



# A mobile application for reporting disease incidents

## EO2HEAVEN

Earth Observation and ENVironmental modelling for the mitigation of HEAlth risks

EU FP7 244100 2/2010-5/2013

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Fraunhofer IOSB

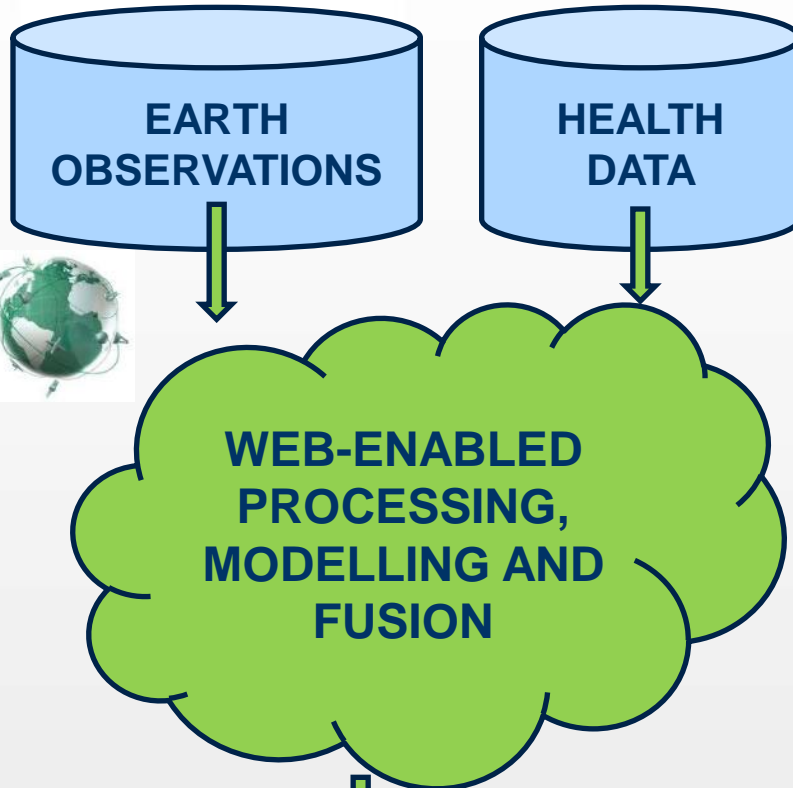


Royal Tropical Institute



**Fraunhofer**

IOSB



## Air Quality and/or Aeroallergens



Image: UKZN

Durban,  
Saxony

## Water borne disease cholera

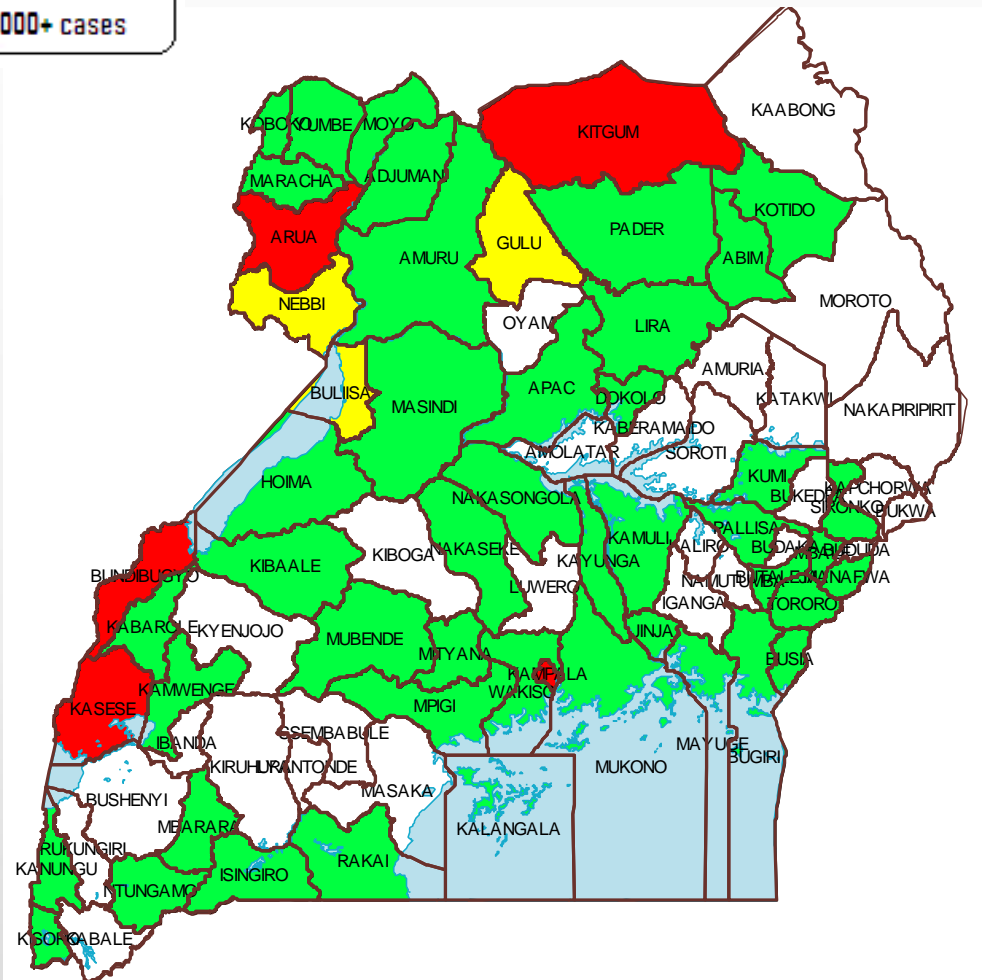
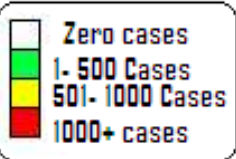


