

**FG-AI4H – Focus Group on AI for Health**

# **Framing the AI for Health to advance national health-related Sustainable Development Goals and targets**

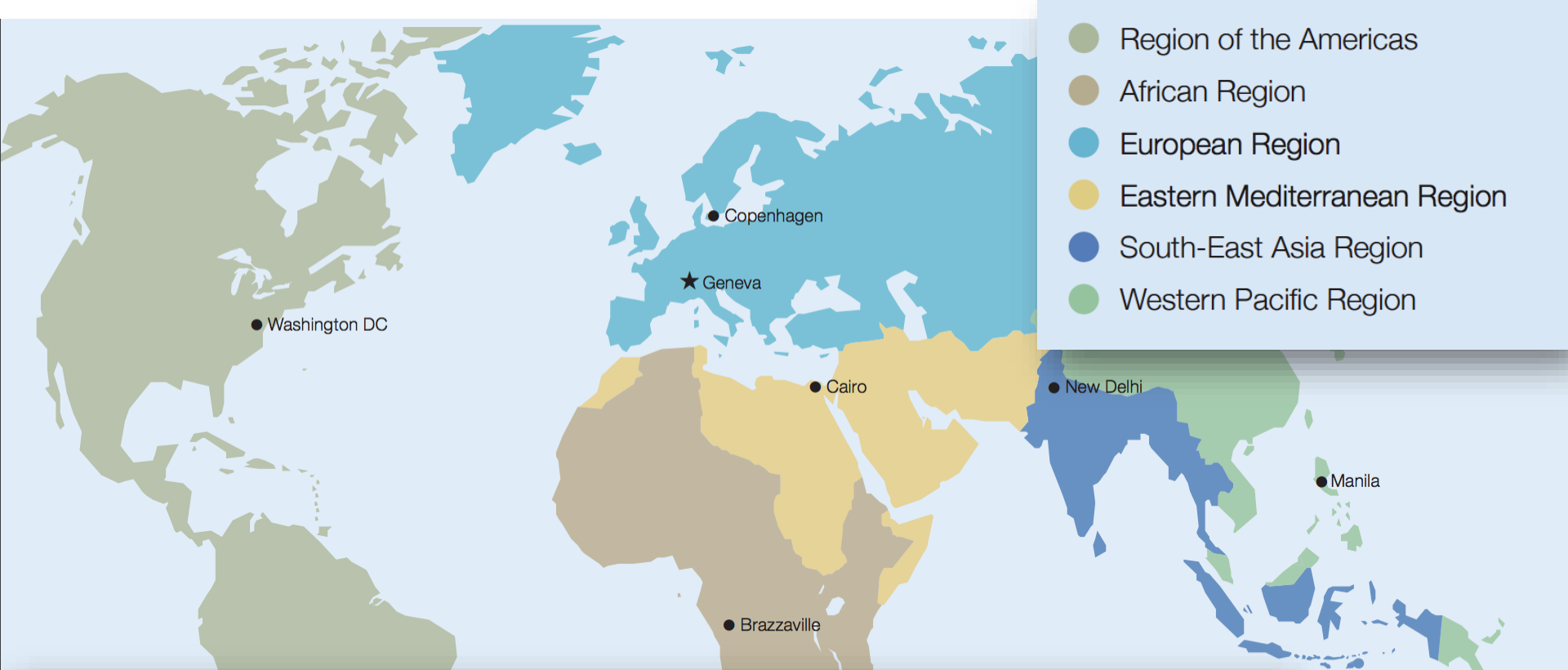
**Ramesh S. Krishnamurthy, PhD, MPH, PHIF**  
Senior Advisor, Health Metrics and Measurement  
World Health Organization  
Geneva, Switzerland

# Key Message

- Application of AI in healthcare is most effective when it helps achieve national health-related SDG goals.
- National and sub-national governments are encouraged to have appropriate policy and governance mechanisms to ensure ethical and safe use of Artificial Intelligence (AI) in Healthcare without hindering innovation.

# About the **World Health Organization**

*the United Nations specialized agency for health  
Established in 1948*



## WHO at a glance

- ▶ 194 Member States
- ▶ Headquarters in Geneva
- ▶ 6 regional offices
- ▶ More than 150 country offices
- ▶ More than 7000 staff
- ▶ More than 700 institutions supporting WHO's work
- ▶ Close partnerships with UN agencies, donors, foundations, academia, nongovernmental organizations and the private sector

