

# 2018



**10. TMF-Jahreskongress**  
 14.–15. März 2018 | HAMBURG

Digitalisierung in der Medizin –  
 Chancen für Forschung und Versorgung

Information und Anmeldung:  
[www.tmf-ev.de/Jahreskongress](http://www.tmf-ev.de/Jahreskongress) | #tmfj18





Surveillance, Outbreak Response Management  
 and Analysis System

## Surveillance, Outbreak Response Management and Analysis System- SORMAS®

Digitization in medicine - opportunities for research and care

# History of SORMAS

- Based on the experience of Ebola 2014 in Nigeria
- Funded by German Government
  - Federal Ministry for Research and Education (BMBF)
  - Gesellschaft für Internationale Zusammenarbeit (GIZ)
  - German Centre for Infection Research (DZIF)



- Developed by Nigerian and German Partners
  - African Field Epidemiology Network
  - Nigerian Center for Disease Control
  - Helmholtz Center for Infection Research
  - Symeda, GmbH



# History of SORMAS



sormas

Surveillance, Outbreak Response Management  
and Analysis System

- Successful 5-week field pilot in 2 states in Nigeria (July 2015)
- Design thinking and test workshops with users from Nigeria
  - March 2015, Potsdam, Germany
  - October 2015, Braunschweig, Germany
  - August 2016, Abuja, Nigeria
  - April 2017, Braunschweig, Germany
  - August 2017, Abuja, Nigeria



# Objectives & scope of SORMAS



sormas

Surveillance, Outbreak Response Management  
and Analysis System

## Ebola outbreak 2015 highlighted need for comprehensive mHealth tool

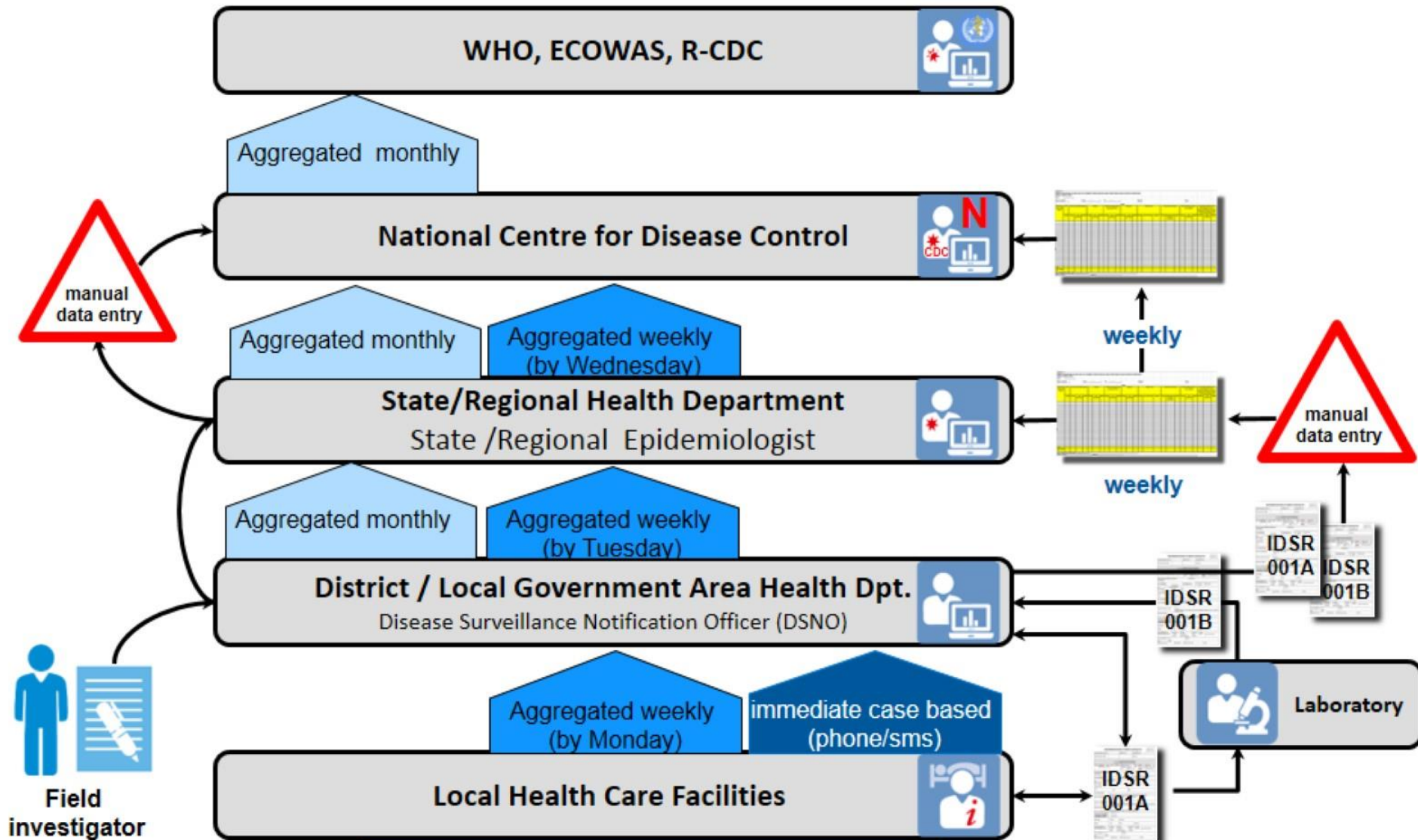
### Requirements:

- Real time data processing
- Interactive task management (including contact tracing)
- Fully digitalized
- Suitable for remote, low resource setting
- User centered design
- Open source