Image: S. Woodborne, CSIR

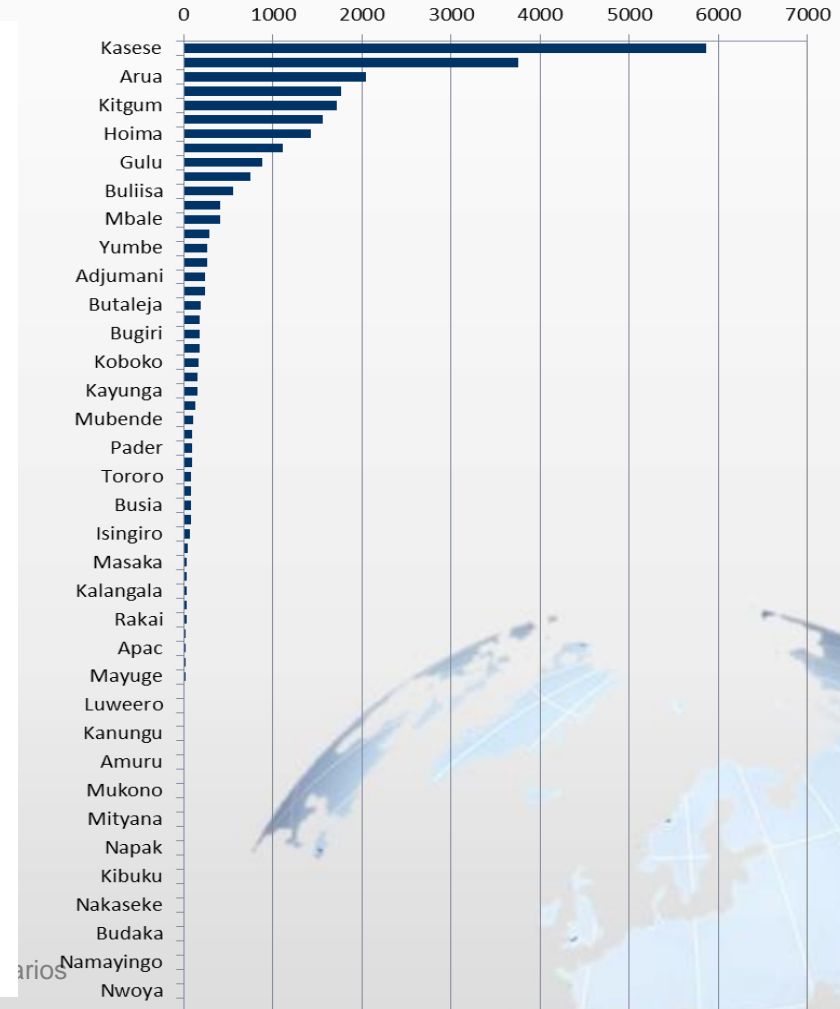
Uganda

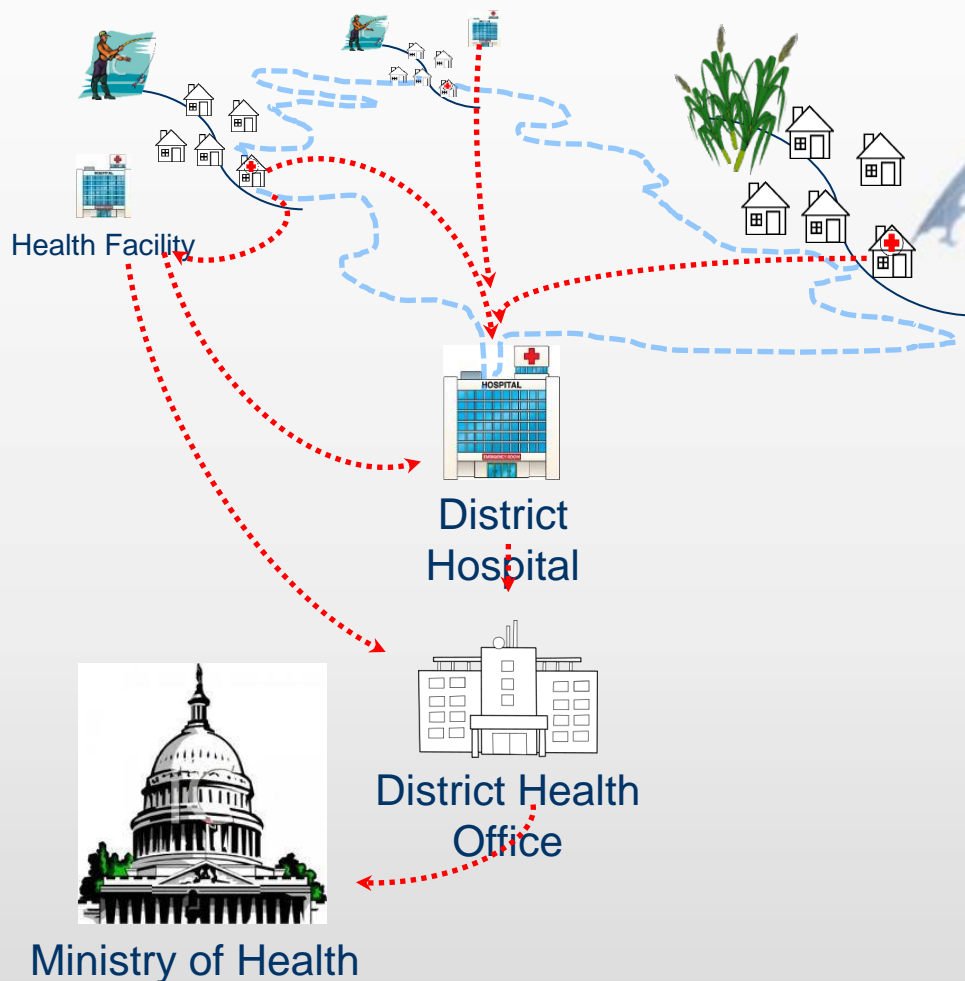
**RISK MAPS  
ALERTING  
TOOLS**

# Distribution of cholera cases in Uganda, 2005-2009



Total nr of cholera cases reported in 68 districts in Uganda ,per districts, 2002-2012