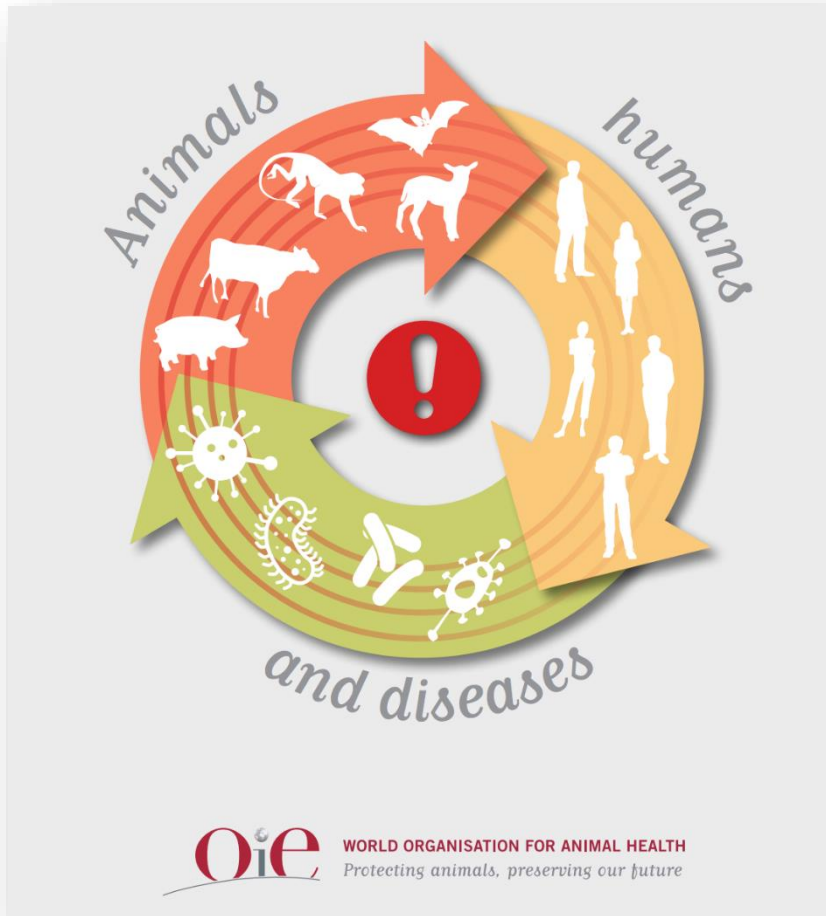
# World Health Assembly the decision-making body of WHO



# One Health

*the interconnectedness of human  
health, animal health and the  
ecosystem*

# One Health



Source: OIE, 2016; <http://www.oie.int/for-the-media/onehealth/>

# One Health

60%

of existing human infectious diseases are zoonotic



At least 75%

of emerging infectious diseases of humans (including Ebola, HIV, and influenza) have an animal origin