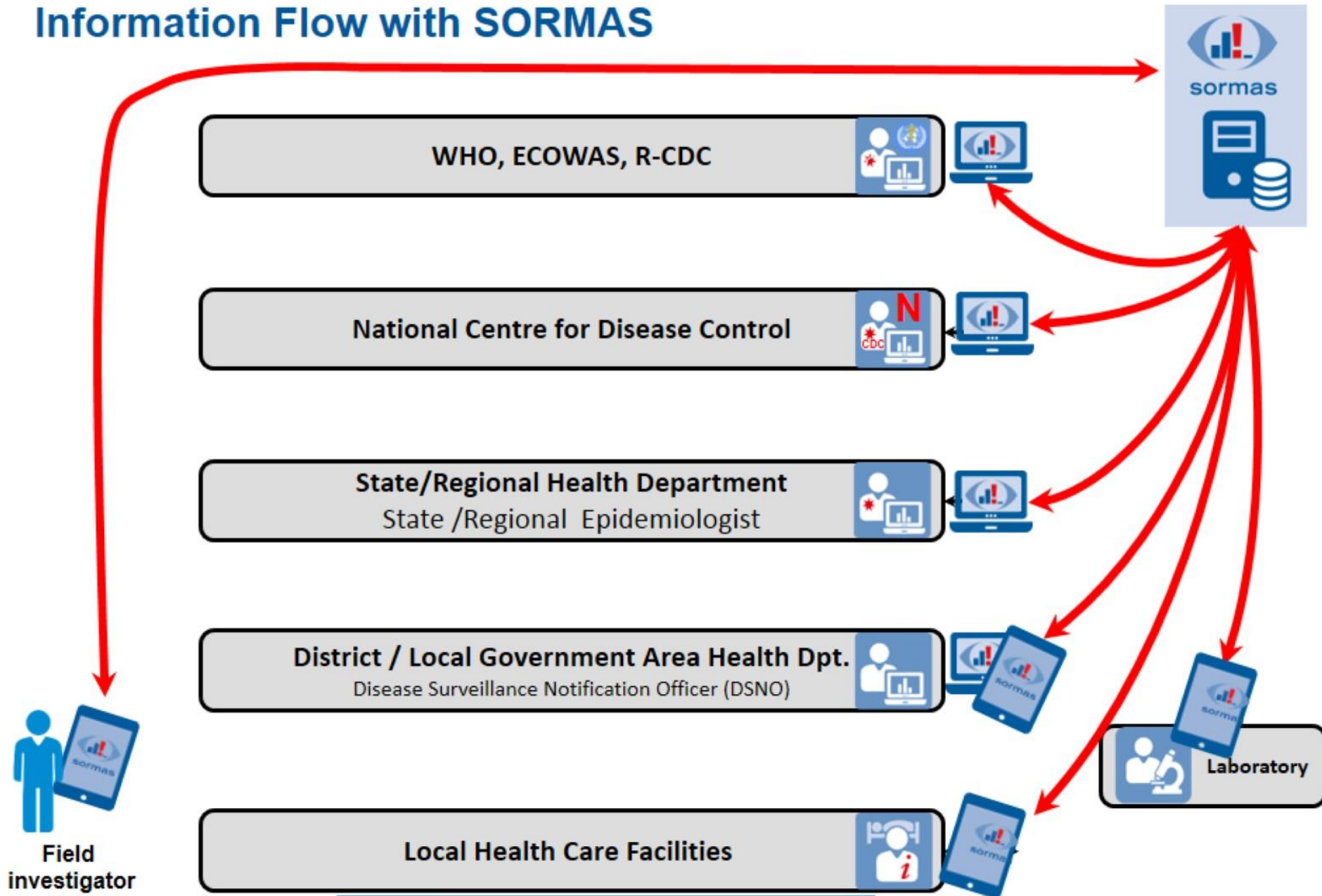


INFECTION RESEARCH

# Integrated Disease Surveillance and Response System (IDSR) Conventional Information Flow




# Integrated Disease Surveillance and Response System (IDSR) Information Flow with SORMAS








# Personas / users of SORMAS



- 

**Community Informant**  
refers suspect cases in community to hospital informant
- 

**Hospital Informant**  
Notifies suspect cases
- 

**Point of Entry Officer**  
Notifies suspect cases at airports, ports and border crossing
- 

**Rumour Officer**  
**State DSNO**  
Receives calls on events from general population

- 


**Surveillance Officer**  
**LGA-DSNO**  
Investigates case, identifies contact persons
- 


**Surveillance Supervisor**  
**State epidemiologist**  
Coordinates surveillance officers
- 


**Laboratory Officer**  
Documents and reports laboratory results
- 


**National CDC**  
**Incident Command Centre**  
Assesses risk, coordinates national response
- 

**Supranational Centre**  
**Regional CDC, WAHO, WHO**  
International coordination

- 

**Case Officer**  
Executes case based control measures (eg. isolation)
- 

**Case Supervisor**  
**MD, head of isolation facility**  
Coordinates case based control measures
- 

**Contact Officer**  
**Assistant LGA-DSNO**  
Conducts follow-up of contact persons
- 

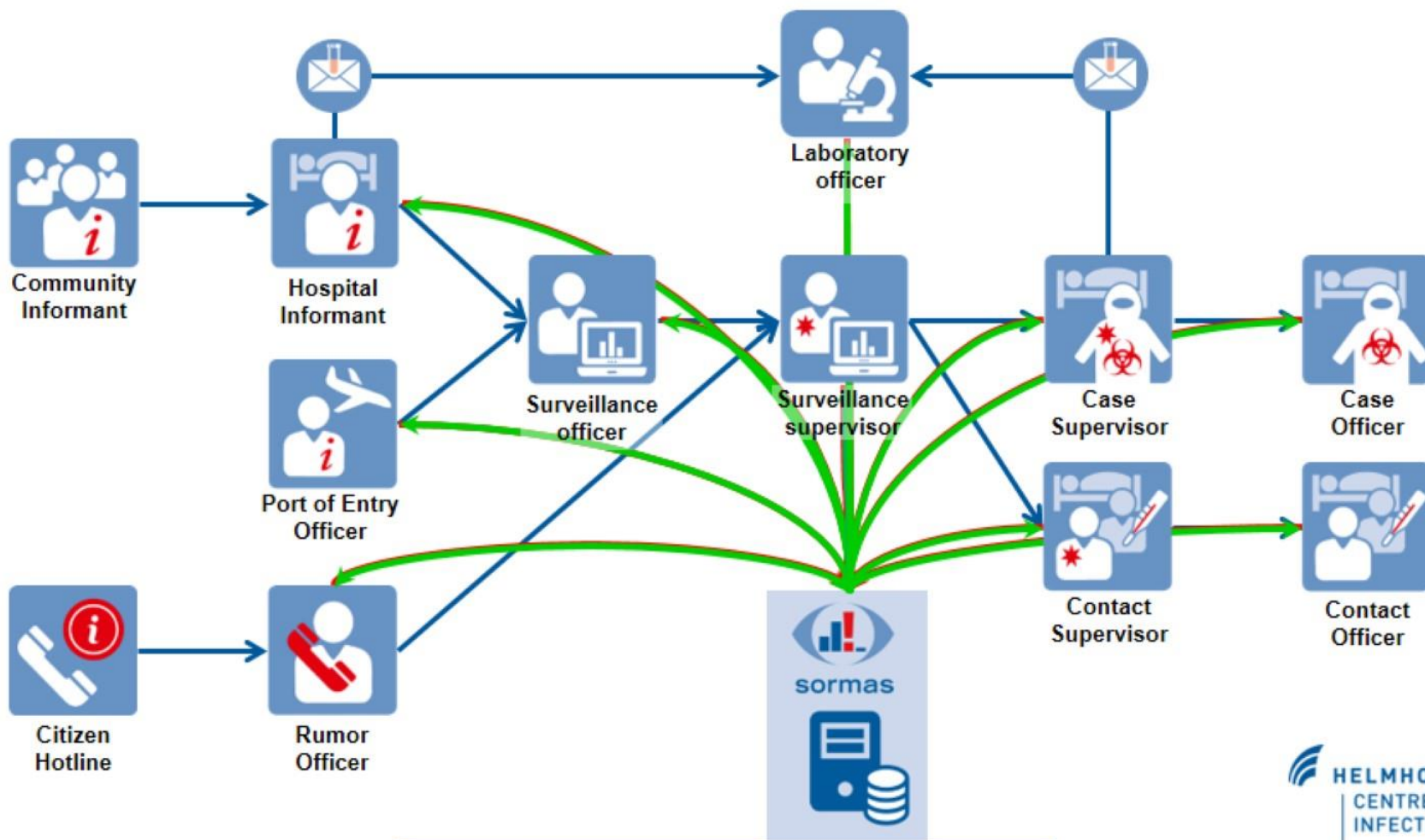
**Contact Supervisor**  
**State epidemiologist**  
Coordinates follow-up of contact persons

