

Real-Time Biosurveillance Program in India and Sri Lanka

e-Asia 2009 e-Health

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Outline

- ***INTRODUCTION TO THE RESEARCH***
- ***DISEASE INFORMATION***
 - determinants of Morbidity in India
 - determinants of notifiable diseases in Sri Lanka
- ***RTBP COMMUNICATION TECHNOLOGY***
 - M-HealthSurvey mobile application
 - T-Cube Web Interface
 - Sahana Messaging/Alerting Module
- ***POLICY IMPLICATIONS***
 - Robustness of data digitization
 - Paradigm shift on analytical methods
 - Efficiencies in notification/reporting

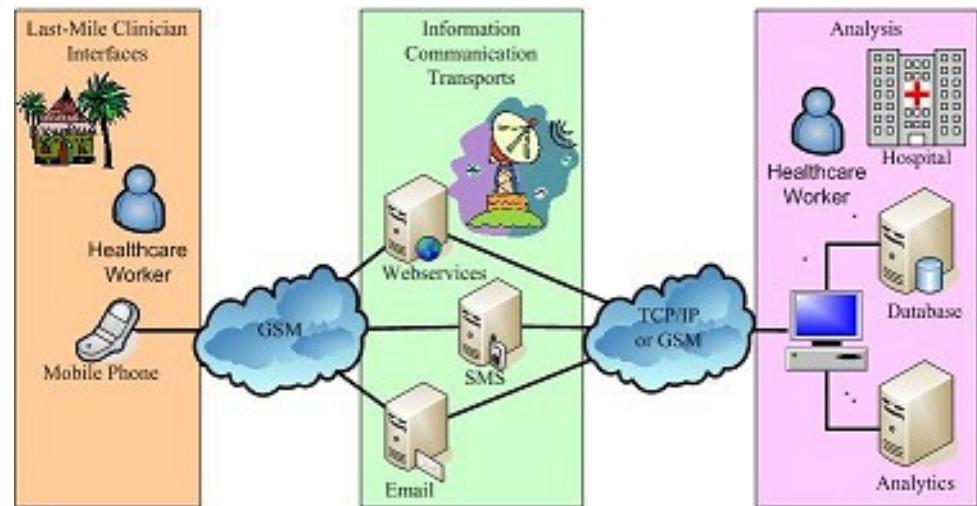


Objective of the Research

Research Question: “Can software programs that analyze health statistics and mobile phone applications that send and receive the health information potentially be effective in the early detection and notification of disease outbreaks?”

Specific Objectives:

- Evaluating the effectiveness of the m-Health RTBP for detecting and reporting outbreaks
- Evaluating the benefits and efficiencies of communicating disease information
- Contribution of community organization and gender participation
- Develop a Toolkit for assessing m-Health RTBPs



Other m-Health Initiatives on disease control

- **Panacea THIRRA** (<http://thirra.primacare.org.my/>)
 - Portable system from telehealth and health information in rural & remote areas
- **Cell-Life**: preventing HIV/Aids (<http://www.cell-life.org/>)
 - monitoring and intervention programs by communicating data via mobile phone GPRS connected workstations
- **EpiSurveyor**: Software developed by DataDyne (<http://www.datadyne.org/>)
 - Desktop tool to develop “forms” for handheld mobile devices; J2ME mobile phone solution
 - Tested on PDAs in Uganda, Tanzania; on “CDC Maternal Health Evaluation Forms”; live stock development board Sri Lanka
- **OpenRosa/JavaRosa**: (<http://www.openrosa.org/>)
 - consortium developing standards based tools for collecting data via mobile phones, analyzing data, and reporting data via mobile phones
 - Free software downloads – <http://code.javarosa.org/wiki/GettingStarted>
 - “Gather” is a project supporting the openrosa work and testing solutions in Africa
- **D-Tree**: Offers Childcare solutions (<http://www.d-tree.org/>)
 - They use javarosa code base; e-MICI project in Uganda – household questionnaire to monitor Child diseases; doing work with BRAC in Tanzania on gathering household health info
- **ComCare** – XForms based solution for collecting community health information
- **InSTEDD**: create and advocate open source tools (<http://www.instedd.org/>)
 - Social network approach
 - Tested in Mekong river basin
 - Event base surveillance techniques