1. New cases directly reported to DHO

2. Confirmed cases are directly reported to the MoH

3. Weekly cholera reports are sent to the DHO (33b)

4. Monthly modifiable disease reports sent to the ministry

5. Ministry reports to international community

# Current recording procedure

**COMMUNICABLE DISEASE SURVEILLANCE FORM (CDC/CDD)**  
**UNIT BWERA HOSPITAL DISEASE CHOLERA DATE ...**

DATE	VILLAGE	SUB COUNTY	SEX	AGE	DATE ON SET OF ILLNESS	SIGN AND SYMPTOM				Status
						D	V	A	R	
270. 22/10/2012	Mtshamba	MPLTC	F	46	22/10/2012					Dead
271. 10/12/2012	Karambwi I	SANGE	F	90	09/12/2012	✓	✓	✓	✓	Dead
272. 11/12/2012	Karambwi	Nyungu	F	35	09/12/2012	✓	✓	✓	✓	Input
273. 11/12/2012	Karambwi	MPLTC	F	23	11/12/2012	✓	✓	✓	✓	Input
274. 11/12/2012	Karambwi	Karambwi	F	60	10/12/2012	✓	✓	✓	✓	Input
275. 11/12/2012	Karambwi I	SANGE	M	17	11/12/2012	✓	✓	✓	✓	Input
276. 11/12/2012	Karambwi	Karambwi	F	20	11/12/2012	✓	✓	✓	✓	
277. 11/12/2012	Karambwi	Nyungu	F	20	11/12/2012	✓	✓	✓	✓	
278. 11/12/2012	Karambwi	MPLTC	F	49	11/12/2012	✓	✓	✓	✓	
279. 12/12/2012	Karambwi	MPLTC	F	15	12/12/2012	✓	✓	✓	✓	
280. 12/12/2012	Karambwi	Nyungu	F	50	12/12/2012	✓	✓	✓	✓	
281. 13/12/2012	Karambwi	SANGE	F	30	12/12/2012	✓	✓	✓	✓	
282. 13/12/2012	Karambwi	MPLTC	M	45	12/12/2012	✓	✓	✓	✓	
283. 13/12/2012	Karambwi	SANGE	F	70	13/12/2012	✓	✓	✓	✓	
284. 13/12/2012	Karambwi	TANZANIA	M	27	13/12/2012	✓	✓	✓	✓	
285. 14/12/2012	Karambwi	BURUNDI	F	35	14/12/2012	✓	✓	✓	✓	
286. 14/12/2012	Karambwi	MUNIKUNGU	F	31	14/12/2012	✓	✓	✓	✓	
287. 14/12/2012	Karambwi	MUNIKUNGU	F	44	14/12/2012	✓	✓	✓	✓	
288. 15/12/2012	Karambwi	BURUNDI	F	26	15/12/2012	✓	✓	✓	✓	
289. 15/12/2012	Karambwi	SANGE	F	28	15/12/2012	✓	✓	✓	✓	
290. 16/12/2012	Karambwi	MUNIKUNGU	F	40	16/12/2012	✓	✓	✓	✓	
291. 16/12/2012	Karambwi	MPLTC	F	2	16/12/2012	✓	✓	✓	✓	
292. 17/12/2012	Karambwi	MPLTC	F	48	17/12/2012	✓	✓	✓	✓	
293. 17/12/2012	Karambwi	MPLTC	F	35	17/12/2012	✓	✓	✓	✓	
294. 18/12/2012	Karambwi	MUNIKUNGU	F	8	18/12/2012	✓	✓	✓	✓	
295. 18/12/2012	Karambwi	MUNIKUNGU	M	27	18/12/2012	✓	✓	✓	✓	
296. 18/12/2012	Karambwi	MPLTC	M	36	18/12/2012	✓	✓	✓	✓	

Paper sheets filled in by hand

Difficult to read correctly

Variations in spelling of the Village and Subcounty

Often incomplete

## Current recording procedure



Photo: KIT

Paper sheets were archived in folders

The cholera patient data have to be typed into an Excel-sheet

Several time delays hinder an early detection of the beginning of a cholera outbreak

Incomplete, missing and duplicate records hinder research



# Design requirements

An application for recording cholera cases, on a handheld mobile device, using possibly unreliable internet technologies



# Design requirements

- Easy to use without the need of special IT knowledge
  - User friendly data input
  - Auto-complete village & county names
- Integrates into existing workflows
  - Printable weekly records
  - Export to Excel
- Records must be updateable
- Fully functional with no or bad Internet connectivity
  - Reliable data transfer
- No Server → Device patient data transfer





# Architectural design

- Android 2.3.3 and higher, native application
- Local patient database on the device
- Local village database
  - Sub-county, county, district relations
  - Coordinates
- Maps rendered from local vector files
- Communication to server using
  - HTTPS REST
  - JSON encoded data
- Export of patient data as CSV
- Export of “old style” patient line list as PDF



