



SORMAS® - Surveillance Outbreak Response Management and Analysis System

How it may contribute to EIOS

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Objectives: Digital, Mobile Outbreak Detection & Response



Surveillance
Outbreak
Response
Management
Analysis
System

response process
management

laboratory
integration

scalability

early warning
& analysis

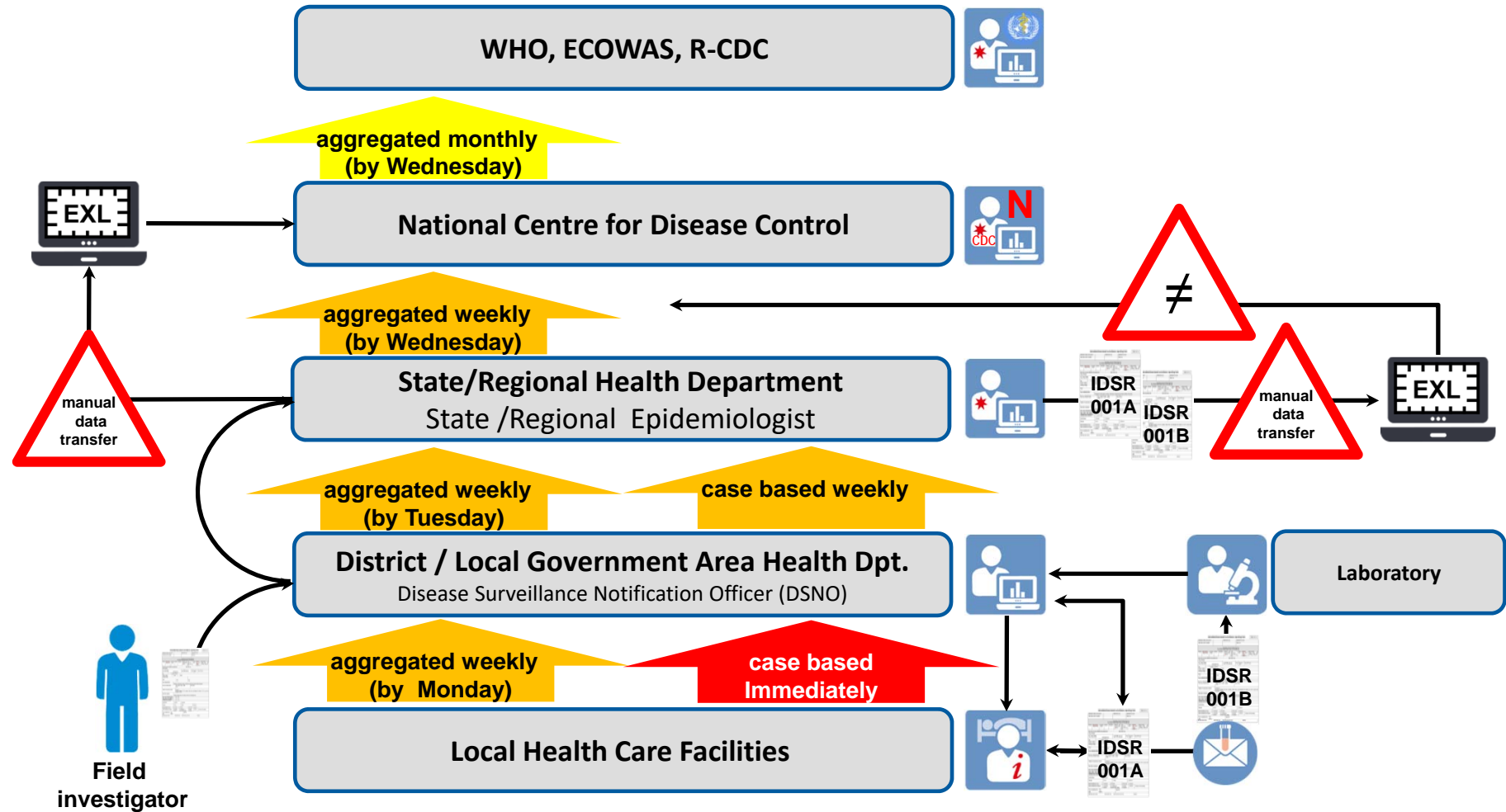