Our pilot in India and Sri Lanka



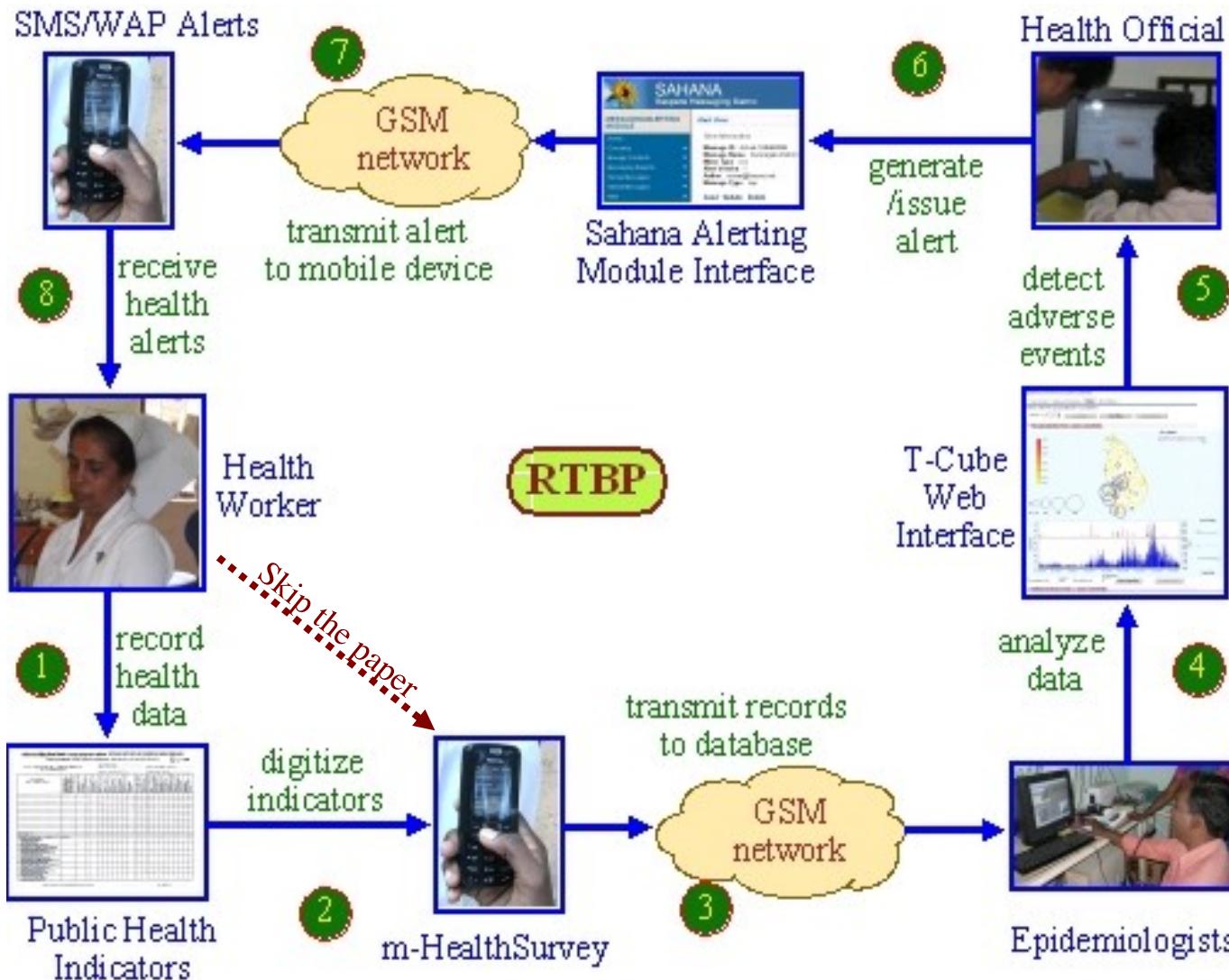
17 total Hospitals/Central Dispensaries

16 Sarvodaya Suwadana Centers *Kurunegala District, North Western Province, Sri Lanka*

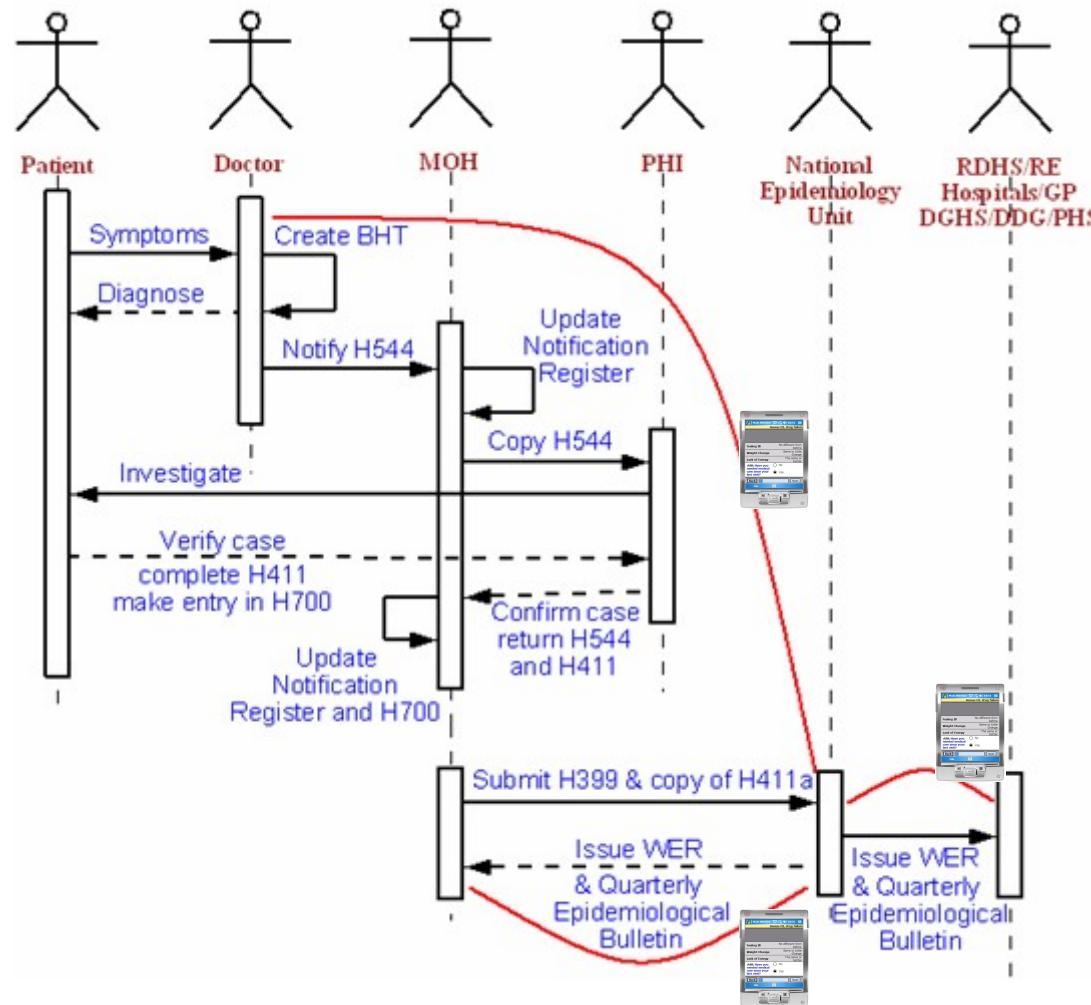
24 Health Sub Centers;
4 Public Health Centers *Thirupathur block, Sivaganga District, state of Tamil Nadu, India*



