapping

## African & European Countries OSM-F



# 3. HOT Voluntary Mapping



### 3. HOT Voluntary Mapping

- HOT – Humanitarian OpenStreetMap Team.
- Initiative of non governmental organizations, e.g. American Red Cross, British Red Cross.  
→ Disaster response units.
- Need essentially geodata & maps of an affected area (in a short time).
- Many disaster areas are not in focus of any mapping activity.

**Neither administration nor public!**

### 3. HOT Voluntary Mapping

- HOT arranges and coordinates mapping activities.
- VGI is the keyword & VGI stands for OSM.
- HOT has established an arbitrary workflow:
  - To produce geodata and load it into the database,
  - To add attribute information &
  - To verify the data finally.

# 3. HOT Voluntary Mapping

HOT workflow in detail:

- Tasking manager: <http://tasks.hotosm.org/>.
- Select your task, it is on your choice.
- Select a tile (1x1km<sup>2</sup>), it is locked for 120min.
- Digitize objects and upload it to the OSM DB.
- Attribute information is not necessary.
- Map an entire tile until it is completed.
- Attributes are added later → cloud cooperation.

# 3. HOT Voluntary Mapping

1

## #728 Missing Maps: Nyaruguru, Rwanda

81%

- Author: **American Red Cross**
- Requesting Organization: **Missing Maps**
- Priority: **Medium**



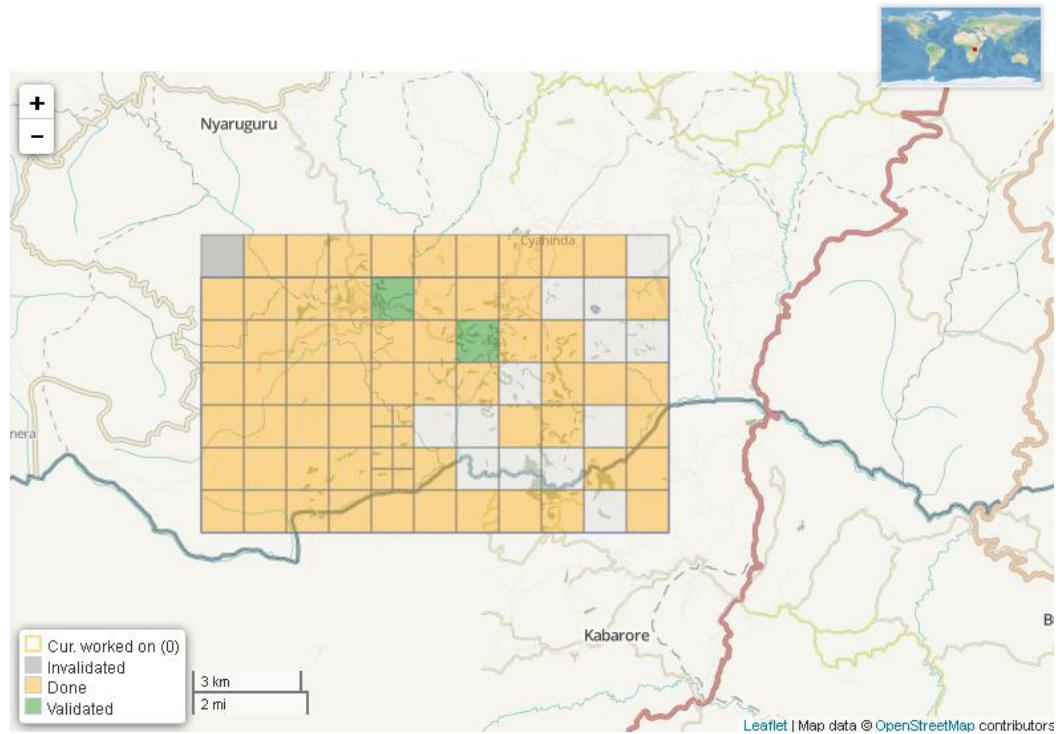
The American Red Cross, with support from [MapGive](#) is beginning long term disaster risk reduction programming in Nyaruguru, Rwanda. The Red Cross hopes to capture GIS data using OSM and needs more detailed basemap data (roads, land features, rivers) to assist in the project design phase. The maps produced will be used to create more efficient and grounded programs to reduce the risk of disease and environmental disaster from affecting the communities in Nyaruguru, Rwanda.