# Current prototype

EO2Heaven Patient Registration

← → 🔍 ⊕ ☰

### Patients 125 to 150 of 150

150 Marco rijnberk, 45y ♂ ● Bwera, Kakone II	D R V	Improved Nov 29, 2012
149 Jona markus, 8y ♂ ● Karambi, Karughe	D A	Unknown Nov 28, 2012
148 Martin drinhuijzen, 62y ♀ ● Kyarumba, Nyakabale	R V	Unknown Nov 27, 2012
147 Daniel van winzum, 89y ♀ ● Bwesumbu, Kinyamagana	D A	Improved Nov 27, 2012
145 Martin munnickhuijzen, 40y ♂ ● Kyarumba, Matembe	A	Died Nov 23, 2012
146 Sabrina bavelaar, 65y ♀ ● Kisinga, Kamughobe II	A	New Nov 23, 2012
144 Johanna swart, 59y ♂ ● Karusandara, Sebwe		Improved Nov 16, 2012
143 Sandra hahn, 83y ♂ ● Isango, Kamukumbi I	D R V	Unknown Nov 16, 2012
142 Niklas mcconnel, 28y ♂ ● Mahango, Kyabwenge	D R	Improved Nov 15, 2012
141 Luca zielschot, 3y ♀ ● Kyarumba, Kanyantsi I	R A	Improved Nov 11, 2012
140 Zoe van der toorn, 4y ♀ ● Maliba, Mpumuro	D R	Unknown Nov 8, 2012
139 Melanie tsioupra, 72y ♀ ● Kyondo, Kinyabisiki	D R A	Improved Nov 7, 2012
138 Claudia van sam, 31y ♀ ● Muhokya, Bwananule	D	Died Nov 6, 2012
137 Jan van gorcum, 59y ♂ ● Maliba, Maliba I		Died Nov 2, 2012
136 Alina van der velden, 72y ♂ ● Bulembia division, Kyaniukvi	D V	Unknown Nov 2, 2012

### Patient Data:

#### Patient

Given Name Daniel

Family Name van winzum

Sex Female

Age 89 Years

Registered Nov 27, 2012

Health Facility Random

Status **Improved**

#### Symptoms

Ill since Nov 25, 2012

Diarrhea Yes

Dehydration No

Vomiting No

Abdominal pain Yes

Cholera diagnosis Not Cholera

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#### Home Town

District Kasese

County Busongora

Subcounty Bwesumbu

Village Kinyamagana

#### Comments

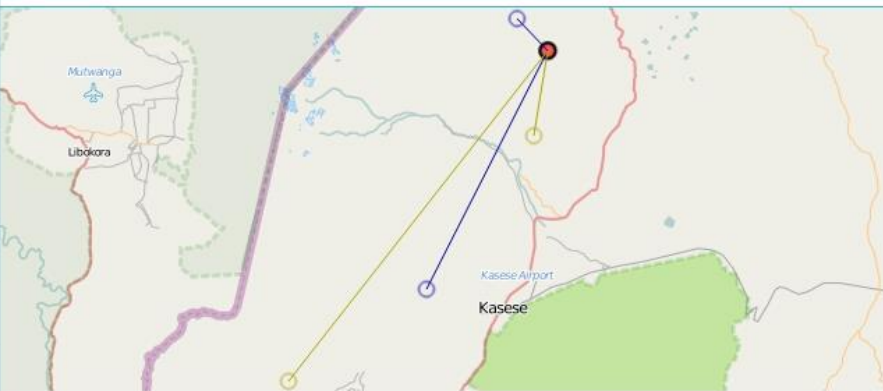
Randomly Generated

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#### Epidemiological Information

Primary water source unknown

Water treatments



Online

← 🏠 📄 🔍 ⬆️
11:51
📶 🔋

# Current prototype

EO2Heaven Patient Registration

Update Patient:

Patient		Symptoms	
Given Name	Daniel	Ill since	Nov 25, 2012
Family Name	van winzum	Diarrhea	Yes
Sex	Female	Dehydration	No
Age	89 Years	Vomiting	No
Registered	Nov 27, 2012	Abdominal pain	Yes
Health Facility	Random	Cholera diagnosis	Not Cholera
Status	Improved	Comments	
Home Town		Randomly Generated	
District	Kasese	Epidemiological Information	
County	Bukonjo	Primary water source	river
Subcounty	Subcounty	Water treatments	boiling
Village		Social Gatherings	
		Contacts with patents	None Given...
		Markets visited	Kalingwe Kisinga Bukonjo Kasese Nyangerere Maliba Busongora Kasese
		Travel Destinations	Butwetse Bwesumbu Busongora Kasese Kibandama II Kilembe Busongora Kasese