5

new human diseases appear every year. Three are of animal origin



80%

of agents with potential bioterrorist use are zoonotic pathogens



Source: OIE, 2016; <http://www.oie.int/for-the-media/onehealth/>

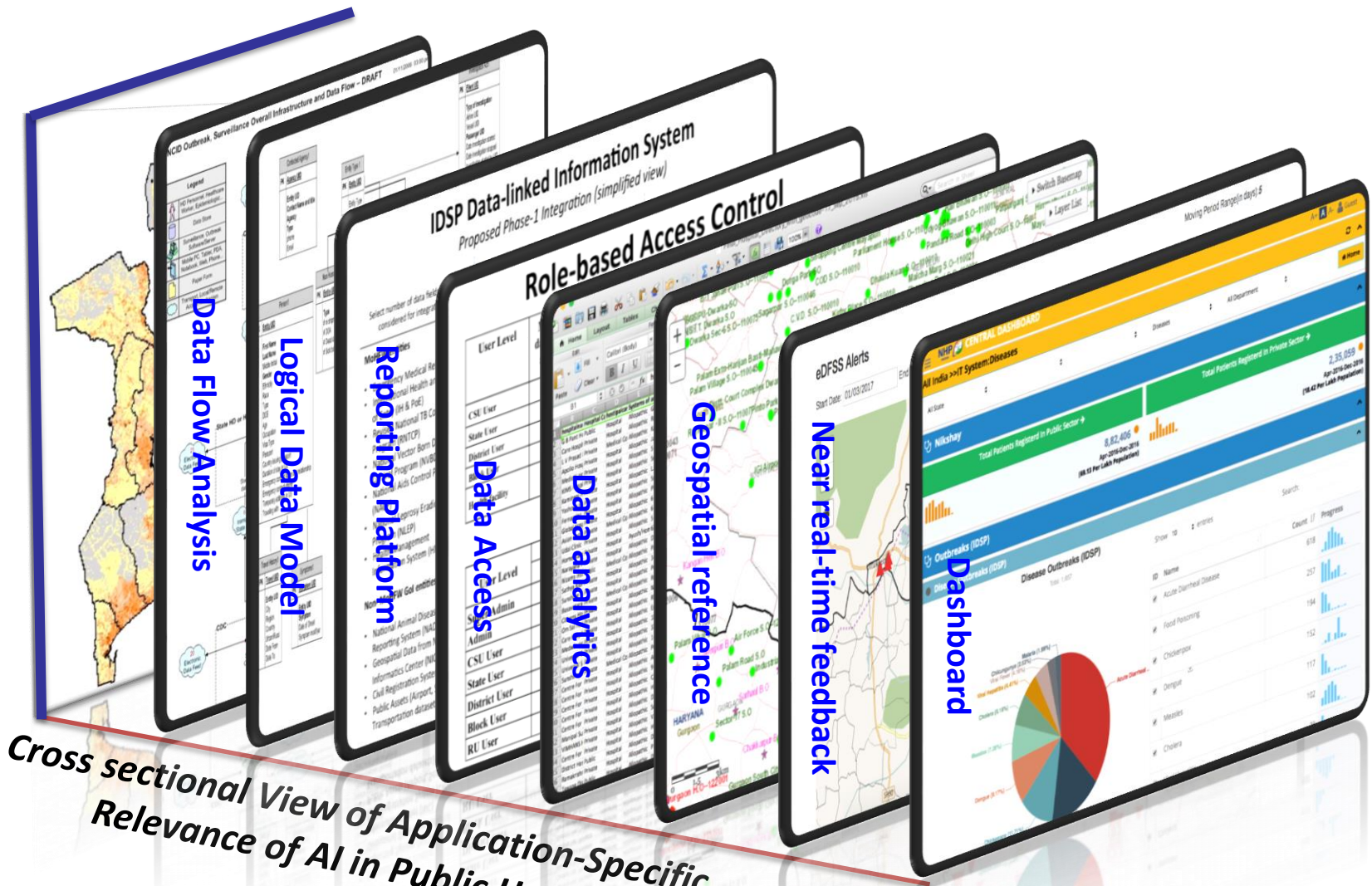


# HEALTH IN THE SDG ERA





**Cross sectional View  
Relevance of AI in Public Health**



**Cross sectional View of Application-Specific Relevance of AI in Public Health**

# Five necessary elements for use of AI in Health at National levels

1. AI Policy Framework and Regulatory Mechanisms
2. AI-Specialized Human Resource Capacity
3. AI Architecture and Computing Infrastructure
4. AI-Specific applications and algorithms
5. Financing “AI for Health” Research & Development

# Potential work streams for AI in Health

- A. AI for primary care and service delivery
- B. Outbreaks, Emergency Response and Risk Reduction
- C. Health promotion, prevention, and education
- D. AI health policy and financing