clinical
management

mobile
offline
bi-directional

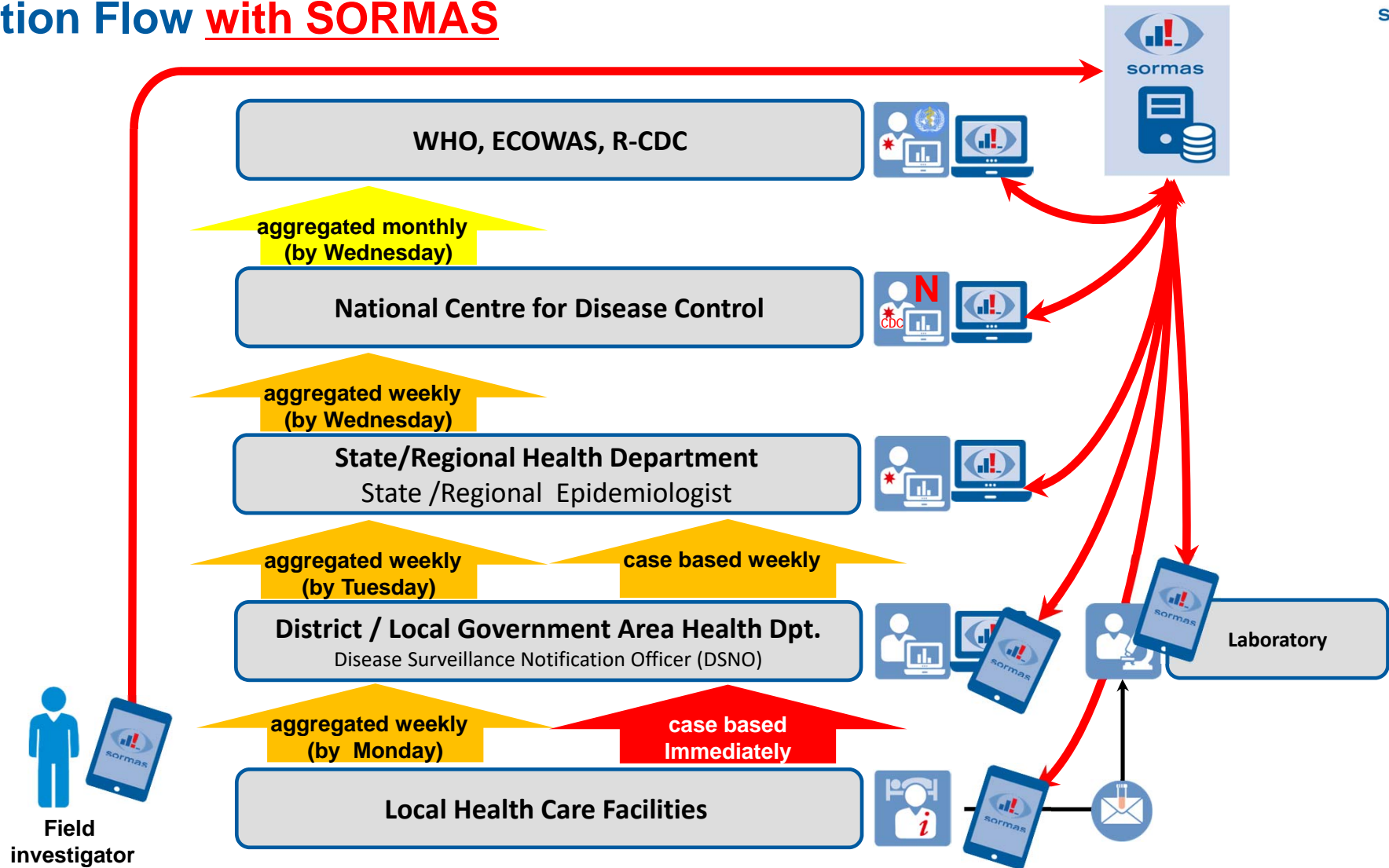
sustainability

Integrated Disease Surveillance and Response System

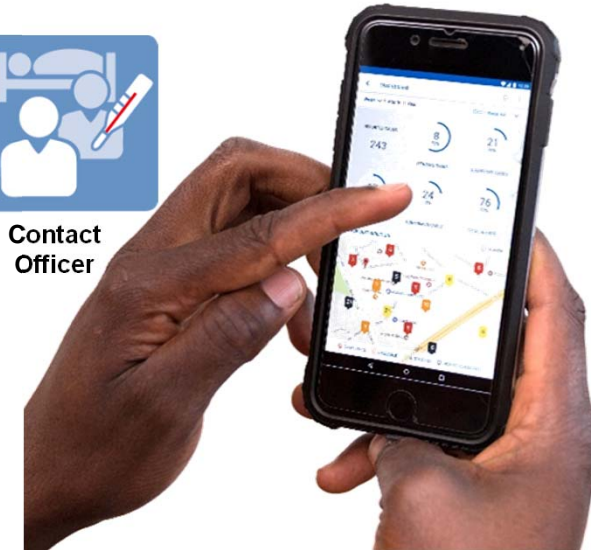
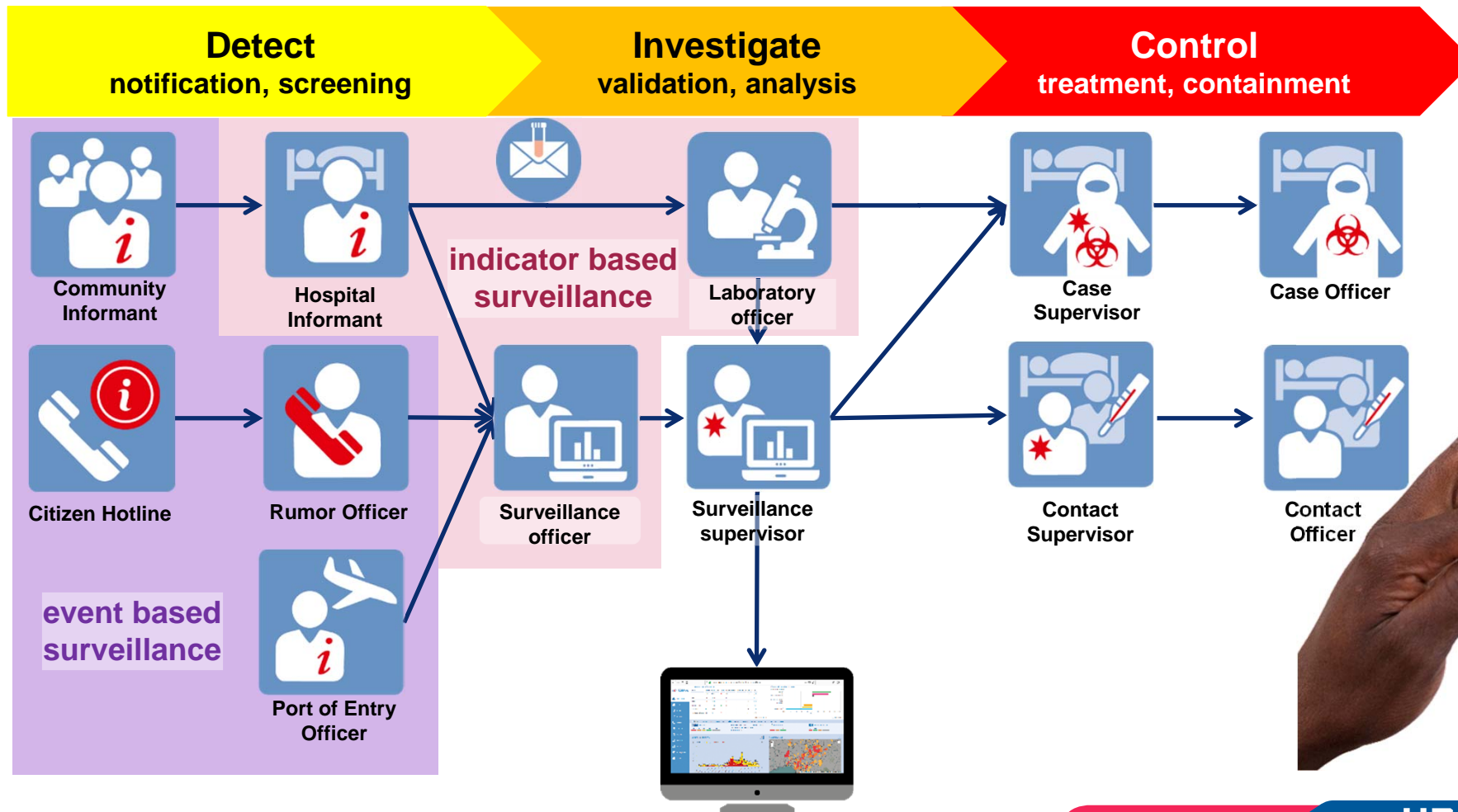
Conventional Information Flow



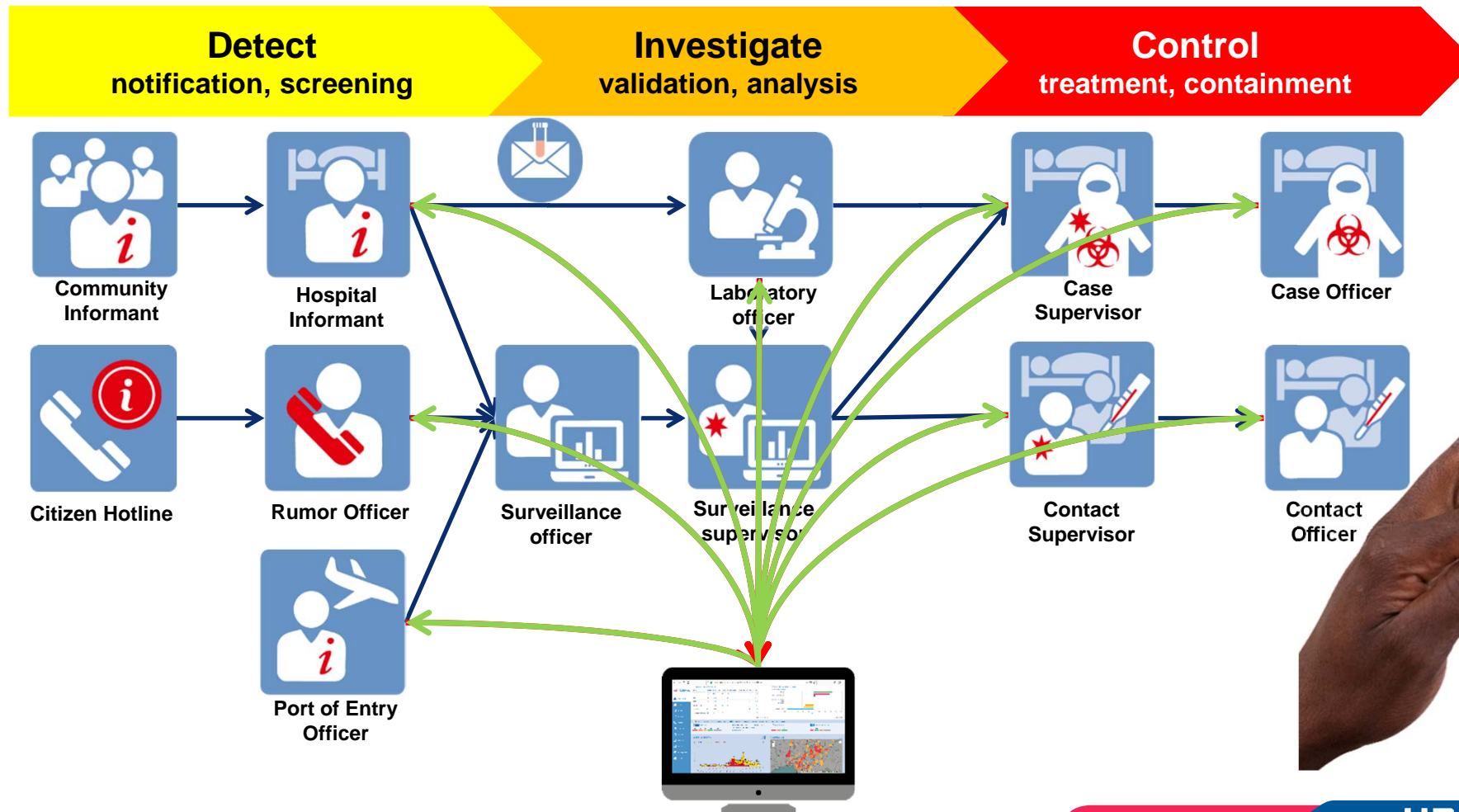
Integrated Disease Surveillance and Response System Information Flow with SORMAS