# Surveillance and Response Work Flow in SORMAS<sup>®</sup>-open (eg. Ebola)

**Detect**  
notifications, screenings, rumors

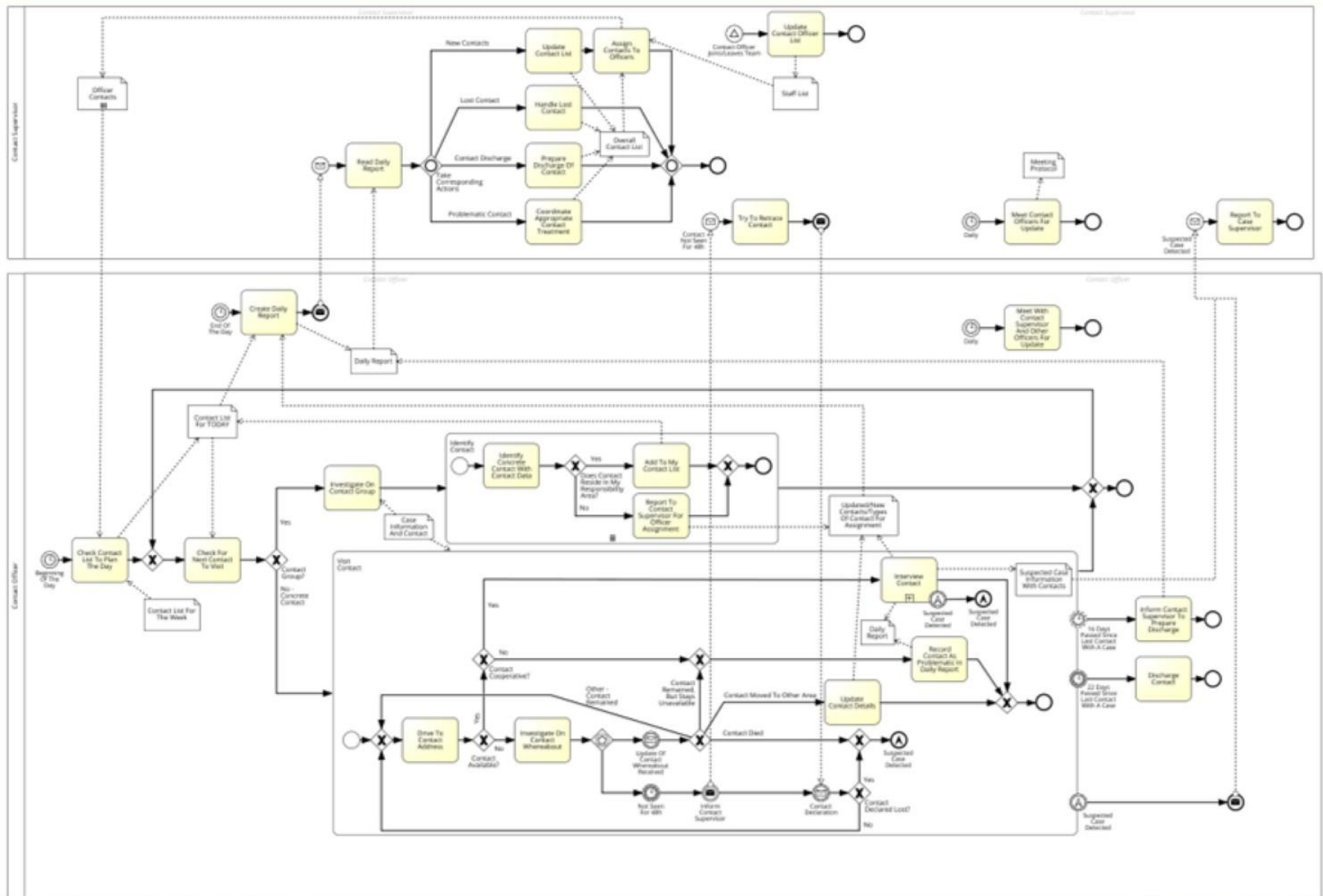
**Validate & Analyse**  
cases, controls, outbreaks

**Control**  
isolation, treatment, follow-up





# Process Model Ebola Virus - Contact Follow-up



# Persona Profile: Laboratory Officer



sormas

Surveillance, Outbreak Response Management  
and Analysis System

## Tasks

- Receives collected specimens from suspected cases from Surveillance supervisor
- Coordinates the laboratory sampling procedure and collection of results in hers/his respective laboratory
- Documents tests done, test results and gives feedback to Surveillance supervisor
- Coordinates specimen referrals for higher level laboratories when needed

## Needs

- to get informed about incoming samples from surveillance supervisor
- to acknowledge the received samples
- to enter the information on the samples
- to have line list of tested specimens with results

## Interaction/Dependencies with/other personas

- Surveillance supervisor

## Artefacts (Input/Output)

- Laboratory investigation form

# Specific Process Models for 10+ Diseases

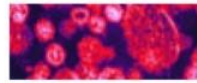


sormas

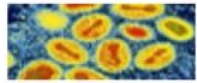
Surveillance, Outbreak Response Management and Analysis System