# Examples of AI-related Ongoing Activities

ARTIFICIAL



HEART

DNA ST



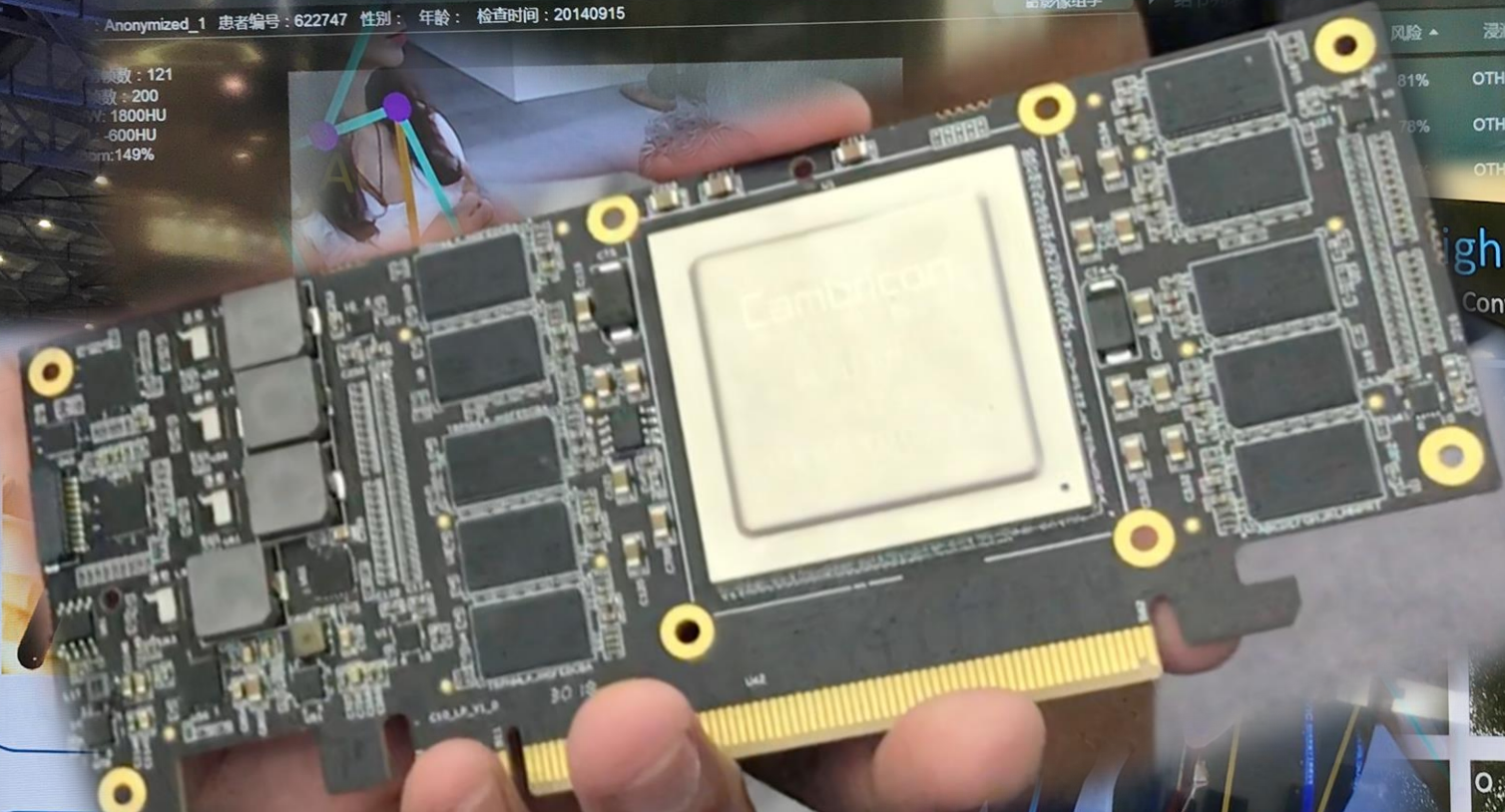
HEART RATE  
68

# 7 ways artificial intelligence is transforming healthcare

RATE CAN BE SH  
RT RATE IS NOT A STAB  
EQUILIBRIUM (BASAL

Anonymized\_1 患者编号: 622747 性别: 年龄: 检查时间: 20140915

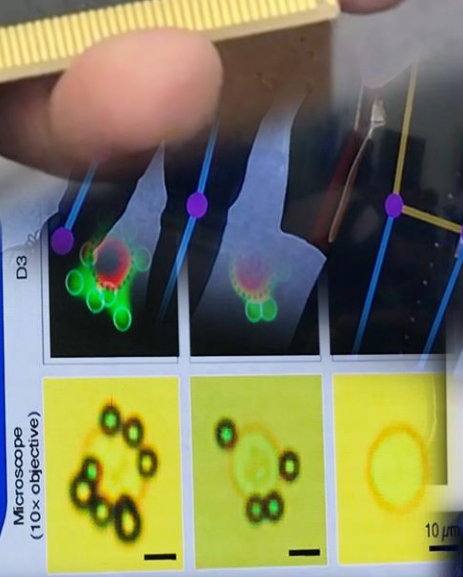
帧数: 121  
帧数: 200  
W: 1800HU  
-600HU  
m: 149%



- 风险
- 81% OTHER
- 78% OTHER
- OTHER

### High Value MRI

Conventional Error





# Track 2: AI + Health: Artificial Intelligence – a game changer for Universal Health Coverage?

**Team Lead:** Marcel Salathé (EPFL); Ramesh Krishnamurthy, Senior Advisor, Department of Information, Evidence and Research, World Health Organization (WHO); Sameer Pujari, "Be Healthy, Be Mobile" Project Manager, World Health Organization (WHO)



## AI for Good Global Summit

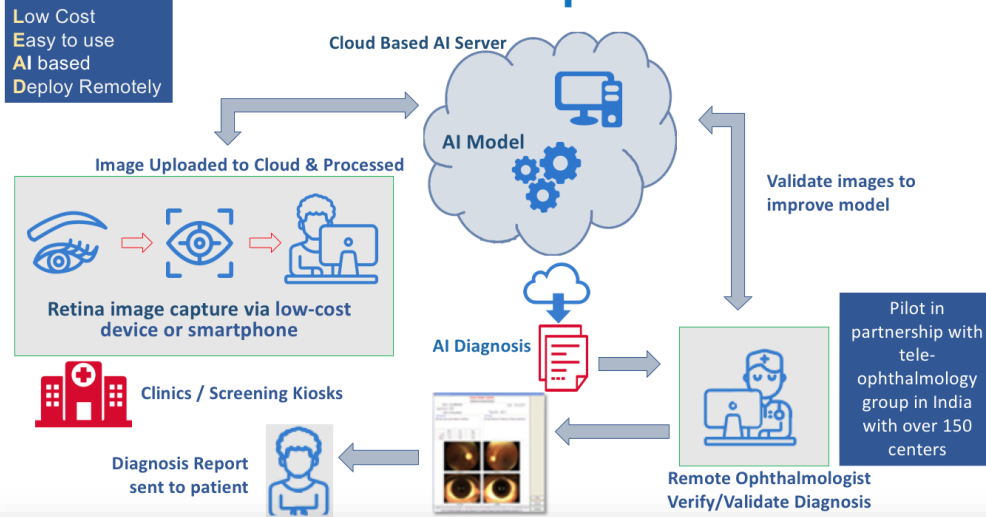
*Accelerating progress  
towards the SDGs*