Save Changes

13:43

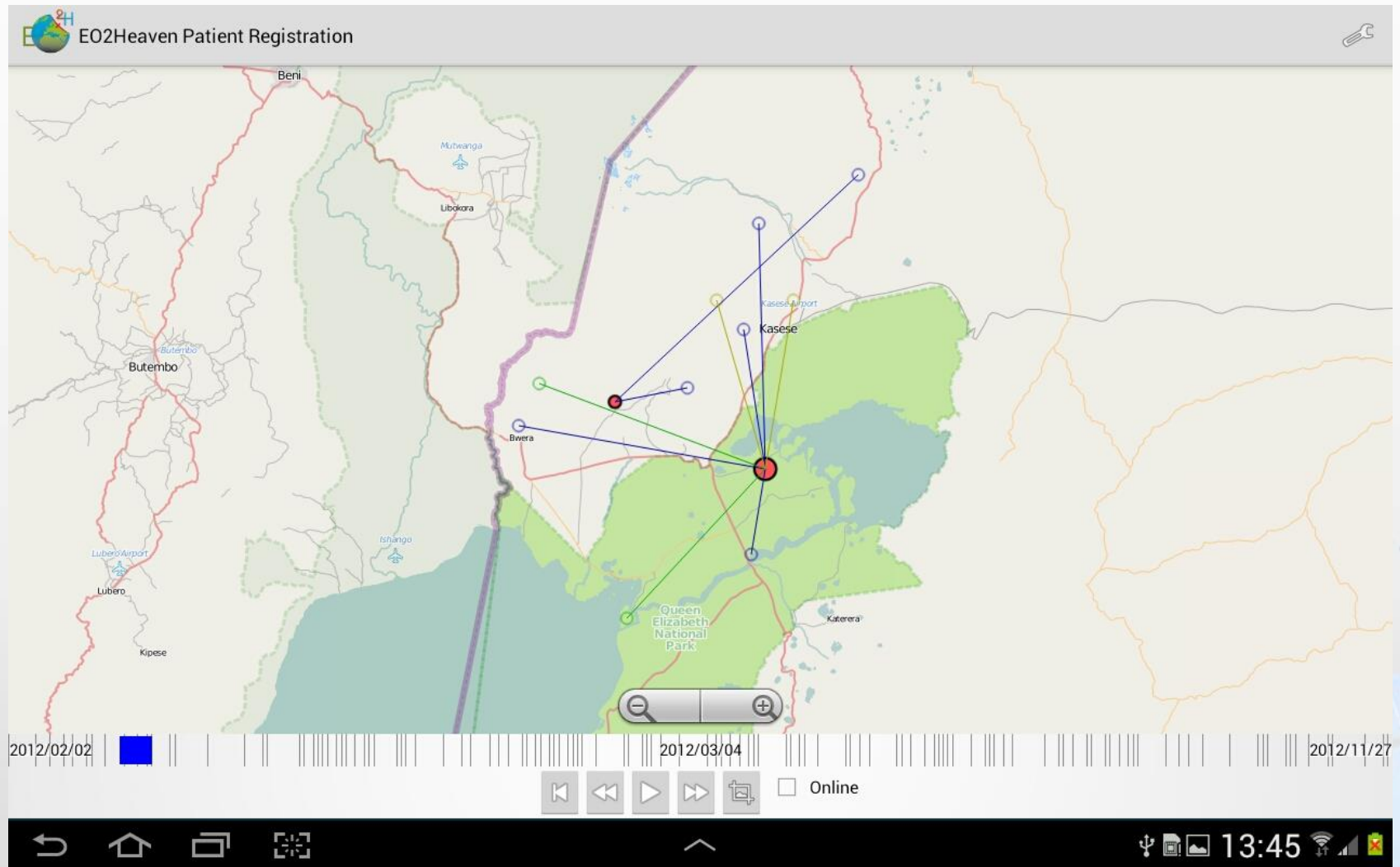
EO2Heaven Patient Registration

Family Name: Doe  
Sex: Male  
Age: 55

District: Kasese  
County: Bukonjo  
Subcounty: Subcounty  
Village: Ikobero, Irughe, Isango