Actors, Objects, Processes, and Data Flow



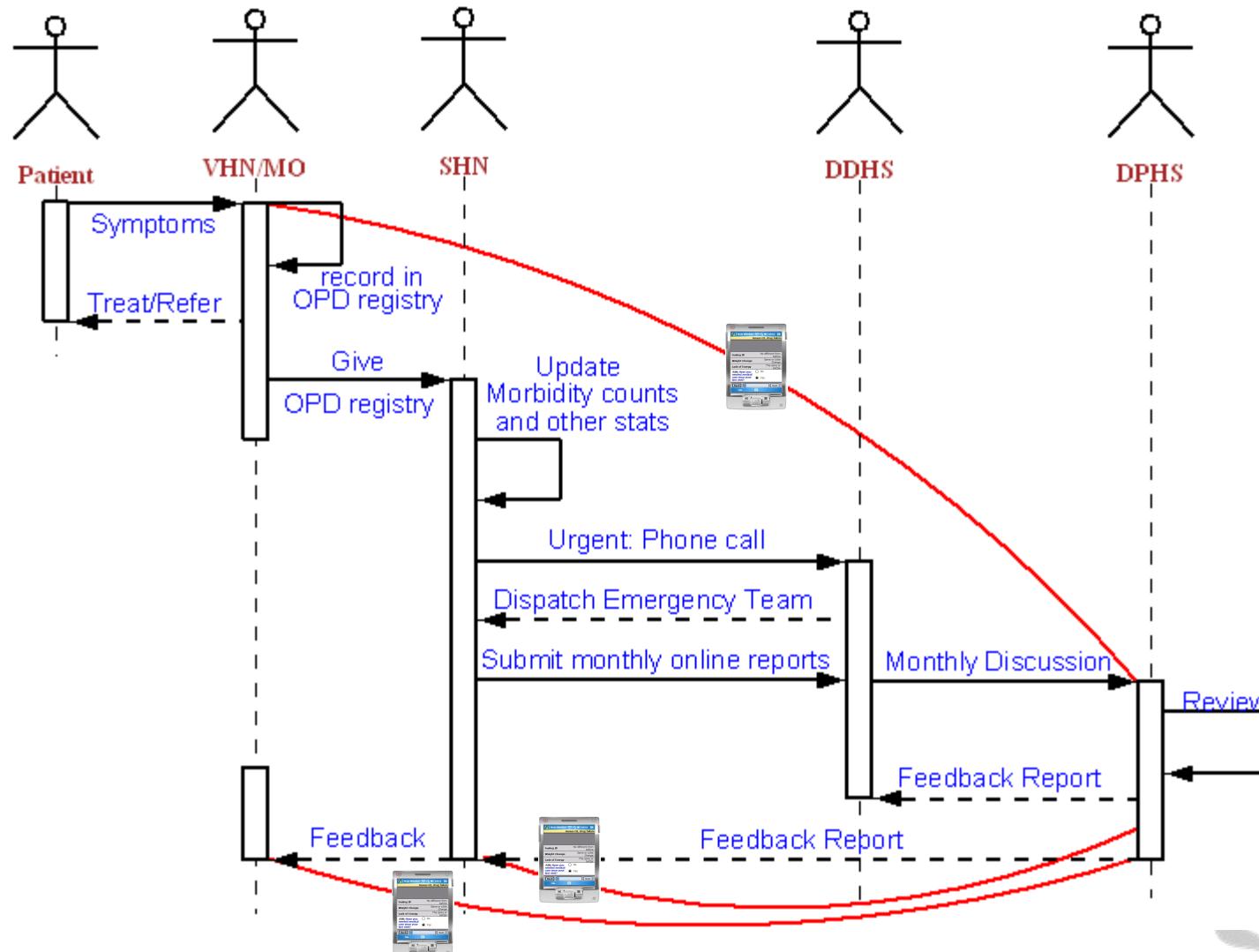
Sri Lanka Epidemiology and RTBP overlay



Black arrows: current manual paper/postal system for health data collection and reporting