#AIforGood

In partnership with



# Overview of Proposed Solution



*Proposal Pitch*

**AI to Detect Vision Loss**

*Category*

**For profit**

*Subject*

**Diabetic Retinopathy (DR), serious eye-disease affecting people**

# Detection & Diagnosis of DR



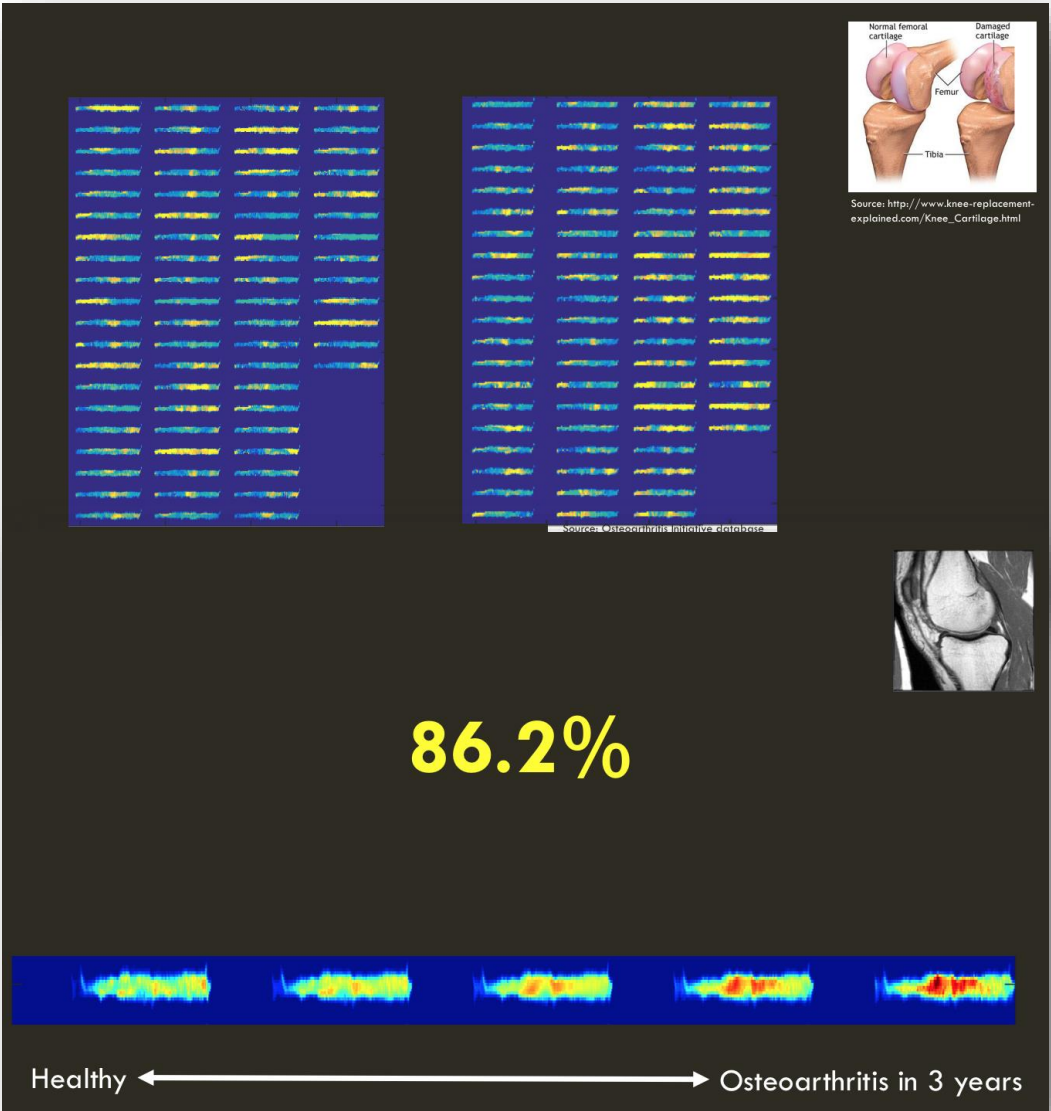
Eye Exam by a trained eye-care specialist using Fundus Camera