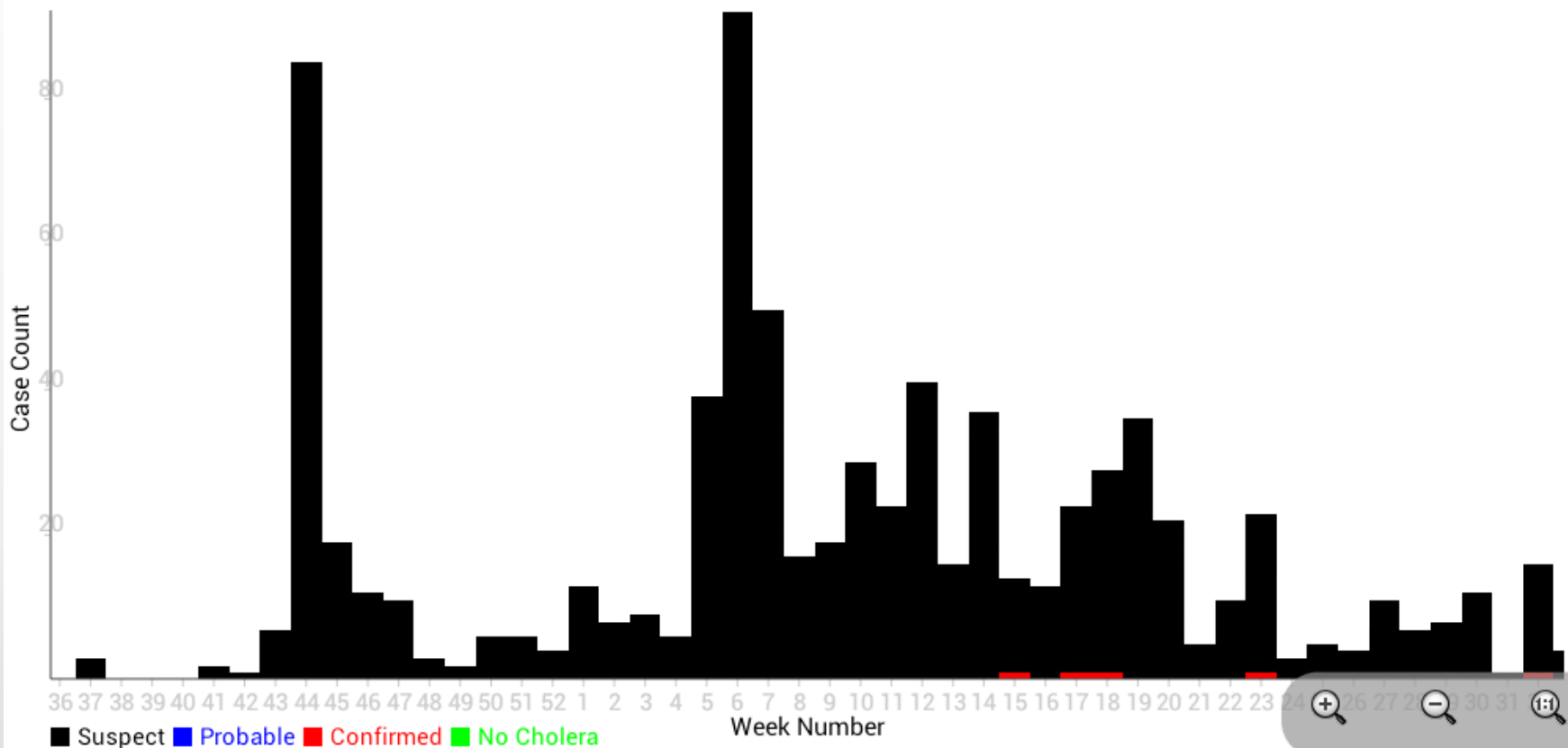
14:34

# Current prototype



# Current prototype

E<sup>2</sup>H Patients per week



# Workshops in Uganda





# After EO2HEAVEN

- OGC Domain working group „Health“
- Standards to transfer health & epidemiological data





# Thank you for your attention

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[www.eo2heaven.org](http://www.eo2heaven.org)

More on EO2HEAVEN tomorrow @ 15.00

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