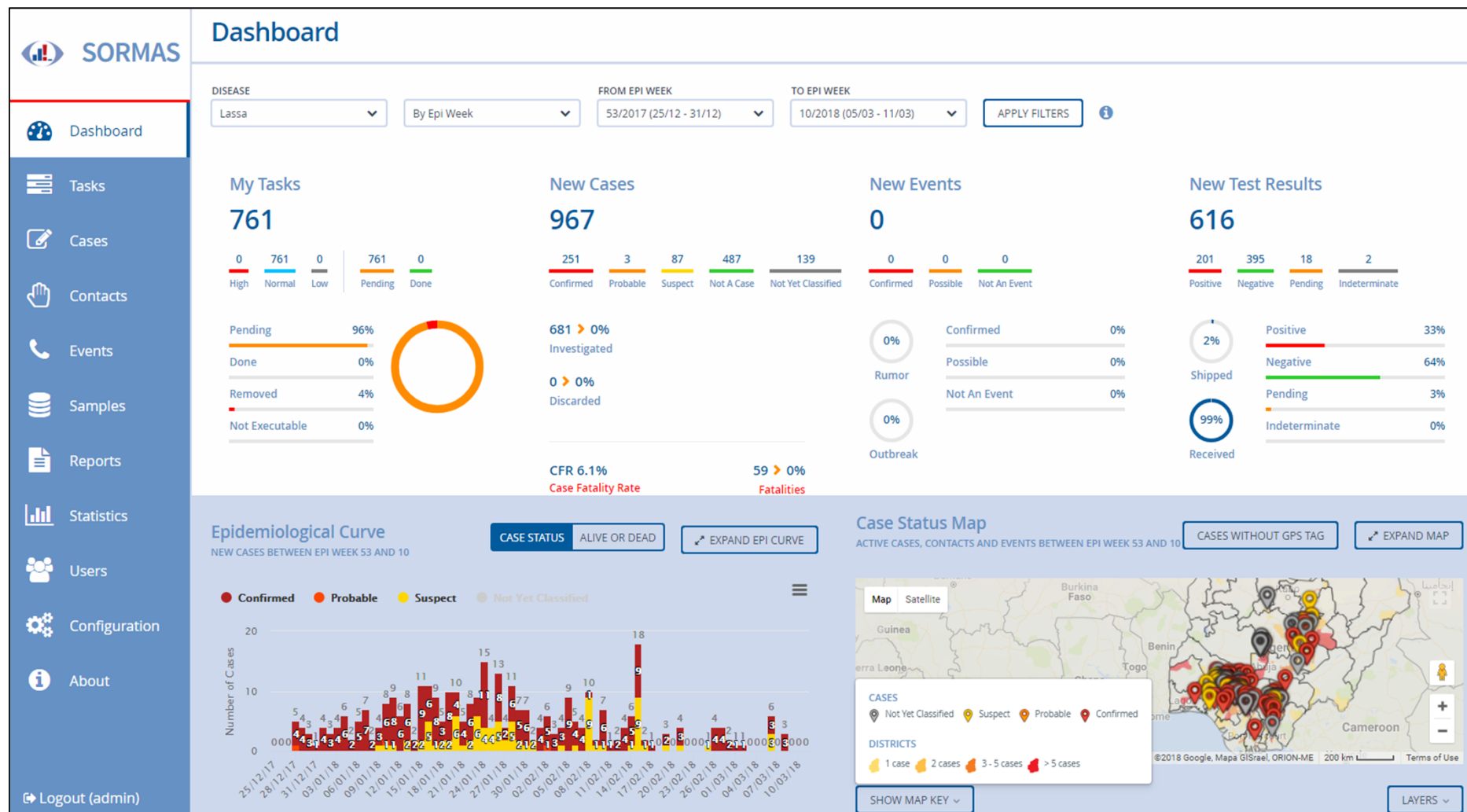
Response Management in SORMAS (e.g. Ebola)



Response Management in SORMAS (e.g. Ebola)



Response Management in SORMAS (e.g. Ebola)



Personas / Users of SORMAS



Detect notification, screening



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

Investigate validation, analysis



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

Control treatment, containment



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

Persona Profile: Laboratory Officer



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

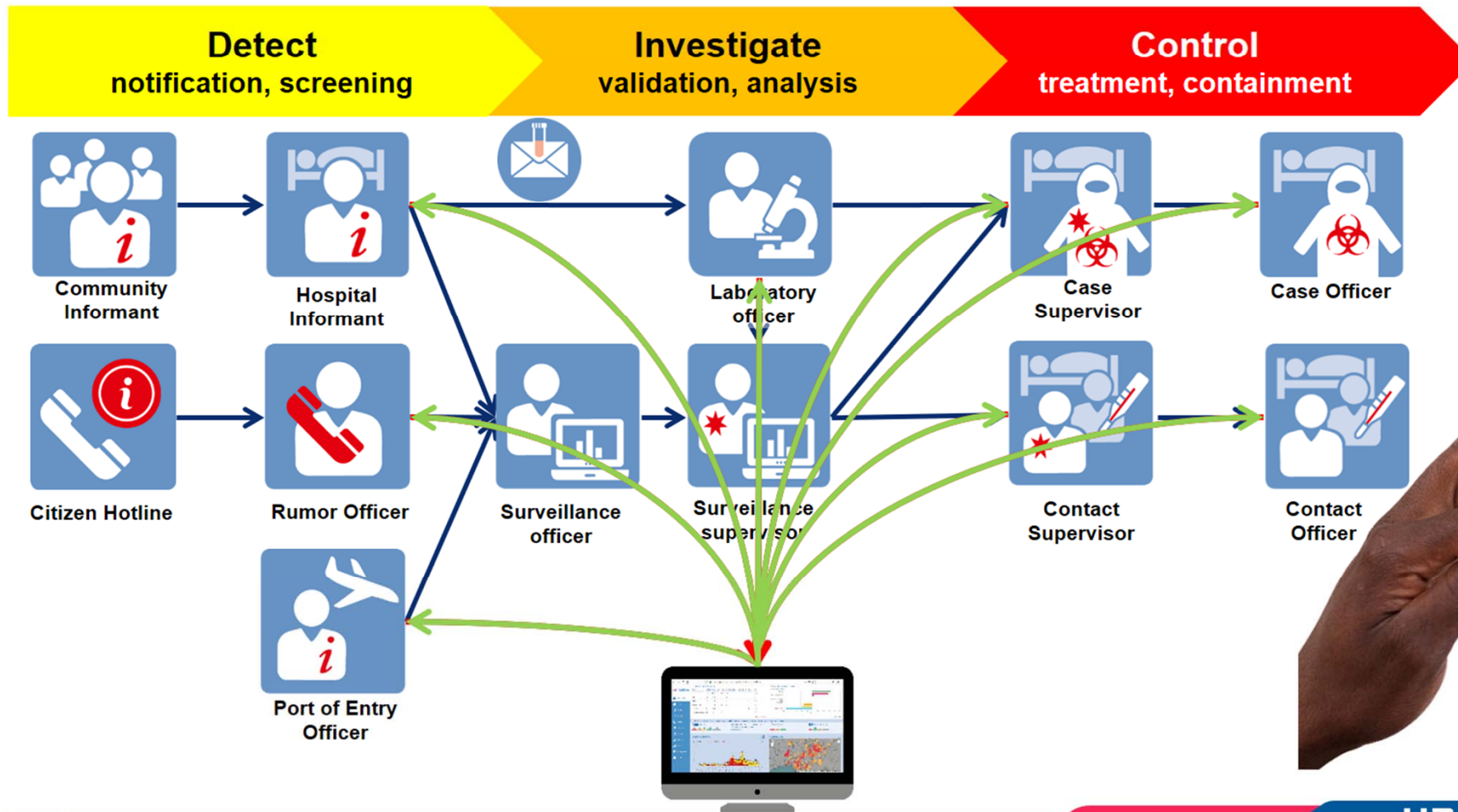
Interaction/Dependencies with/other personas