Diagnosis by manual examination of images for DR

**001**

**Credit:** Arun Shroff, Co-founder, Medindia.net  
AI for Good Summit, 2018.



*Proposal Pitch*  
**AI to Detect Osteoarthritis**

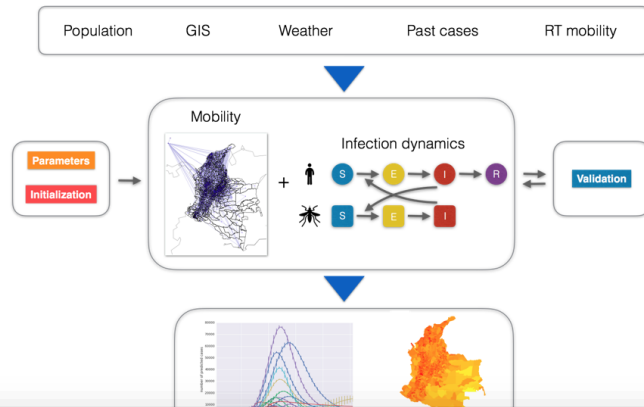
*Category*  
**Non-profit**

*Subject*  
**Prediction of who will develop osteoarthritis**

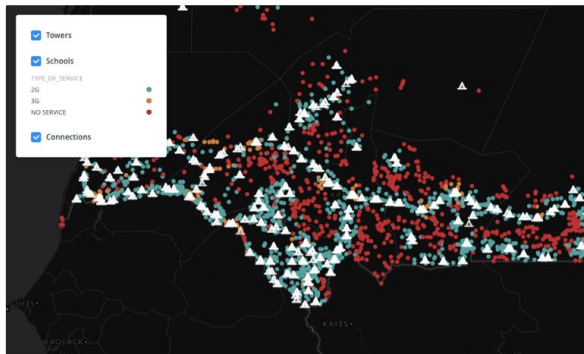
002

**Credit:** Shinjini Kundu, University of Pittsburgh Medical Center  
 AI for Good Summit, 2018

# Integrate epidemic modelling



# Mapping risk factors



**CASE STUDY:**  
**“How do you map risk?”**  
How do you map every school in the world?”



UN INNOVATION NETWORK

*Proposal Pitch*  
**AI powered Epidemic Modelling**

*Category*  
**Non profit**

*Subject*  
**Mapping risk factors and assess epidemic risks**

**007**

**Credit:** Clara Palau, UNICEF  
AI for Good Summit, 2018.

Tackling the snakebite humanitarian crisis:

**Snapp: First medical decision-support tool for snake identification based on AI and global collaborative expertise**

Dr. Rafael Ruiz de Castañeda  
Dr. Isabelle Bolon  
Institute of Global Health  
Faculty of Medicine  
University of Geneva

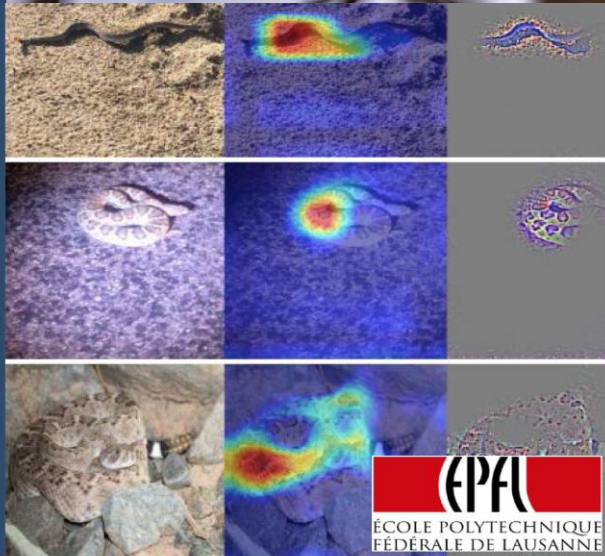


Source: Jacobus van Niekkerk



**Objective 2:**

Develop and test a system to **identify snakes from photos based on AI** (led Prof. Salathé, EPFL)