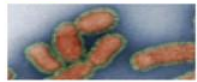
**Ebola Virus**



**Lassa Virus**



**Monkeypox Virus**



**Avian Influenza Virus**



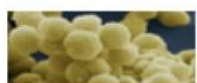
**Dengue Virus**



**Yellow Fever Virus**



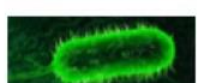
**Measles Virus**



***Neisseria meningitidis***



***Yersinia pestis***



***Vibrio cholera***



**Emerging Pathogen X**

**Contact Follow-up**

**Veterinary Health**

**Vector Control**

**Vaccination**

**Chemoprophylaxis**

**Environmental Sanitation**

**Ad-hoc configuration**





# Surveillance officer

Case - SurvOff  
Case Jane DOE (WWAYID)

PATIENT HOSPITALIZATION SYMPTOMS EPIDEMIOLOGY

Select ent Select ent Select ent

Age Unit  
Enter value Select entry

Gender  
Select entry

Present condition  
Select entry

Phone number Owner of phone  
Enter value Enter value

Permanent residence of person  
 Enter location

Occupation  
Type of occupation  
Select entry

- Verify
  - Name and contact details



# Surveillance officer

The image shows a smartphone screen displaying the 'Case - SurvOff' application. The app is titled 'Case - SurvOff' and shows a case for 'Jane DOE (WWAYID)'. The interface has three tabs: 'HOSPITALIZATION', 'SYMPTOMS', and 'EPIDEMIOLOGICAL DATA'. The 'HOSPITALIZATION' tab is active. The form displays the following information:

- Most recent hospitalization**
- Hospital name:** Yako Basic Health Clinic
- Date of admission:** Pick date
- Date of discharge:** Pick date
- Isolation:**  Yes  No  Unk
- Was the patient hospitalized or did he/she visit a health clinic previously for this illness?**  Yes  No  Unk

## ■ Verify

- Name and contact details
- Hospitalization data



# Surveillance officer

Case - SurvOff  
Case Jane DOE (WVAYID)

SYMPTOMS EPIDEMIOLOGICAL DATA CONTACTS SAM

Clinical Signs and Symptoms

Current body temperature in °C  
Select entry

Source of body temperature  
Select entry

Please tick an answer for ALL symptoms indicating if they occurred during this illness between symptom onset and case detection:

Clear all Set cleared to No

Abdominal pain  Yes  No  Unk

Acute hearing loss  Yes  No  Unk

Altered level of consciousness  Yes  No  Unk

Anorexia/loss of appetite  Yes  No  Unk

Chest pain  Yes  No  Unk

## ■ Verify

- Name and contact details
- Hospitalization data
- Symptoms and onset dates





# Surveillance officer

The screenshot shows the 'Case - SurvOff' application interface for a patient named Jane Doe (WWAYID). The interface is divided into sections: CASE DATA, PATIENT, HOSPITALIZATION, and SYMPTOMS. The CASE DATA section includes fields for Case ID (WWAYID), EPID number (KNS), Disease (Ebola Virus Disease), Investigation status (Investigation pending), Date of report (26/11/2017 11:26), State (Kano), LGA (Kiru), Ward (Yako Ward), and Health facility (Yako Basic Health Clinic). There are red notification icons next to the EPID number and Case classification fields. A link to 'Move case to another health facility ->' is visible at the bottom.

Field	Value
Case ID	WWAYID
EPID number	KNS
Disease	Ebola Virus Disease
Investigation status	Investigation pending
Date of report	26/11/2017 11:26
State	Kano
LGA	Kiru
Ward	Yako Ward
Health facility	Yako Basic Health Clinic

## ■ Verify

- Name and contact details
- Hospitalization data
- Symptoms and onset dates

## ■ Classify case



# Surveillance officer

**Case - SurvOff**  
Case Jane DOE (WWAYID)

EPIDEMIOLOGICAL DATA CONTACTS SAMPLES TASKS

Epidemiological data  
Please indicate if any of the following is relevant for the patient during the incubation period or illness.

Visited a burial  
 Yes  No  Unk

Visited a social event  
 Yes  No  Unk

Traveled  
 Yes  No  Unk

Animal contacts  
Please indicate an answer regarding ALL animals (live or dead) the person had direct exposure to (e.g. hunt, touch, eat) during the incubation period.

Rodents or their excreta  
 Yes  No  Unk

Bats or their excreta  
 Yes  No  Unk

- Verify
  - Name and contact details
  - Hospitalization data
  - Symptoms and onset dates
- Classify case
- Assess exposures



# Surveillance officer

The image shows a smartphone screen displaying a form titled "Create new sample". The form has a blue header with a back arrow and a lock icon. The status bar at the top shows 67% battery and 11:58. The form fields are:

- Sample data**
  - Name: Jane DOE
  - Sample code: Enter value
- Date and time of sampling \***
  - Pick date
  - Pick time
- Sample material \***
  - Select entry
- Suggested type of test**
  - Select entry
- Laboratory \***
  - Select entry
- Shipped
- Comment**
  - Enter value

- Verify
  - Name and contact details
  - Hospitalization data
  - Symptoms and onset dates
- Classify case
- Assess exposures
- Initiate laboratory testing





# Surveillance officer

The image shows a smartphone screen with the 'Create new contact - SurvOff' app. The interface includes the following fields and options:

- Date of last contact:** A date picker field with a red notification icon.
- First name:** A text input field with a red asterisk.
- Last name:** A text input field with a red asterisk.
- Type of contact - if multiple pick the closest contact proximity:** A radio button selection menu with four options:
  - 1-Touched fluid of source case
  - 2-Direct physical contact with source case
  - 3-Manipulation of clothes or other objects of source case
  - 4-Was in same room or house with source case
- Relationship with case:** A dropdown menu with a red notification icon.
- Contact description:** A text input field.

- Verify
  - Name and contact details
  - Hospitalization data
  - Symptoms and onset dates
- Classify case
- Assess exposures
- Initiate laboratory testing
- Identify contact persons



# Contact Officer

Smartphone displaying the 'Contact - ContOff' app interface for 'Contact Fane DOE (Q24/JMA)'. The screen shows a form with fields for Person details:

- Person
- First name \*  
Fane
- Last name \*  
Doe
- Nickname  
Enter value
- Mother's maiden name  
Enter value
- Date of birth (year / month / day)  
Select ent    Select ent    Select ent
- Age                      Unit  
Enter value              Select entry
- Gender  
Select entry

## ■ Verify

- Name and contact details



# Contact Officer

The image shows a smartphone screen displaying a mobile application interface for a contact officer. The app is titled "Follow-up visit - ContOff". The screen is divided into two main sections: "VISIT DATA" and "SYMPTOMS". Under "VISIT DATA", there is a field for "Date and time of visit" with the value "26/11/2017" and "13:04". Below this is a question "Person available and cooperative?" with three radio button options: "Unavailable", "Available, but uncooperative", and "Available and cooperative". At the bottom of the "VISIT DATA" section is a text input field labeled "Visit remarks" with the placeholder text "Enter value". The smartphone's status bar at the top shows the time as 13:04 and battery level at 66%. The Android navigation bar is visible at the bottom of the phone.