Red lines: RTBP mobile phone communication system for heath data collection and reporting

India morbidity reporting and RTBP overlay



Black arrows: current manual paper/postal system for health data collection and reporting

Red lines: RTBP mobile phone communication system for heath data collection and reporting

m-HealthSurvey Midlet [IITM's-RTBI]

Select Application:

- Health Survey
- Offline Survey
- Download List(*)
- Profiles(*)
- Locations(*)

(a)

Configure Healthcare worker Profile

ID:(*) 6900v
Retype ID:(*) 6900v
First Name:(*) Harry
Last Name:(*) Potter
Type:(*) * VHN
Phone: +91 555 1212
E-Mail: harry@potter.uk.co

(b)

Register Health Worker Locations

Fill to download location
Location:(*)
HSC
Parent Location:(*)
A.Therukur

(c)

Enter Patient Record

Date:
02:04:00 PM
Sat, 01 Aug 2009

Location(*): * Athikadu

Health worker ID: * 6900v

Patient First Name:
Harry

Patient Last Name:
Potter

Note:
Japan

Gender(*): * Male

AgeGroup(*): * 5-14

Press Next button to go next page

Back Next

(d)

Disease Information

Search Disease:
ch

Disease: * Cholera

Symptoms:(*)
Abdominal pain, Ache, Chills, Muscle Cramps, Nausea, Thirst, Vomiting, Watery Diarrhoea

Signs:
Dehydration, Drowsiness, Increase sensitivity to touch, Tachycardia

Status: * Referred

(e)

- (a) Main menu
- (b) Profile registration
- (c) Retrieve locations
- (d) Patient record screen I
- (e) Patient record screen II



T-Cube Web Interface [Auton Lab]

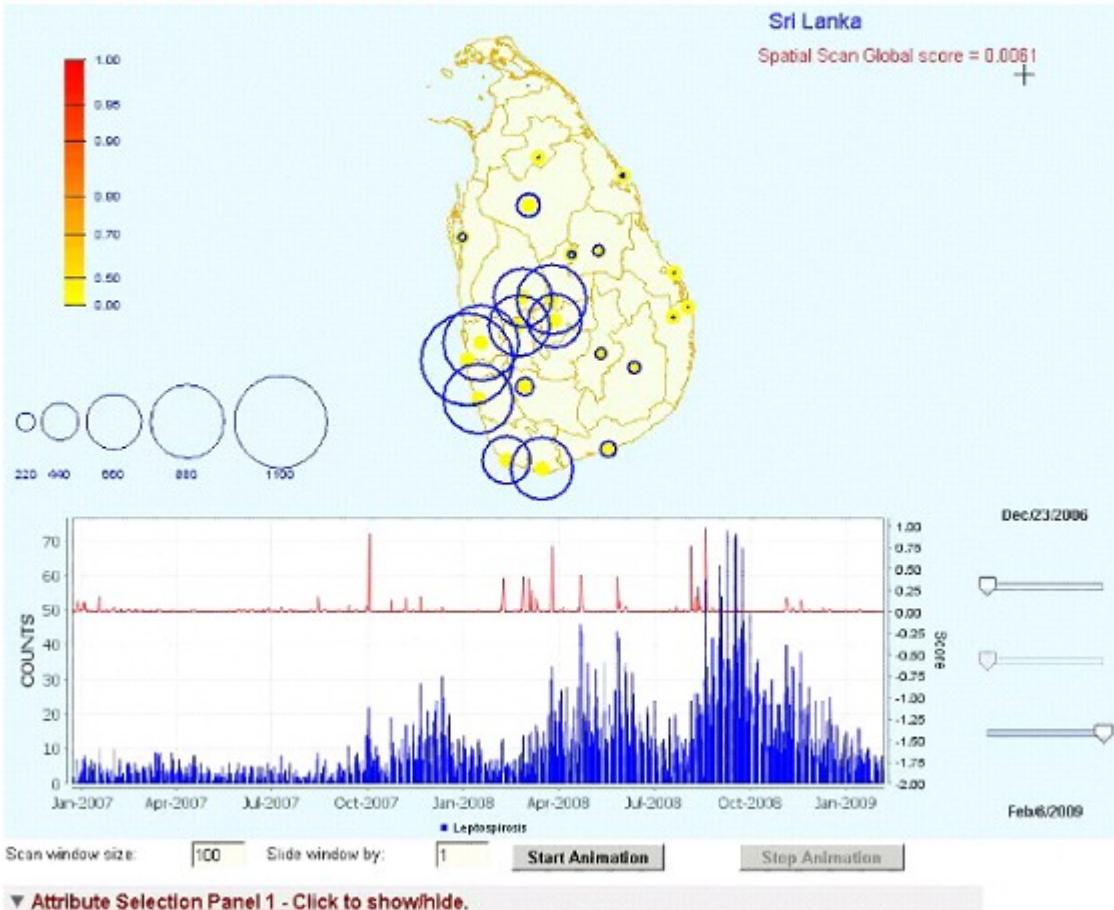
Spatial Scan has been successfully completed.