Source: Mohanty from Digital Epidemiology Lab - EPFL

**Credit:** Ruiz Castaneda, Marcel Salathe  
AI for Good Summit, 2018.

*Proposal Pitch*

**AI-based snake identification**

*Category*

**Non profit**

*Subject*

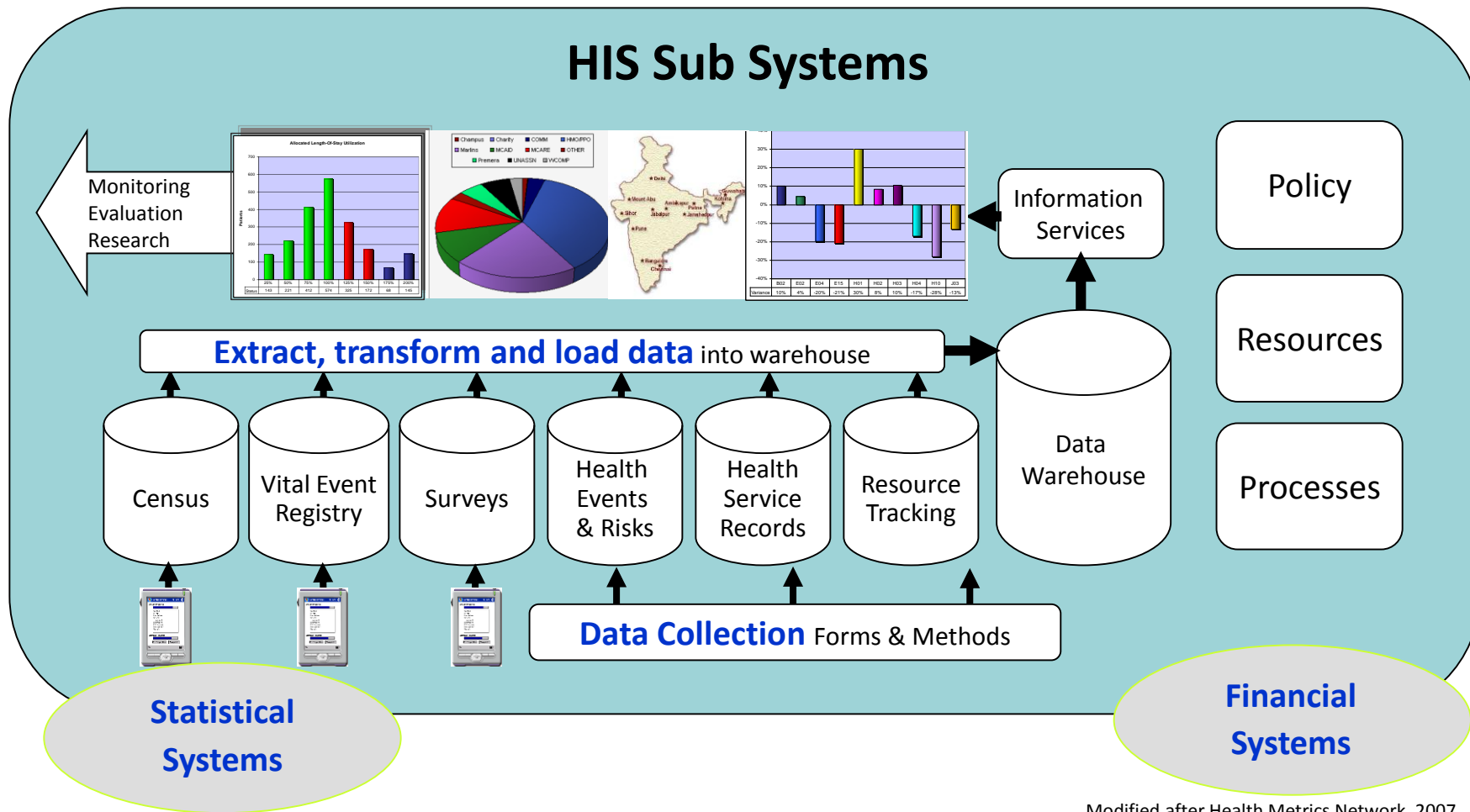
**Rapid response support to health workers to treat snakebites**