- Verify
  - Name and contact details
- Document visit





# Contact Officer

**Case - Infor**  
Case Jane DOE (WWAYID)

SYMPTOMS EPIDEMIOLOGICAL DATA CONTACTS SAM

Clinical Signs and Symptoms

Current body temperature in °C  
Select entry

Source of body temperature  
Select entry

Please tick an answer for ALL symptoms indicating if they occurred during this illness between symptom onset and case detection:

Clear all Set cleared to No

Abdominal pain  Yes  No  Unk

Acute hearing loss  Yes  No  Unk

Altered level of consciousness  Yes  No  Unk

Anorexia/loss of appetite  Yes  No  Unk

Chest pain  Yes  No  Unk

- Verify
  - Name and contact details
- Document visit
- Update Symptoms (fever measurement)



# Contact Officer

**Contact - ContOff**  
Contact Fane DOE (Q24JMA)

CONTACT DATA   PERSON   FOLLOW-UP VISITS   TASKS

Contact ID: Q24JMA   Follow-up status: Follow-up

Follow-up status comment

Reporting user: ad MIN - NatUser   Report date: 26/11/2017

Contact person: Fane DOE   Follow-up until: 17/12/2017

Date of last contact: 26/11/2017

Type of contact - if multiple pick the closest contact proximity 1

- 1-Touched fluid of source case
- 2-Direct physical contact with source case
- 3-Manipulation of clothes or other objects of source case
- 4-Was in same room or house with source case

Relationship with case

Live in the same household

Contact description

- Verify
  - Name and contact details
- Document visit
- Update Symptoms (fever measurement)
- Schedule next visit





# Health Facility Informant

The image shows a smartphone screen displaying a form titled "Case - Infor" for "Case Jane DOE (WWAYID)". The form has four tabs: "PATIENT", "HOSPITALIZATION", "SYMPTOMS", and "EPIDEMIOLOG". The "PATIENT" tab is active. The form fields are as follows:

- Person
- First name \*  
Jane
- Last name \*  
Doe
- Nickname  
Enter value
- Mother's maiden name  
Enter value
- Date of birth (year / month / day)  
Select ent    Select ent    Select ent
- Age                      Unit  
Enter value              Select entry
- Gender  
Select entry

## ■ Notify

- Name and contact details





# Health Facility Informant

**Case - Infor**  
Case Jane DOE (WWAYID)

HOSPITALIZATION   SYMPTOMS   EPIDEMIOLOGICAL DATA

Most recent hospitalization

Hospital name  
Yako Basic Health Clinic

Date of admission      Date of discharge  
Pick date      Pick date

Isolation  
 Yes  No  Unk

Was the patient hospitalized or did he/she visit a health clinic previously for this illness?  
 Yes  No  Unk

## ■ Notify

- Name and contact details
- Hospitalization data



# Health Facility Informant

**Case - Infor**  
Case Jane DOE (WWAYID)

SYMPTOMS EPIDEMIOLOGICAL DATA CONTACTS SAM

Clinical Signs and Symptoms

Current body temperature in °C  
Select entry

Source of body temperature  
Select entry

Please tick an answer for ALL symptoms indicating if they occurred during this illness between symptom onset and case detection:

Clear all Set cleared to No

Abdominal pain  Yes  No  Unk

Acute hearing loss  Yes  No  Unk

Altered level of consciousness  Yes  No  Unk

Anorexia/loss of appetite  Yes  No  Unk

Chest pain  Yes  No  Unk

## ■ Notify

- Name and contact details
- Hospitalization data
- Symptoms and onset dates



# Health Facility Informant

**Case - Infor**  
Case Jane DOE (WWAYID)

EPIDEMIOLOGICAL DATA CONTACTS SAMPLES TASKS

Epidemiological data  
Please indicate if any of the following is relevant for the patient during the incubation period or illness.

Visited a burial  
 Yes  No  Unk

Visited a social event  
 Yes  No  Unk

Traveled  
 Yes  No  Unk

Animal contacts  
Please indicate an answer regarding ALL animals (live or dead) the person had direct exposure to (e.g. hunt, touch, eat) during the incubation period.

Rodents or their excreta  Yes  No  Unk

Bats or their excreta  Yes  No  Unk

## ■ Notify

- Name and contact details
- Hospitalization data
- Symptoms and onset dates
- Exposures



# Health Facility Informant

**Create new sample**

Sample data

Name: Jane DOE

Sample code: Enter value

Date and time of sampling \*

Pick date: Pick time

Sample material \*

Select entry

Suggested type of test

Select entry

Laboratory \*

Select entry

Shipped

Comment

Enter value

- Notify
  - Name and contact details
  - Hospitalization data
  - Symptoms and onset dates
  - Exposures
- Initiate laboratory testing
- Document contact persons (if known)