- Surveillance supervisor

Artefacts (Input/Output)

- Laboratory investigation form




Response Management in SORMAS (e.g. Ebola)



Process Models for Disease Specific Control Measures




CONTACT FOLLOW-UP



-  search of contact persons
-  symptom monitoring
-  home quarantine




PREVENTIVE TREATMENT



-  search of contact persons
-  preventive treatment
-  symptom monitoring

VECTOR CONTROL






-  vector traps
-  treatment of breeding sites
-  residential spraying



CLINICAL MANAGEMENT






VETERINARY HEALTH

-  animal surveillance
-  veterinary diagnostics
-  culling






VACCINATION

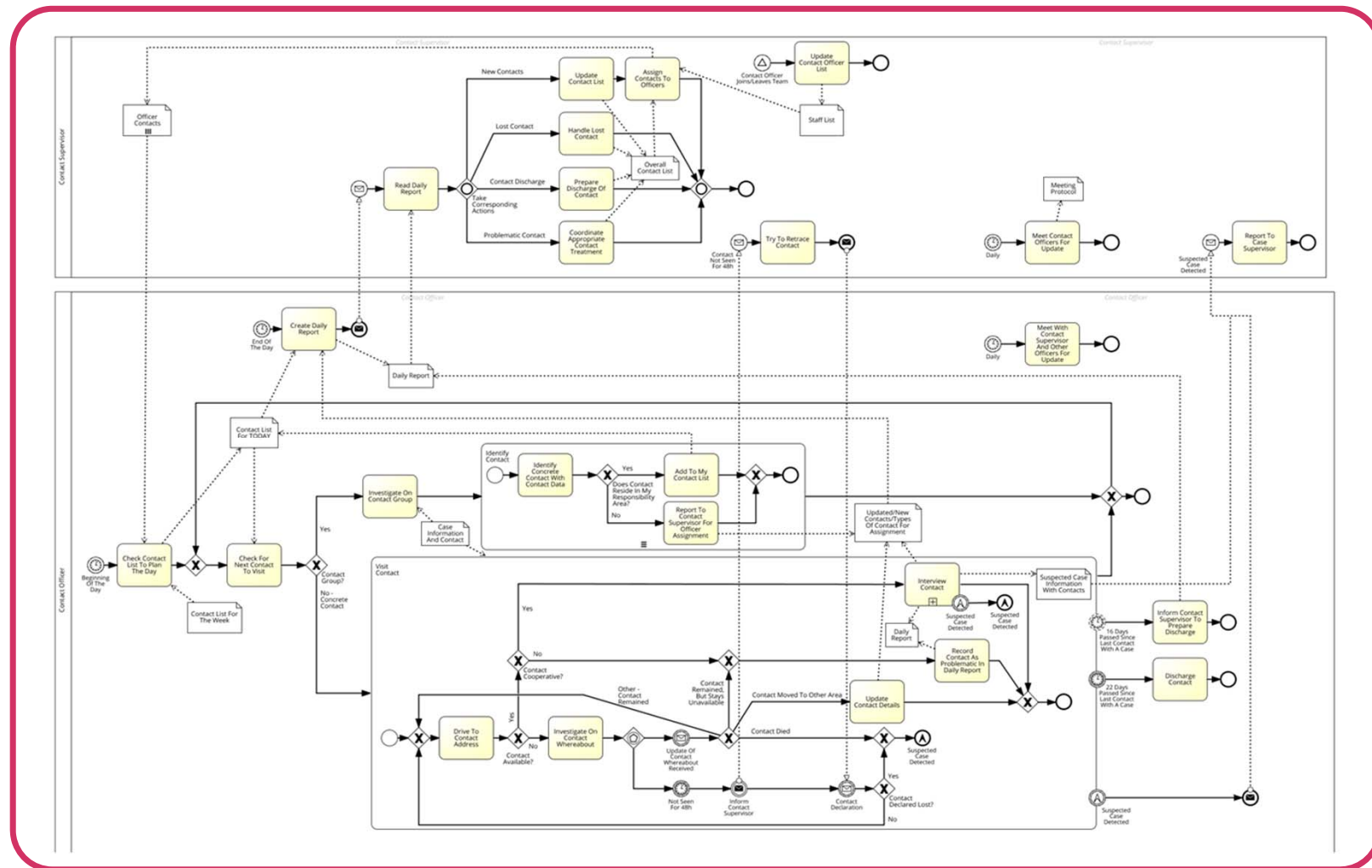
-  coverage survey
-  catch-up vaccination
-  ring vaccination