Time Series | Massive Screening | **Maps** | Pivot Tables

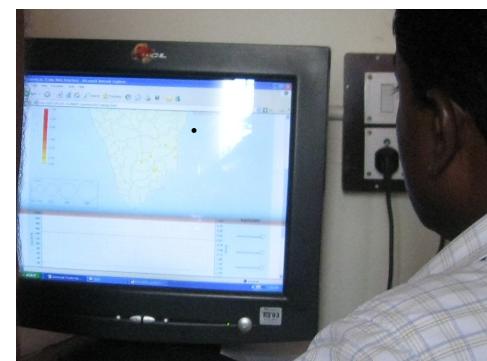
Please select the spatial attribute in your dataset.

Dataset 1 lk_city ▾ Load Map Clear Map Load Attributes

► File Upload/Clear Panel - Click to show/hide.



- AD Tree data structure
- Trained Bayesian Networks
- Fast response to queries
- Statistical estimations techniques
- Data visualization over temporal and spatial dimensions
- Automated alerts



Messaging/Alerting CAP/EDXL Broker [Sahana]

MESSAGING/ALERTING MODULE

- Home
- Consoles
- Manage Contacts
- Messaging Reports
- Survey Messages
- Stored Messages
- Alert
 - New
 - View
 - Remove
- Templates
- Common Alerting Protocol

SAHANA MAIN

- Sahana Home
- Messaging/Alerting Module
- User Preferences

Logged In
User: sahana
[Logout](#)

Alert **Information** **Resource** **Area**

Message Identifier: Actual-1246440944

Sender: pdhs@nw.health.gov.lk

Status: Actual ? HELP

Message Type: Alert ? HELP

Source: Wayamba PDHS

Scope: Restricted ? HELP

Language: English ?

Category: Health

Event: Disease Outbreak

Priority: Low

Sender Name: Dr. Lukshman Edirisinghe

Headline: A Dengue outbreak is in eff

Description: A dengue outbreak is in effect for Kurunegala District of Sri Lanka. All Medical Officers are Advised to execute preventive measures.

Recipient List

Contacts

- Groups
 - Resperc
- Individuals
 - Mifan
 - Nuwan_W
 - Mifan_M

Select Contacts

nuwan@lirneasia.net, +94773710394,
lukshman.edirisinghe@yahoo.com.au,
+947775551212

Select Delivery Type

Delivery Category	Delivery Type	Select
Short Text	SMS	<input checked="" type="checkbox"/>
	HF	<input type="checkbox"/>
	RDF	<input type="checkbox"/>
	Email	<input checked="" type="checkbox"/>
Long Text	Email	<input checked="" type="checkbox"/>
	Web	<input type="checkbox"/>
Voice Text	VoiceXML	<input type="checkbox"/>
	IVR	<input type="checkbox"/>



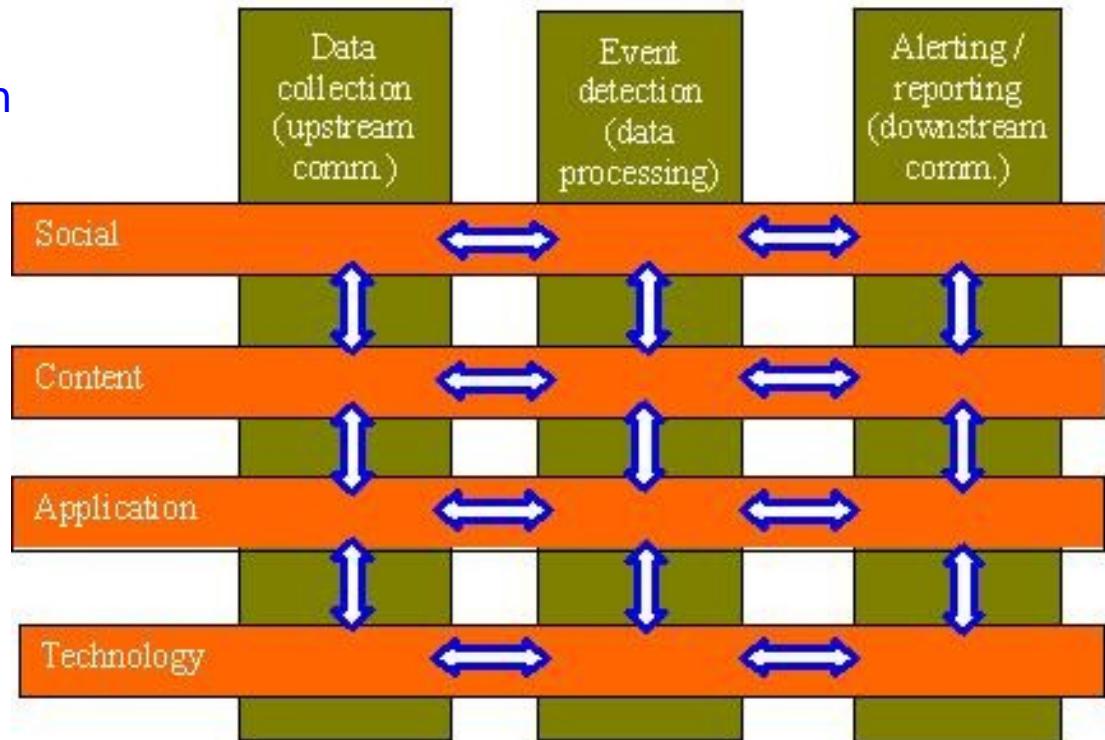
- Single input multiple output engine; channeled through multiple technologies
- Manage publisher /subscribers and SOP
- Adopt PHIN Communication and Alerting Guidelines for EDXL/CAP
- Relating the template editor with the SMS/Email Messaging module
- Do direct and cascading alert from a regional jurisdictional prospective
- Designing short, long, and voice text messages
- Addressing in multi languages