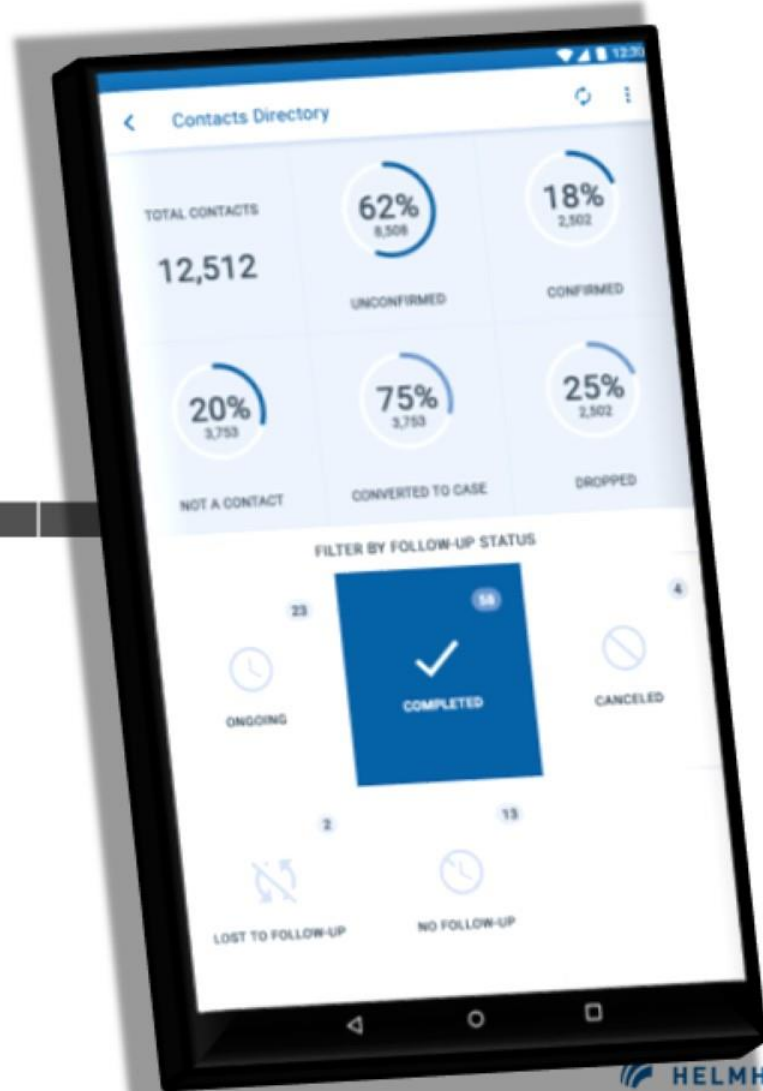
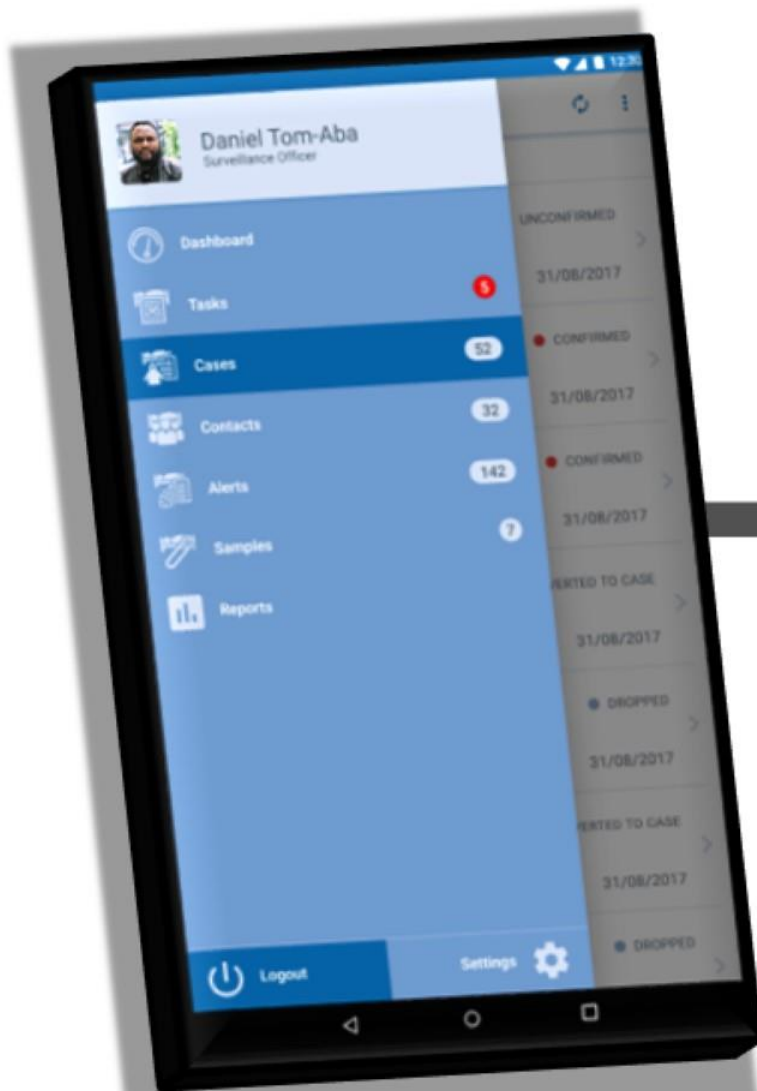


# Health Facility Informant

Smartphone screen showing the 'Create new contact - Infor' form. The form includes fields for 'Date of last contact', 'First name', 'Last name', 'Type of contact' (with radio button options), 'Relationship with case', and 'Contact description'. Red exclamation mark icons are present next to the 'Date of last contact', 'Type of contact', and 'Relationship with case' sections.

- Notify
  - Name and contact details
  - Hospitalization data
  - Symptoms and onset dates
  - Exposures
- Initiate laboratory testing
- Document contact persons (if known)

# Dashboard for Field Surveillance officer



# SORMAS Dashboard, Lassa Fever, February 2018



US-CDC Director Global Health, Rebecca Martin, visiting SORMAS Dashboard at Nigerian Centre for Disease Control



# Status and Outlook

## Deployment status of SORMAS as of March 2018

- 184 districts (local government areas)
- 16 federal states
- 51 million population covered



## Outlook

- Nigerian Center for Disease Control aims to deploy SORMAS in all of Nigeria
- Ministries of Health in Ghana and Burkina Faso already endorsed piloting in their countries
- WAHO has formally endorsed deployment of SORMAS in West Africa
- New Regional WAHO-CDC would benefit from SORMAS