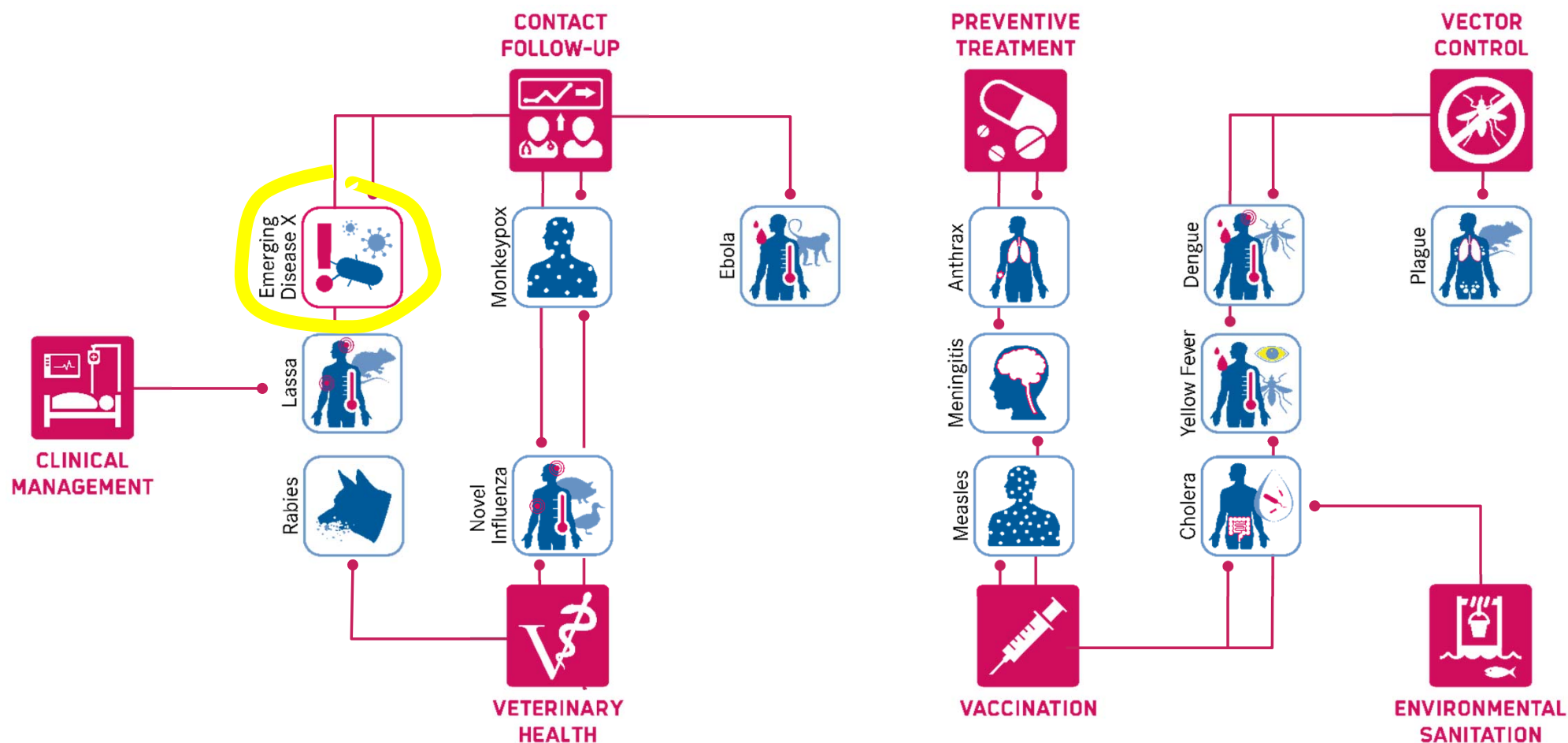
ENVIRONMENTAL SANITATION

-  environmental samples
-  alternative supply
-  access control or recall

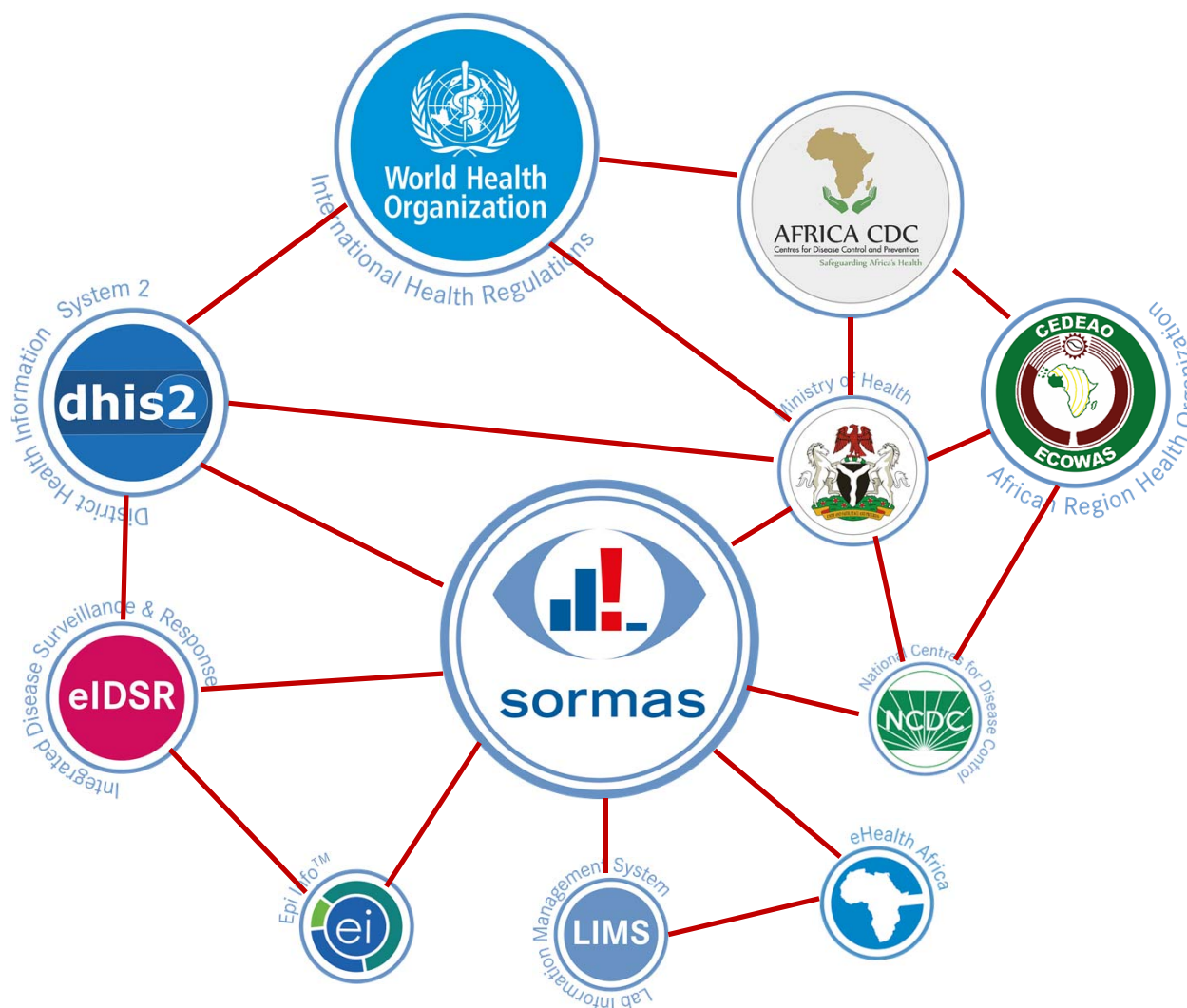
Process Model Ebola Virus - Contact Follow-up



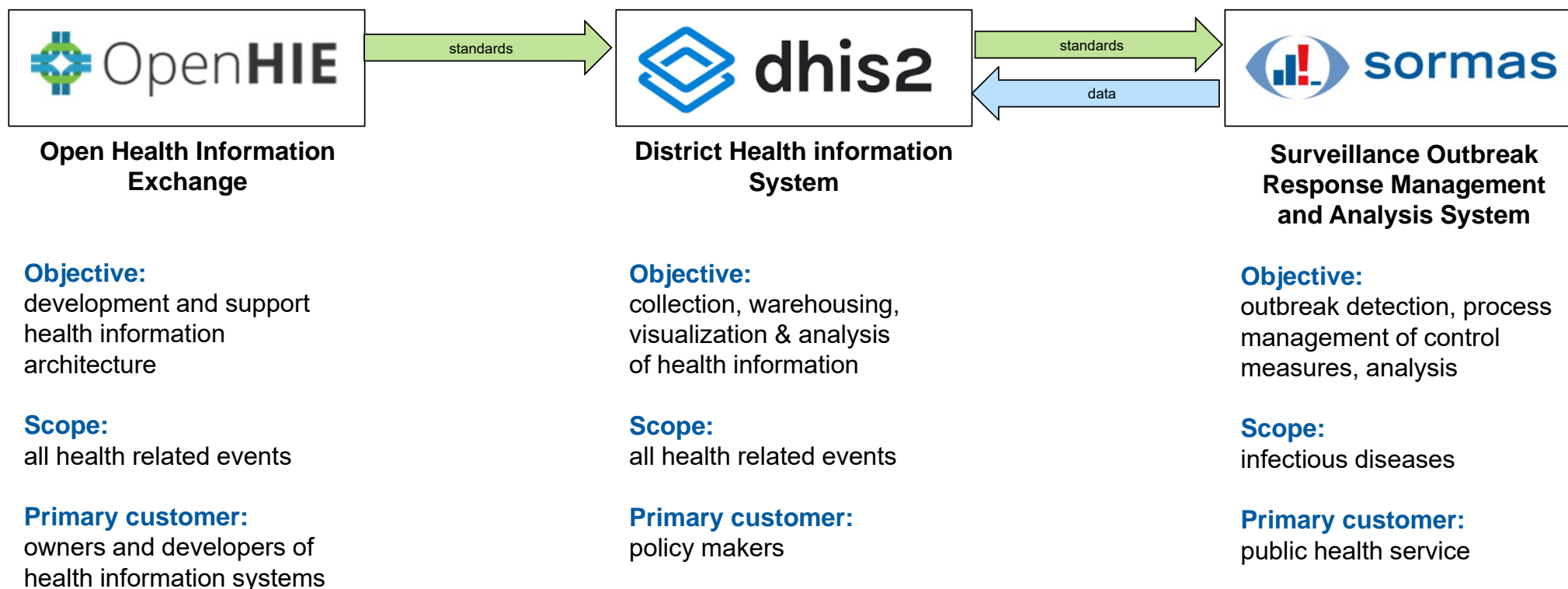
Process Models for Disease Specific Control Measures