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Evaluation metric

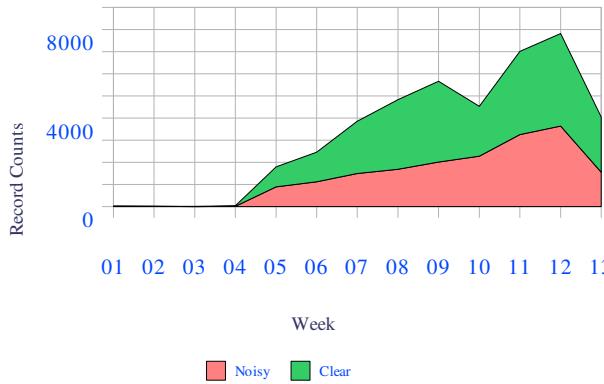
- Three verticals – data collection, event detection and reporting
- Four layers – social, content, application Technology
- Arrows showing the Interoperability between layers and verticals
- Objectively assess by calculating various indicators: costs, efficiencies, error rates, etc
- Subjectively assess through interviews and simulations



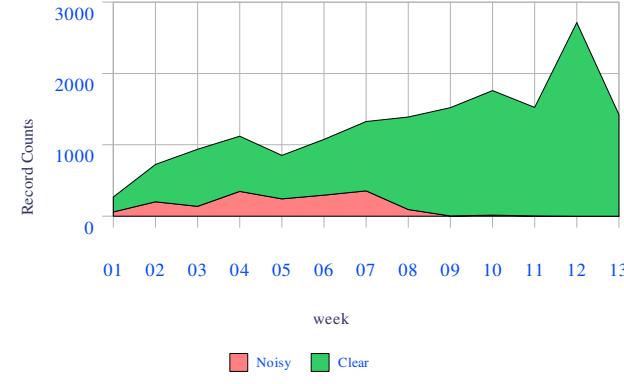
Data collection shortcomings: noisy and off-time

Noisy and Clean data

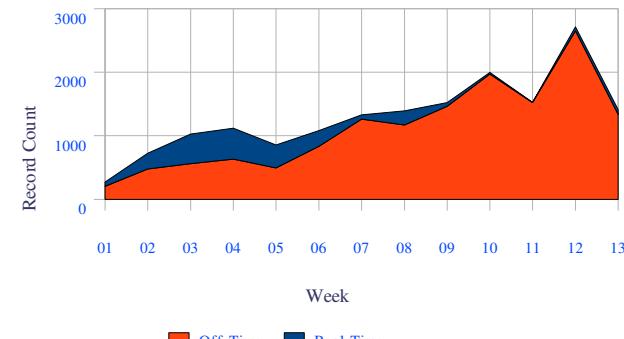
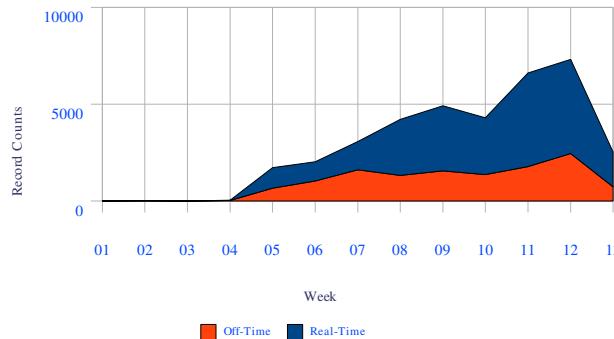
Sri Lanka