**Thank you for listening**

# Software used for SORMAS

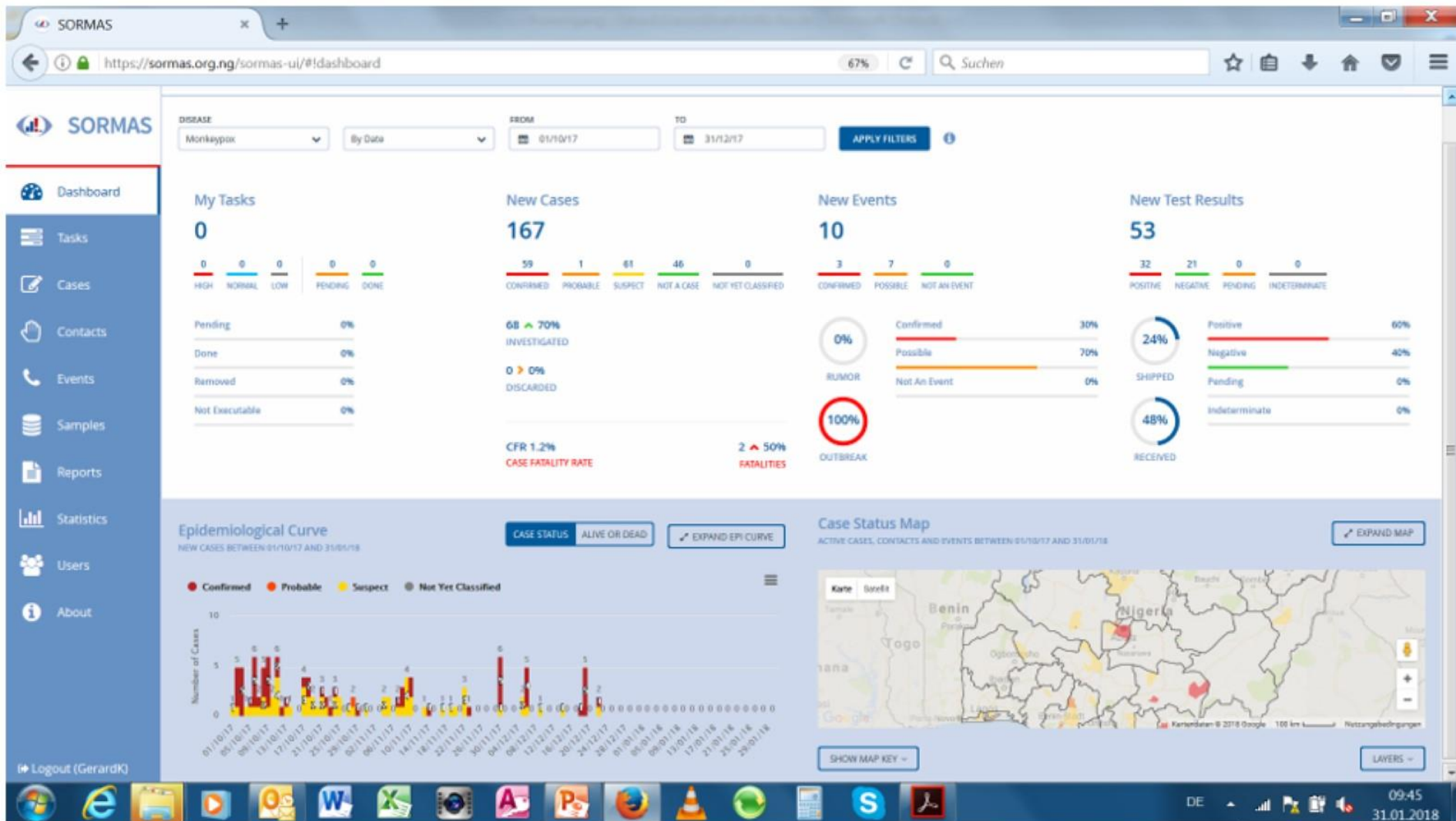
- **UNIX System UBUNTU** LTS 16 Server 16GB RAM, HDD efficient, 500GB
- **Data Backup** (separate system storage from the scripts using CRON JOB scripts)
- **Vaadin** Web Client (vaadin.org)
- **JAVA** EE Server Payara
- **POSTGRES** Database (pgadmin)
- **CRONJOB** Backup
- **Android OS 4.0** and above
- **SORMAS** android app
- **Google Chrome Browser** (recommended)
- **Windows Operating System** (recommended)

# Hardware Requirements for SORMAS

- **Computer Machine**
  - 3 Laptops (standard specification)
  - 3 internet dongles (Mobile internet sticks)
  
- **64-bit (x86-64) CPU** (can run the 32-bit (x86) version as well)
  
- **Ubuntu Server (CLI) Installation**
  - 300 MHz x86 processor
  - 192 MiB of system memory (RAM)
  - 1 GB of disk space
  - Graphics card and monitor capable of 640x480
  - CD drive
  
- **Mobile Phone Requirements**
  - **Android** mobile phones with large screen (at least 4 inch screens)
  - **Sim cards** for internet Data bundle plans and voice calls communication
  - Extended **Battery Life**
  - **Touch screen** feature

# National Level Dashboard of SORMAS

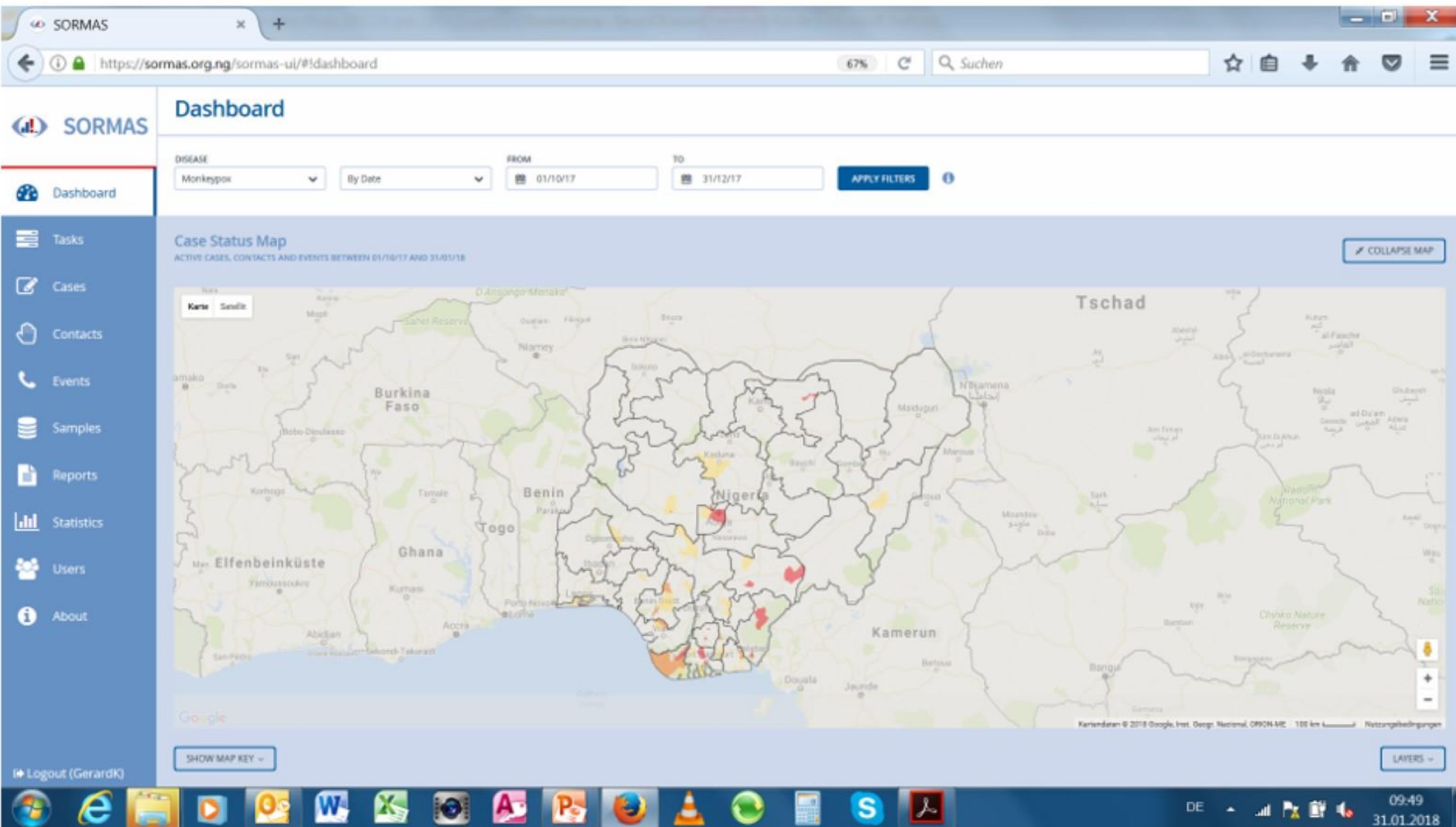
(example: monkeypox, December 2017)