Technical and Organizational Interoperability of SORMAS



Complementarity between openHIE, DHIS2 and SORMAS



SORMAS Deployment in 3 Simultaneous Outbreaks



November 2017 - July 2018

Monkeypox Outbreak

8 Federal states

33 Districts

Yinka-Ogunleye, Lancet Infectious Diseases 2018

January - March 2018

Bacterial Meningitis Outbreak

8 Federal states

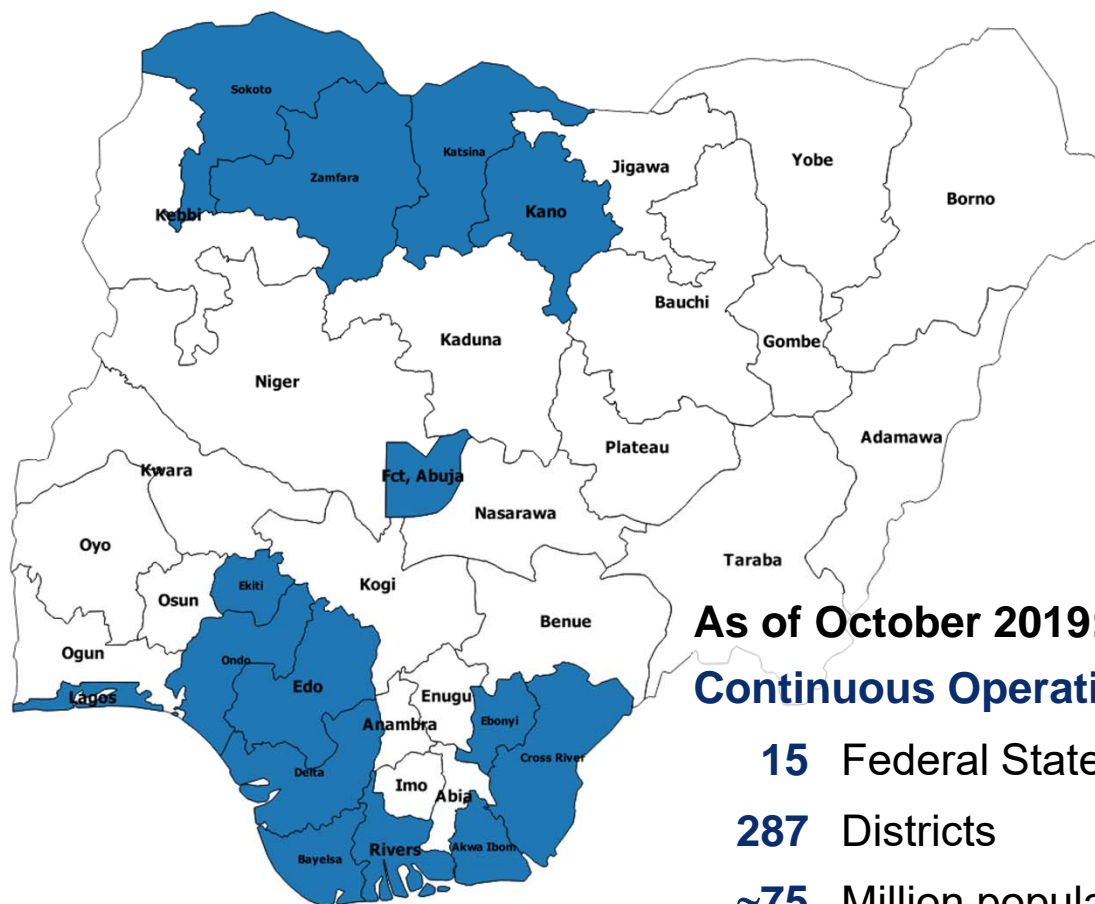
33 Districts

February - April 2018

Lassa Fever Outbreak

3 Federal states

49 Districts



As of October 2019:

Continuous Operation in

15 Federal States

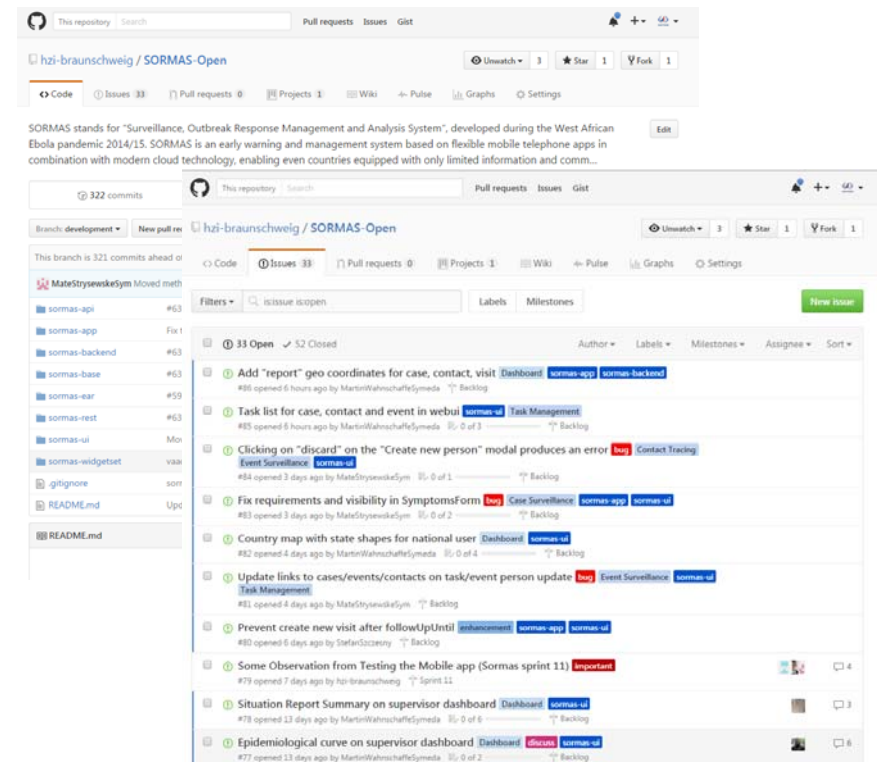
287 Districts

≈75 Million population covered

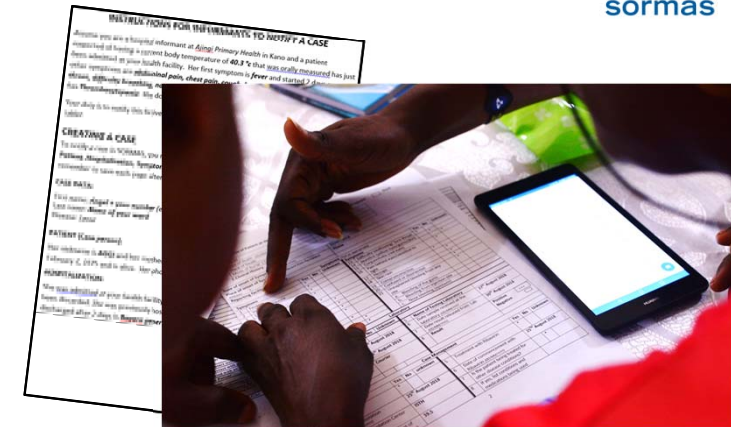
Open Source Technology Stack of SORMAS



- **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 SQL Database** (pgadmin)
- **CRONJOB Backup**
- **Android OS 4.0 and above**
- **Open Street Map**
- **Codes and Roadmap on GitHub**



Training Materials for SORMAS



Instructional Carton Videos

- Surveillance Supervisor
- Contact Officer
- Contact Supervisor
- Hospital Informants
- Surveillance Officer

<https://www.youtube.com/watch?v=0vTKZr8-vg> – Surveillance Supervisor

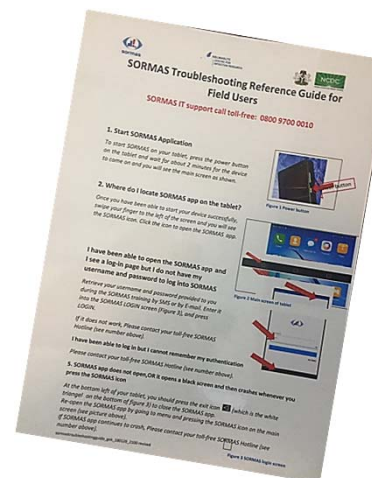
https://www.youtube.com/watch?v=YCA_0K46dqE&t=43s – Contact Officer

<https://www.youtube.com/watch?v=J7JUdTieEPQ&t=11s> – Contact Supervisor

<https://www.youtube.com/watch?v=it2ve1ARRbU> – Hospital Informants

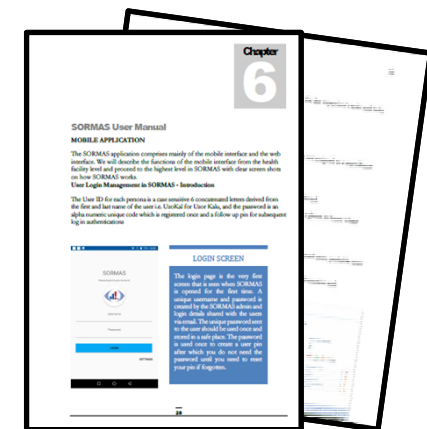
<https://www.youtube.com/watch?v=nVJ1k-84d-0&t=65s> – Surveillance Officer