India



Real-Time and Off-Time

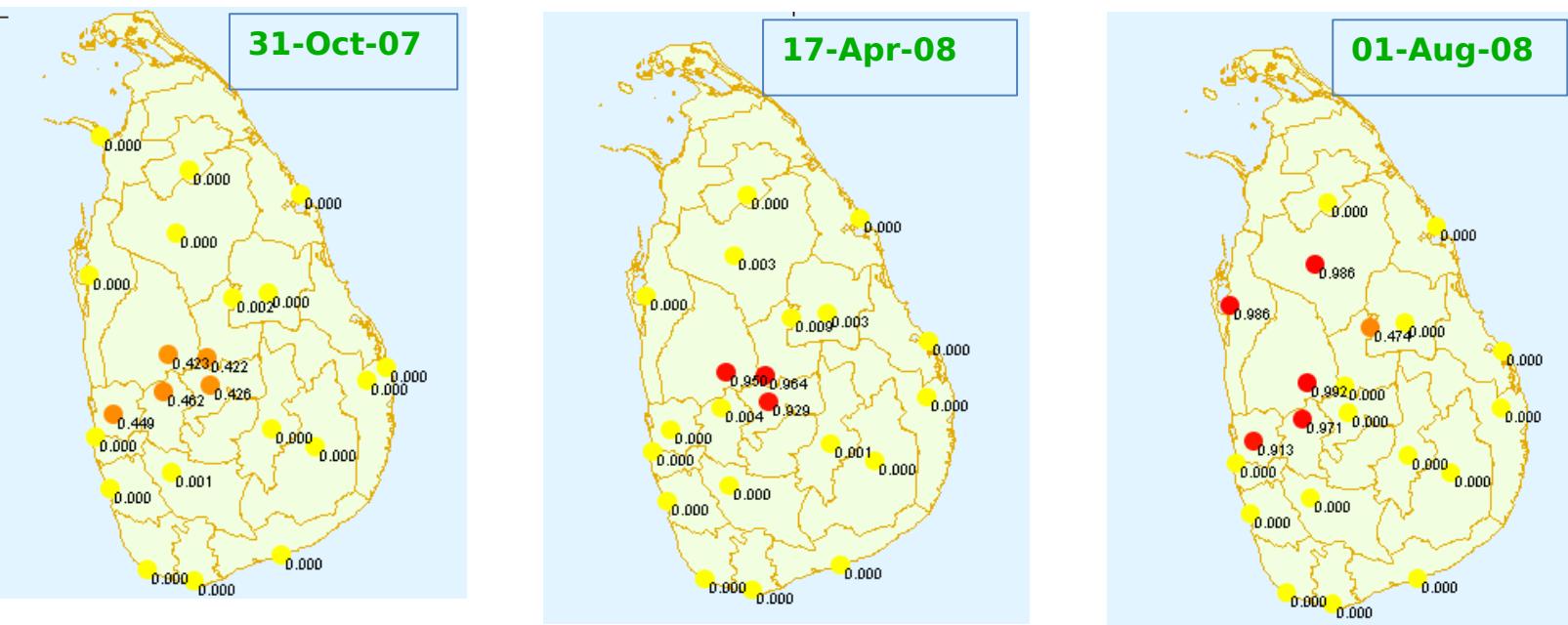
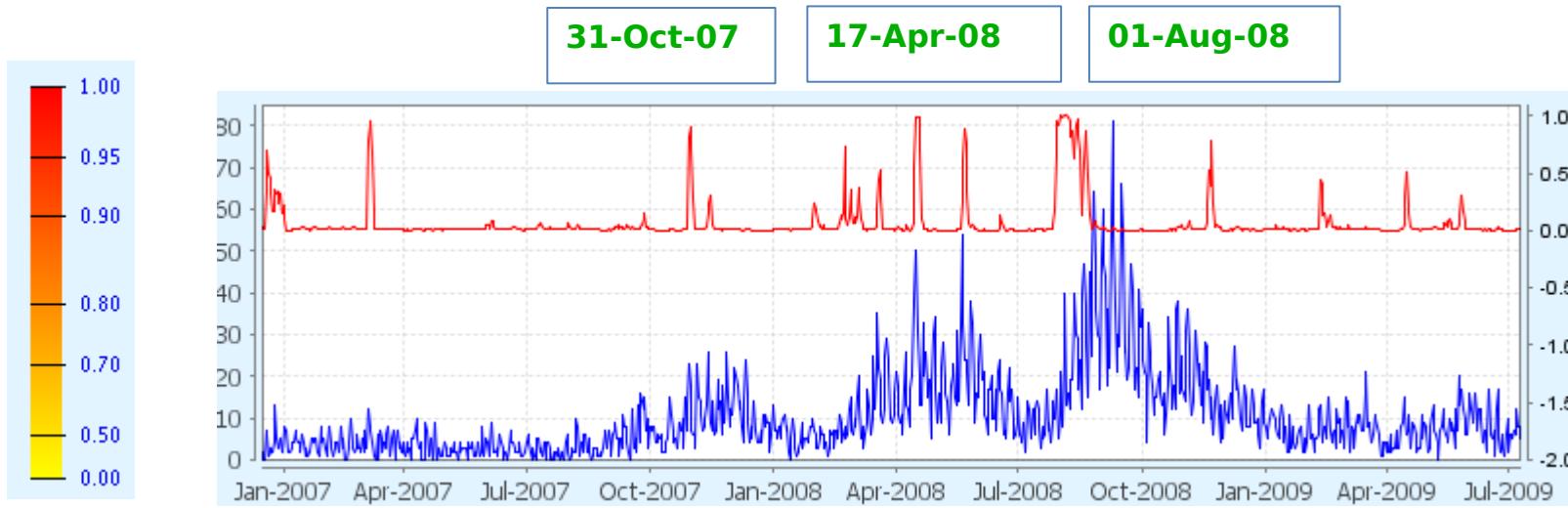