The purpose of this task is to trace roads, rivers, land features, major buildings, and other landmarks.

Erstellt von [dkunce](#) - Upgedated vor etwa einem Monat - Priorität: mittel

# 3. HOT Voluntary Mapping

2





American Red Cross

# Disaster Operations Center

8:29 SYDNEY 7:29 TOKYO 8:29 GUNI 11:29 AMER SAMOA 12:29 HAWAII 1:29 ALASKA 2:29 PACIFIC 3:29 MOUNTAIN 4:29 CENTRAL 5:29 EASTERN

### Missing Maps

**TODAYS TASKS**

- #720 - Missing Maps Leyte, Philippines  
Map: [https://www.openstreetmap.org/#map=12/10.833333333333333/124.83333333333333](#)  
ChangeLog: [#missingmaps-120](#) #MissingMaps #OpenStreetMap
- #721 - Missing Maps Hwange, Zimbabwe  
Map: [https://www.openstreetmap.org/#map=12/17.083333333333333/28.833333333333333](#)  
ChangeLog: [#missingmaps-121](#) #MissingMaps #OpenStreetMap
- #722 - Missing Maps Luanda, DRC  
Map: [https://www.openstreetmap.org/#map=12/-11.833333333333333/15.833333333333333](#)  
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**WEBSITES**

- OpenStreetMap  
<https://www.openstreetmap.org>
- OpenStreetMap tasking Manager  
<https://tasks.openstreetmap.org>

**ENTITIES TO MAP**

- Roads
- Buildings
- Rivers
- Major features
- Landuse
- Residential Areas

**WI-FI INFO**

Network: 24b\_dsl or 50b\_dsl  
Password: disaster

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### 3. HOT Voluntary Mapping

- Meaning, e.g. attributes, will be added later to the objects → local knowledge is essential(!).
- Real cloud mapping in cooperation.
- Success model during the 2014 Ebola outbreak; HOT action after the Nepal earthquake aftermath.

## 4. Result & Conclusions



# OpenStreetMap Activities for Ebola Response (2014)

## General Information

Number of OSM Contributors: 2,170  
Number of Map Changes: 11,024,404  
(Total number of Changesets: 74,951)  
(Number of visualized Changesets with >= 400 Map Changes: 7,151)

## If you want to help?

Go to the OpenStreetMap Wiki page [West Africa Ebola Response \(2014\)](#)