Didactic Lectures



Trouble Shooting Guide

Interactive Training Scenarios



User Manual

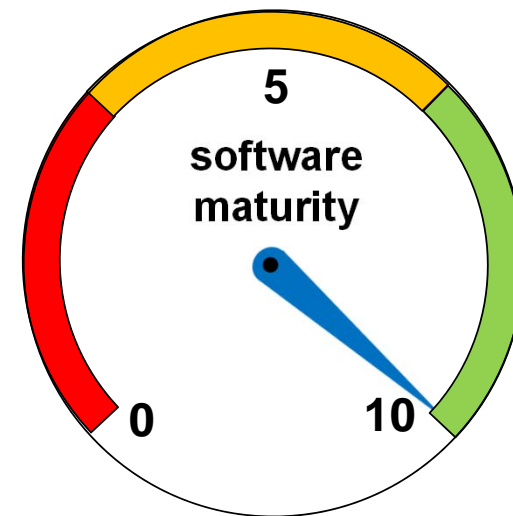
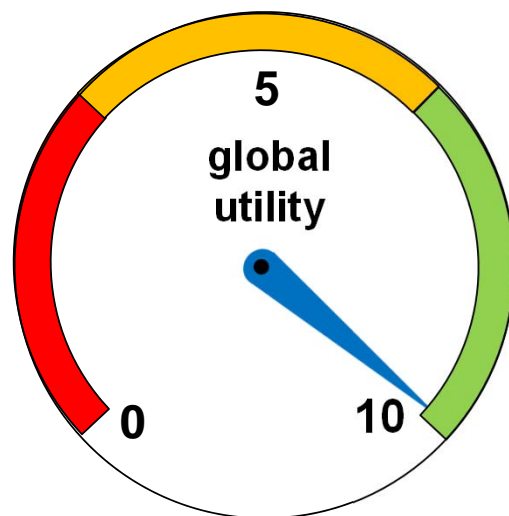
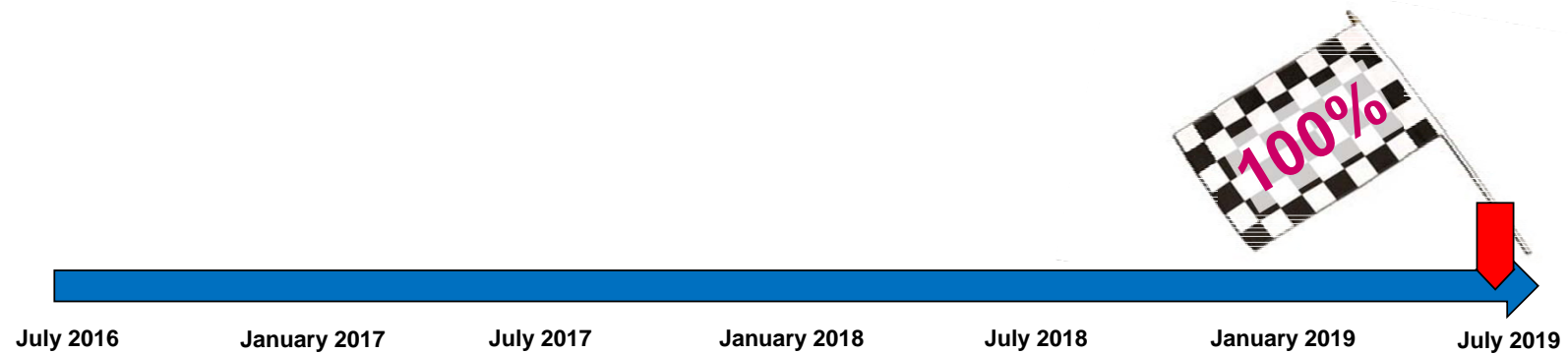
Global Good Maturity Model for Digital Health Software



Global Utility	<input type="checkbox"/> Country Utilization	-1	0	1
	<input type="checkbox"/> Country Strategy	-1	0	1
	<input type="checkbox"/> Digital Health Interventions	-1	0	1
	<input type="checkbox"/> Source Code Accessibility	-1	0	1
	<input type="checkbox"/> Funding and Revenue	-1	0	1
Community Support	<input type="checkbox"/> Developer, Contributor and Implementor Community Engagement	-1	0	1
	<input type="checkbox"/> Community Governance	-1	0	1
	<input type="checkbox"/> Software Roadmap	-1	0	1
	<input type="checkbox"/> User Documentation	-1	0	1
	<input type="checkbox"/> Multi-Lingual Support	-1	0	1
Software Maturity	<input type="checkbox"/> Technical Documentation	-1	0	1
	<input type="checkbox"/> Software Productization	-1	0	1
	<input type="checkbox"/> Interoperability and Data Accessibility	-1	0	1
	<input type="checkbox"/> Security (PEN Test)	-1	0	1
	<input type="checkbox"/> Scalability	-1	0	1