- E.61 hand held keypad inefficient for high volume data entry by medical officers
- Better to use touchscreen keyboard and hand writing recognition
- Comprehensive database of disease syndrome can reduce data errors
- Robust application with predictive text and validations for speedy data entry



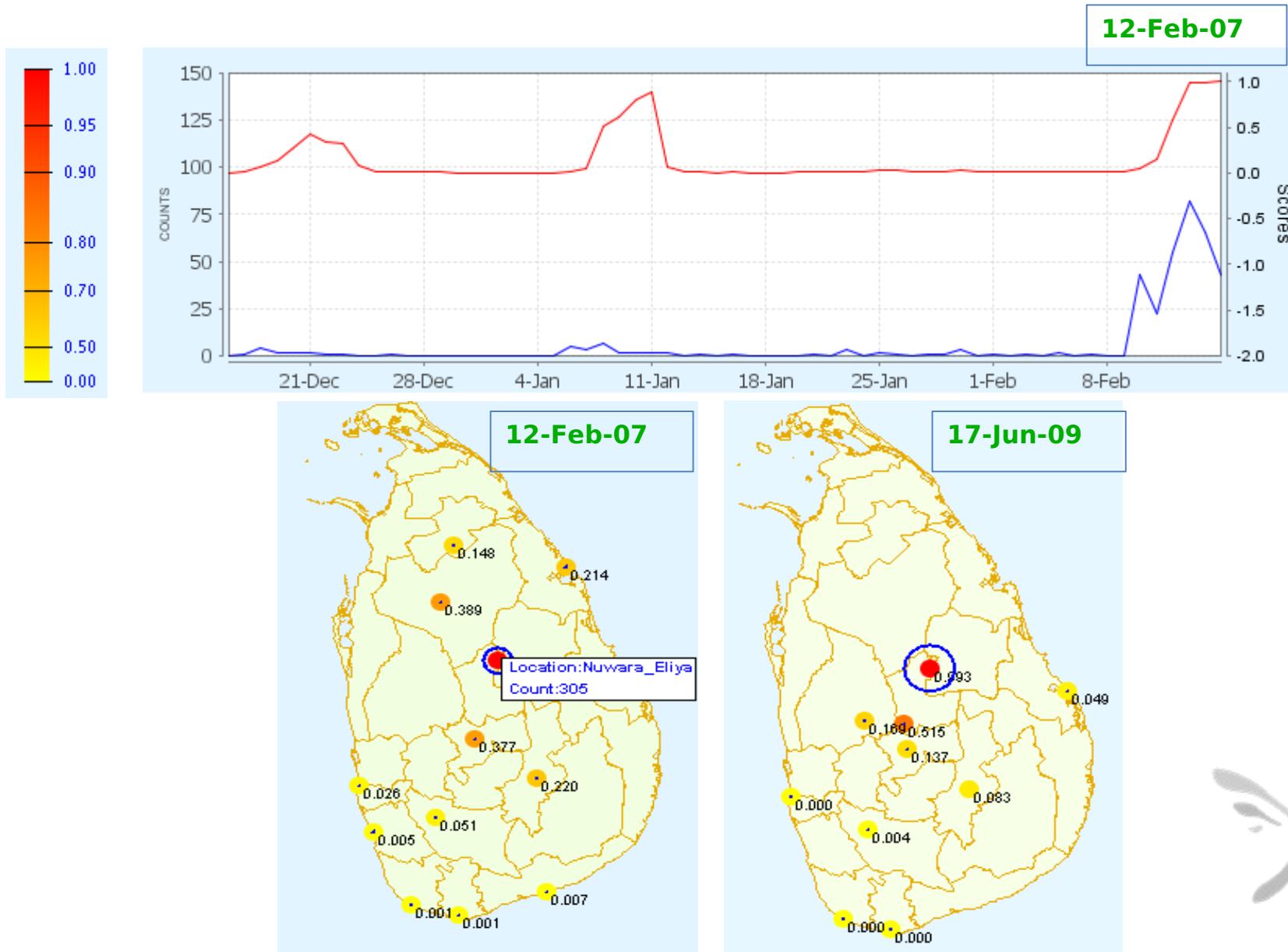
T-Cube replication study : detection of Leptospirosis

- Leptospirosis global counts and spatial scan global score (max group=6 window size = 7)



T-Cube replication study : detection of Food Poisoning

- Food Poisoning outbreak in Nuwaraeliya (max group=6 window size = 7)



T-Cube replication study : detection of Dengue

□ Progression of Dengue April – June 2009