# National Level Dashboard of SORMAS

(example: monkeypox, cumulative incidence by LGA, December 2017)



# National Level Dashboard of SORMAS

(example: monkeypox, GIS-location of cases (red) and contact persons (yellow), December 2017)

The screenshot displays the SORMAS National Level Dashboard in a web browser. The browser's address bar shows the URL <https://sormas.org.ng/sormas-ui/#!dashboard>. The dashboard interface includes a navigation sidebar on the left with options like Dashboard, Tasks, Cases, Contacts, Events, Samples, Reports, Statistics, Users, and About. The main content area is titled "Dashboard" and features a filter section for "DISEASE" (set to Monkeypox), "By Date", and date ranges "FROM 01/10/17" and "TO 31/12/17". Below the filters is a "Case Status Map" showing "ACTIVE CASES, CONTACTS AND EVENTS BETWEEN 01/10/17 AND 31/12/17". The map displays red pins for cases and yellow pins for contacts across Nigeria, with shaded regions in orange and red. A legend on the right side of the map allows users to toggle various data layers, including "Show cases", "Show contacts", "Show confirmed contacts", "Show unconfirmed contacts", "Show events", "Show regions", "Case count", and "Case incidence". The Windows taskbar at the bottom shows the system clock at 10:01 on 31.01.2018.



sormas

Surveillance, Outbreak Response Management and Analysis System

# Digital surveillance tools in Nigeria

	SORMAS	DHIS2	NSTOP	AVADAR	mSERS	VHFms
Front end	App/web	App/web	SMS	SMS	SMS	Web
Data base	PostGres	PostGres	Excel	Excel	Excel	SQL
Diseases	10+	9+	4	1	9+	3
Case based	✓	✓	✓	✗	✗	✓
Bidirectional	✓	✗	✗	✗	✗	✗
Contact tracing	✓	✗	✗	✗	✗	✗
Task management	✓	✗	✗	✗	✗	✗
Health facility	✓	✗	✗	✗	✗	✗
Laboratory	✓	✗	✗	✗	✗	✗

# Contacts & Transmissions Dashboard

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Phasellus luctus lacinia pharetra.

Dashboard

Tasks

Cases

Contacts

Alerts

Samples

Users

About

COUNTRY  
Nigeria

STATE  
Abia

DISEASE  
Ebola Virus Disease

By Date

FROM WEEK  
Week 44

TO WEEK  
Week 44

APPLY FILTER

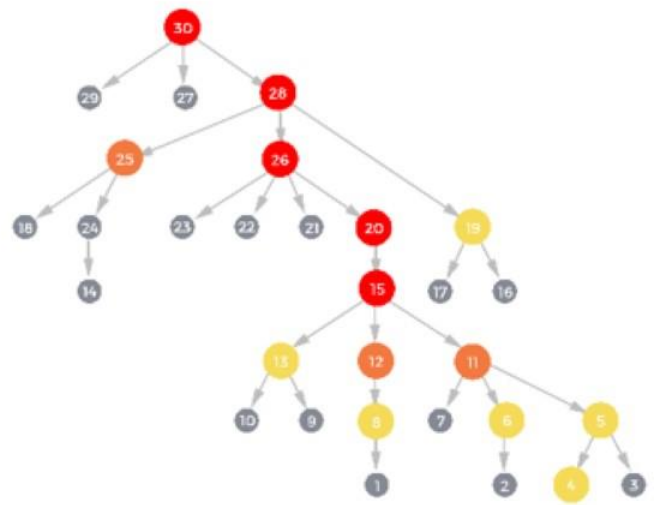
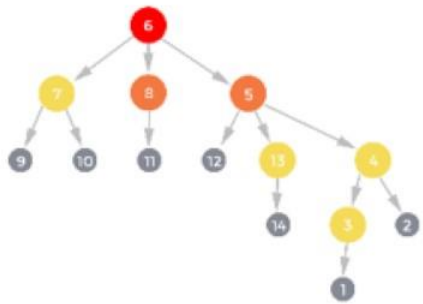
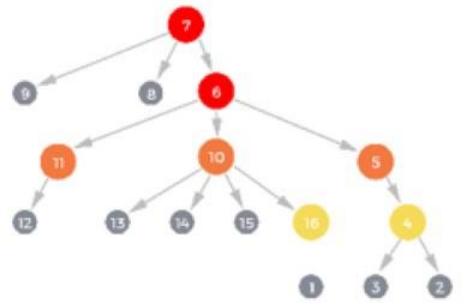
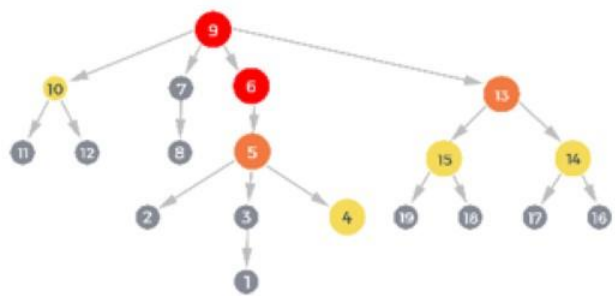
> Nigeria  
STATE - ABIA | EBOLA VIRUS DISEASE | WEEK 44

## Transmission Chain

LAST 7 DAYS

HEALTH WORKERS OTHERS

BY DISEASE STATUS BY GENDER BY ONSET DATE BY PROFESSION BY INDIVIDUAL CHAINS EXPAND





- Contacts
- Alerts
- Samples
- Users
- About

# Transmission Chain

- BY DISEASE STATUS
- BY GENDER
- BY ONSET DATE
- BY PROFESSION
- BY INDIVIDUAL CHAINS
- EXPAND

LAST 7 DAYS

ASYMPTOMATIC SUSPECTED PROBABLE CONFIRMED