https://wiki.digitalsquare.io/index.php/What_are_Global_Goods

Progress of Global Good Maturity Score of SORMAS: full score as of July 2019

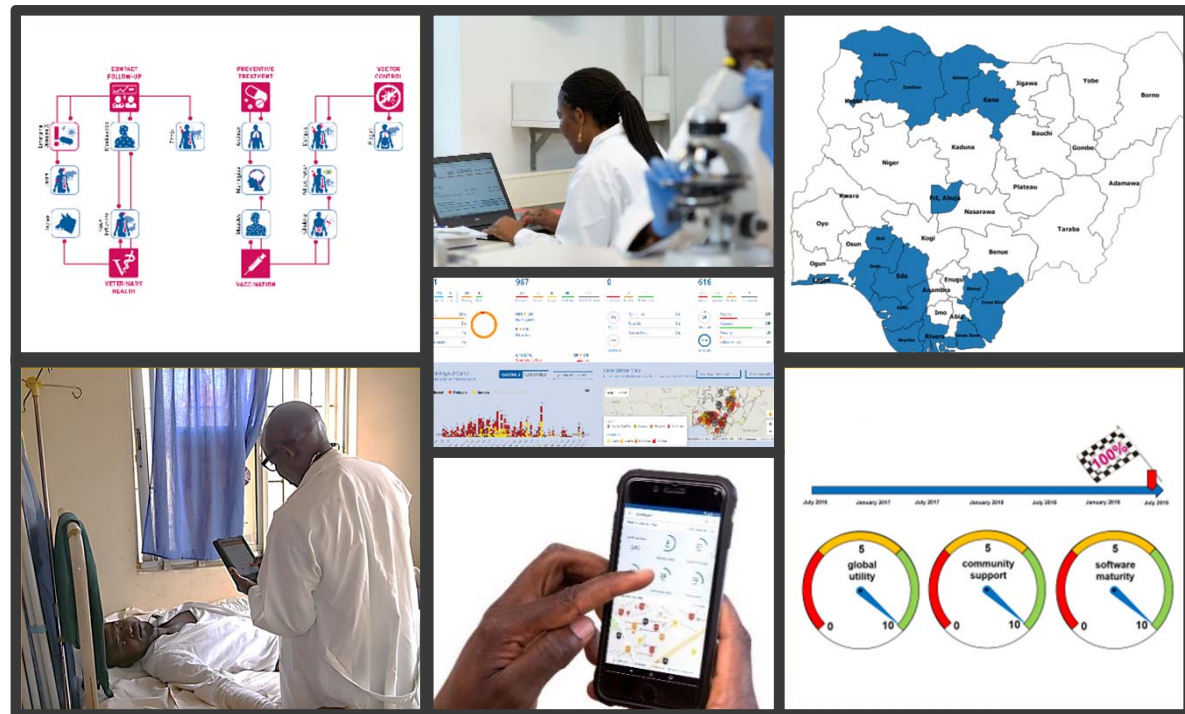


https://wiki.digitalsquare.io/index.php/What_are_Global_Goods

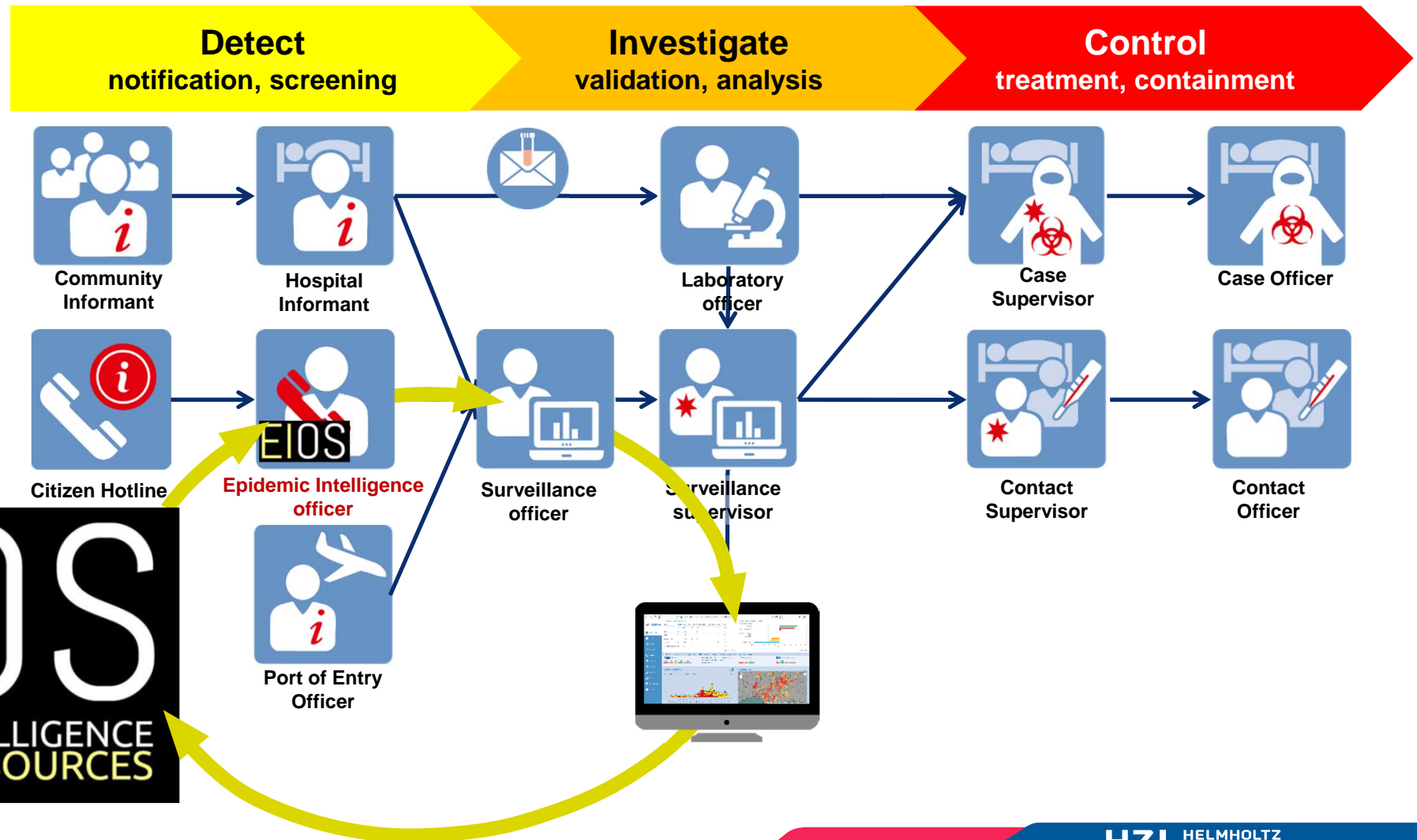
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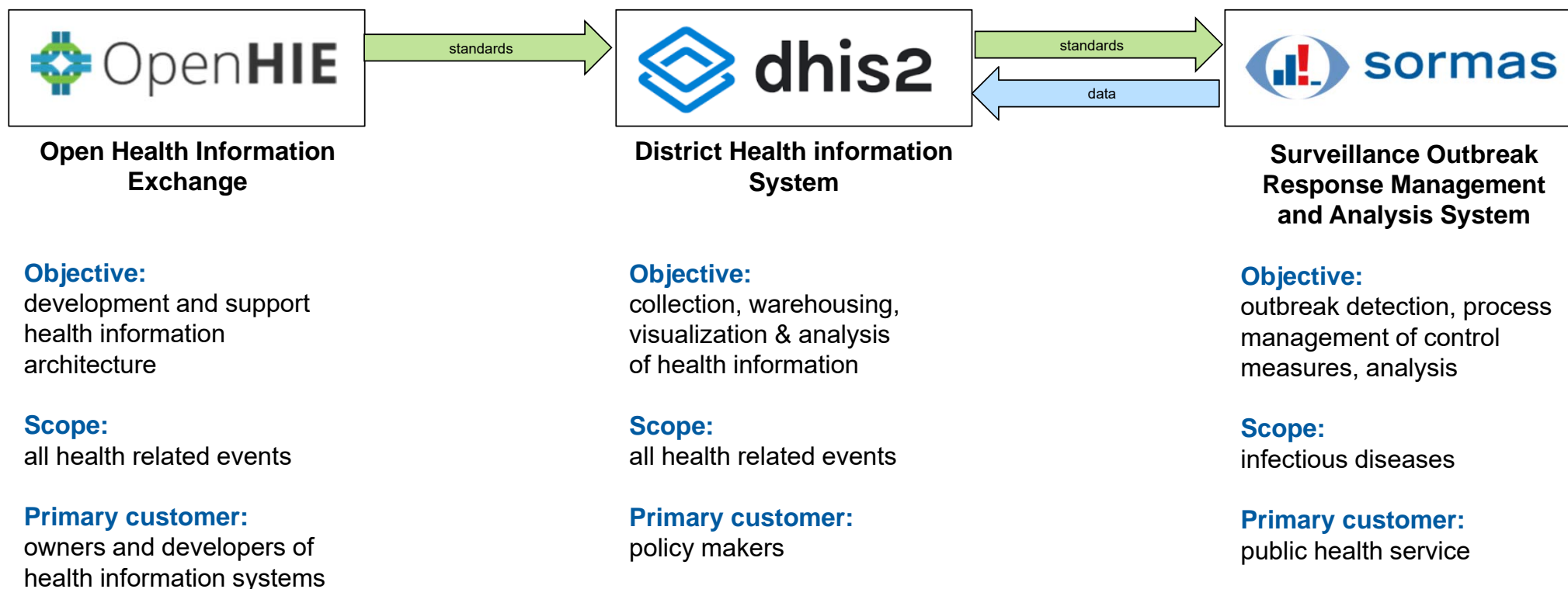


Contribution of SORMAS to EIOS



EIOS
EPIDEMIC INTELLIGENCE
FROM OPEN SOURCES

Complementarity between openHIE, DHIS2 and SORMAS



Strategy on Future Concepts and Methods in SORMAS



Tuberculosis, Polio + 32 additional diseases



Weather based algorithms



Molecular surveillance



Vaccination campaign & vigilance



Antimicrobial resistance monitoring



Verification within Epidemic Intelligence from Open Sources

Acknowledgements to all Partners, Sponsors, Advisors and Contractors



Partners

African Field Epidemiology Network (AFENET)
Centers for Disease Control and Prevention (CDC)
Deutsche Gesellschaft für Internationale
Zusammenarbeit (GIZ)
Ghana Community Network Services Limited (GCNET)
Ghana Health Service (GHS)
Helmholtz Center for Infection Research (HZI) [lead]
Nigerian Centre for Disease Control (NCDC)
University of Maryland Baltimore, Nigeria (UMB)



ROBERT KOCH INSTITUT



Advisors

Africa Centers for Disease Control (Africa CDC)
Centers for Disease Control and Prevention
DHIS2 Design Lab, University of Oslo
Hasso Plattner Institute (HPI)
Kreditanstalt für Wiederaufbau (KfW)
Robert Koch Institute (RKI)
University Braunschweig (TU)
West African Health Organization (WAHO)
World Health Organization (WHO-HQ)



World Health Organization



Federal Ministry
for Economic Cooperation
and Development

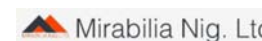


Federal Ministry
of Education
and Research



Sponsors

Basic Healthcare Provision Fund Nigeria (BHCF)
Bill and Melinda Gates Foundation (BMG)
Centers for Disease Control and Prevention (CDC)
Centre for Infection Research (DZIF)
Development (BMZ)
European Union (EU)
German Federal Ministry for Economic Cooperation and German
German Federal Ministry for Education and Research (BMBF)
Helmholtz Center for Infection Research (HZI)
Helmholtz Association (HGF)
WHO-Country Office Nigeria
World Bank



Elektro- & Datentechnik

Contractors

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