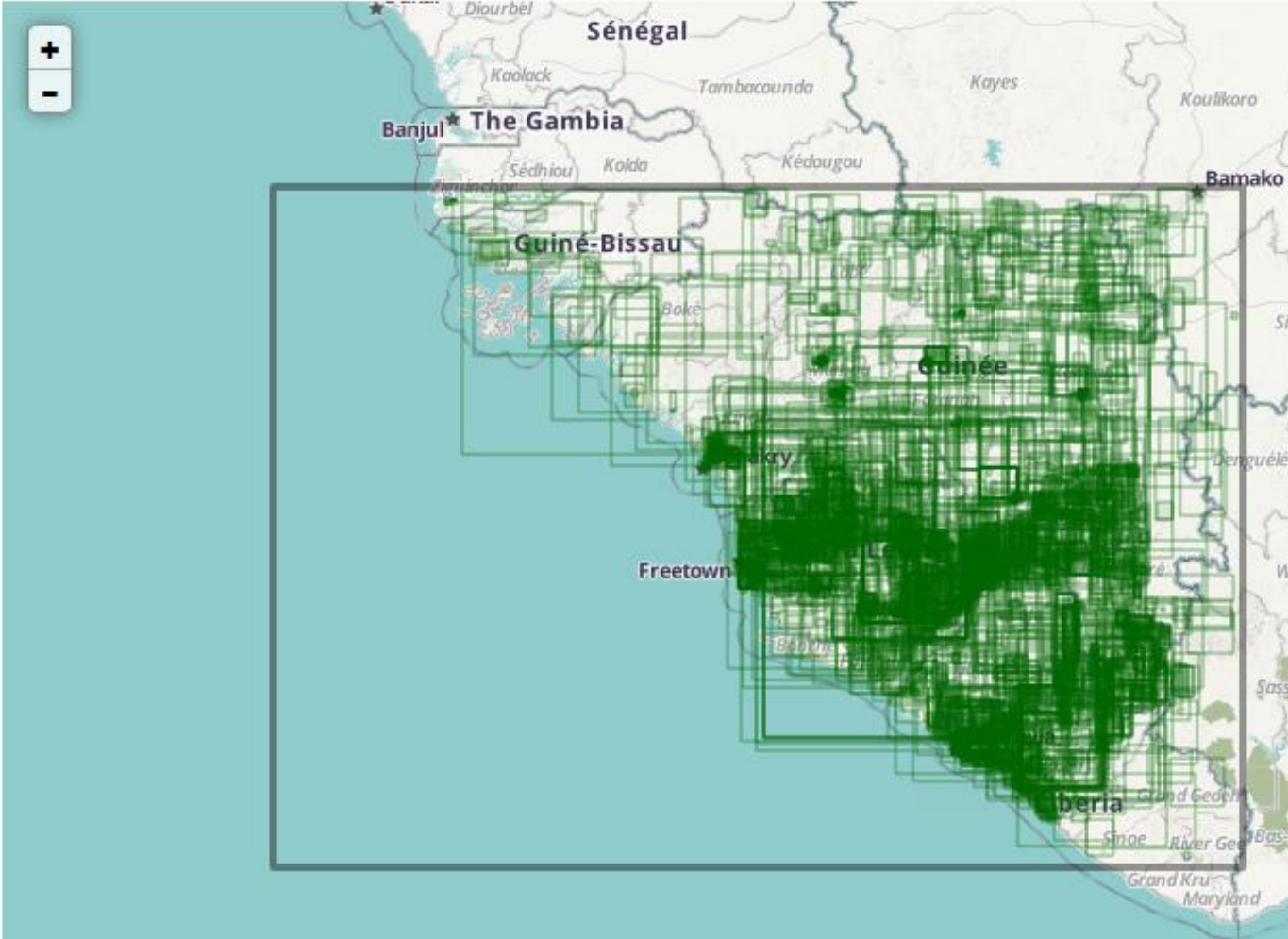
Additional information can be found at [Humanitarian OSM Team \(HOT\) Mailing-List](#)

## Who helped?

[Blog Post](#) about this website

## Legend

- Analysis Extent
- OSM Changesets



[http://wiki.openstreetmap.org/w/images/0/06/Ebola\\_Outbreak\\_changesets\\_vis.png](http://wiki.openstreetmap.org/w/images/0/06/Ebola_Outbreak_changesets_vis.png)

## 4. Result & Conclusions

### OSM-F changes Nov-Dec. 2014 sel. A & EU countries

Cont.	Country (Ebola outbr.)	OSM-F change %
A	Guinea (2164)	119,63
A	Burkina Faso	117,81
A	Ivory Coast	114,04
A	Kenya	107,41
A	Botswana	107,27
A	Sierra Leone (7312)	104,94
A	Liberia (7635)	104,89
A	Congo Dem. Republic	104,78
A	Cameroon	104,39
A	Morocco	103,85

Cont.	Country (Ebola outbr.)	OSM-F change %
EU	Czech Republic	103,62
A	Guinea-Bissau	103,45
EU	Albania	102,70
EU	Poland	102,65
A	South Africa & Lesotho	102,53
EU	Hungary	102,53
EU	Ukraine	102,40
A	Ethiopia	102,40
EU	Ireland	102,35
EU	Belarus	102,06

## 4. Result & Conclusions

Deficits of HOT voluntary mapping:

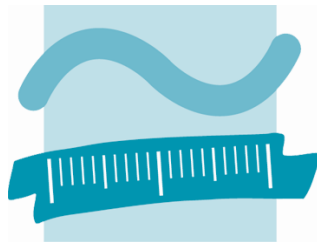
- Untrained mappers sometimes not familiar with Earth objects.
- Checking/verifying by professional mappers is time consuming &
- Frustrating (in case untrained mappers change an already proofed tile).

### Conclusion

**HOT OSM VGI is a mapping success story.**

# THANKS

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