# **Use of AI in Public Health:** *Evidence-informed decision-making and the role of AI*

# Health Information System Landscape

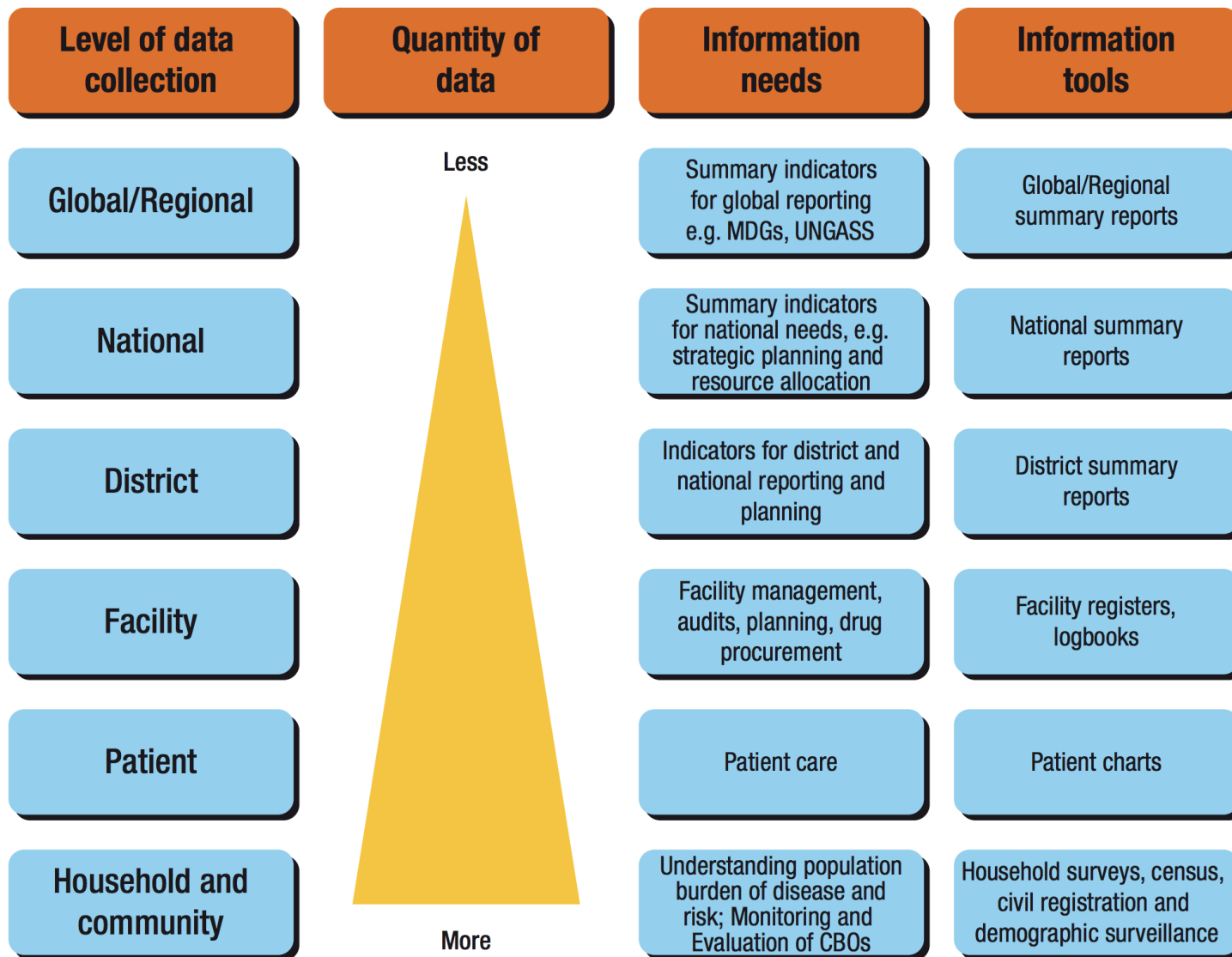
## *A Set of Complex Sub Systems*

### HIS Sub Systems



Modified after Health Metrics Network, 2007.

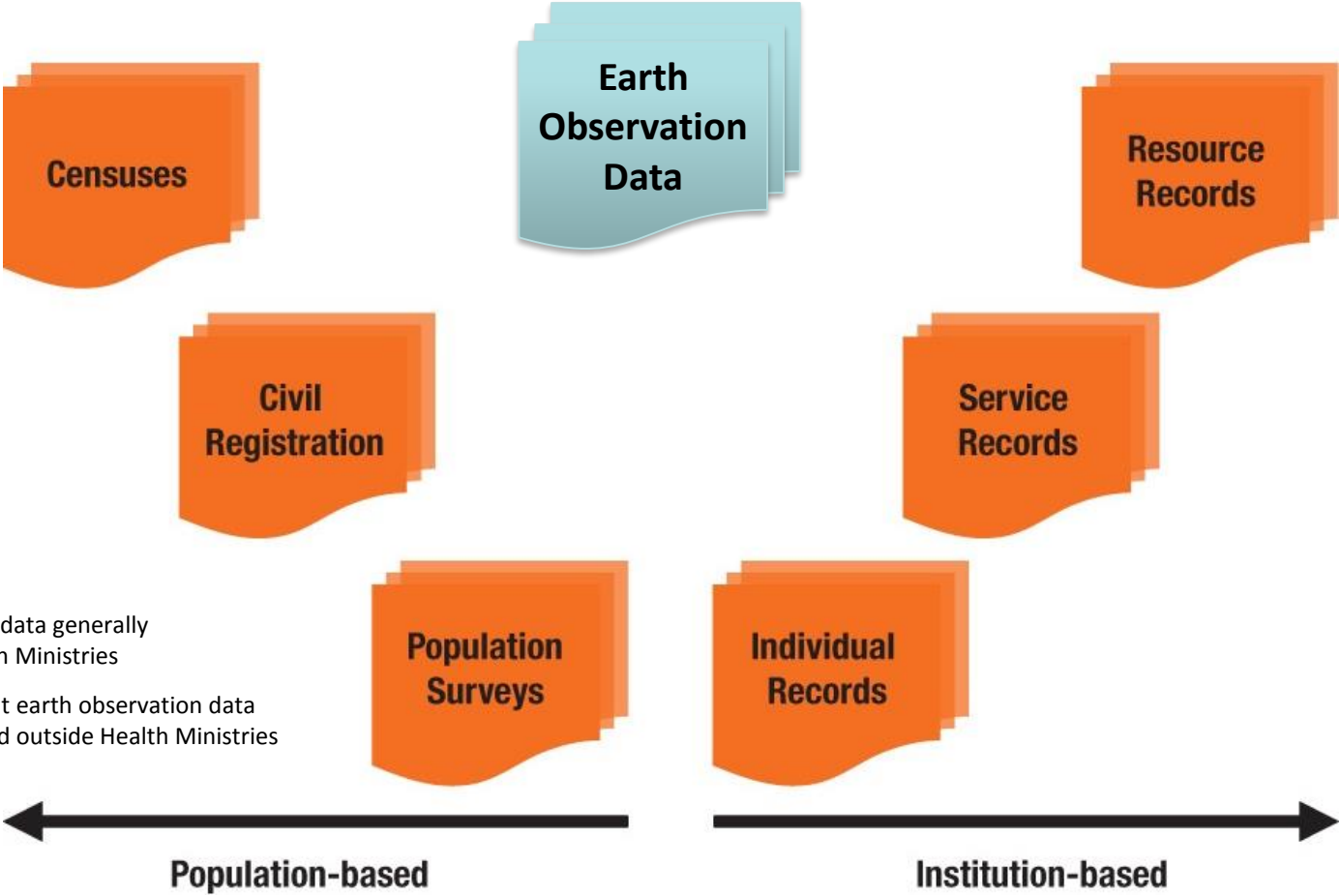
# Information Needs and Tools at Different Levels of Data Collection



Source: HMN, WHO 2008



# Common health-relevant data sources



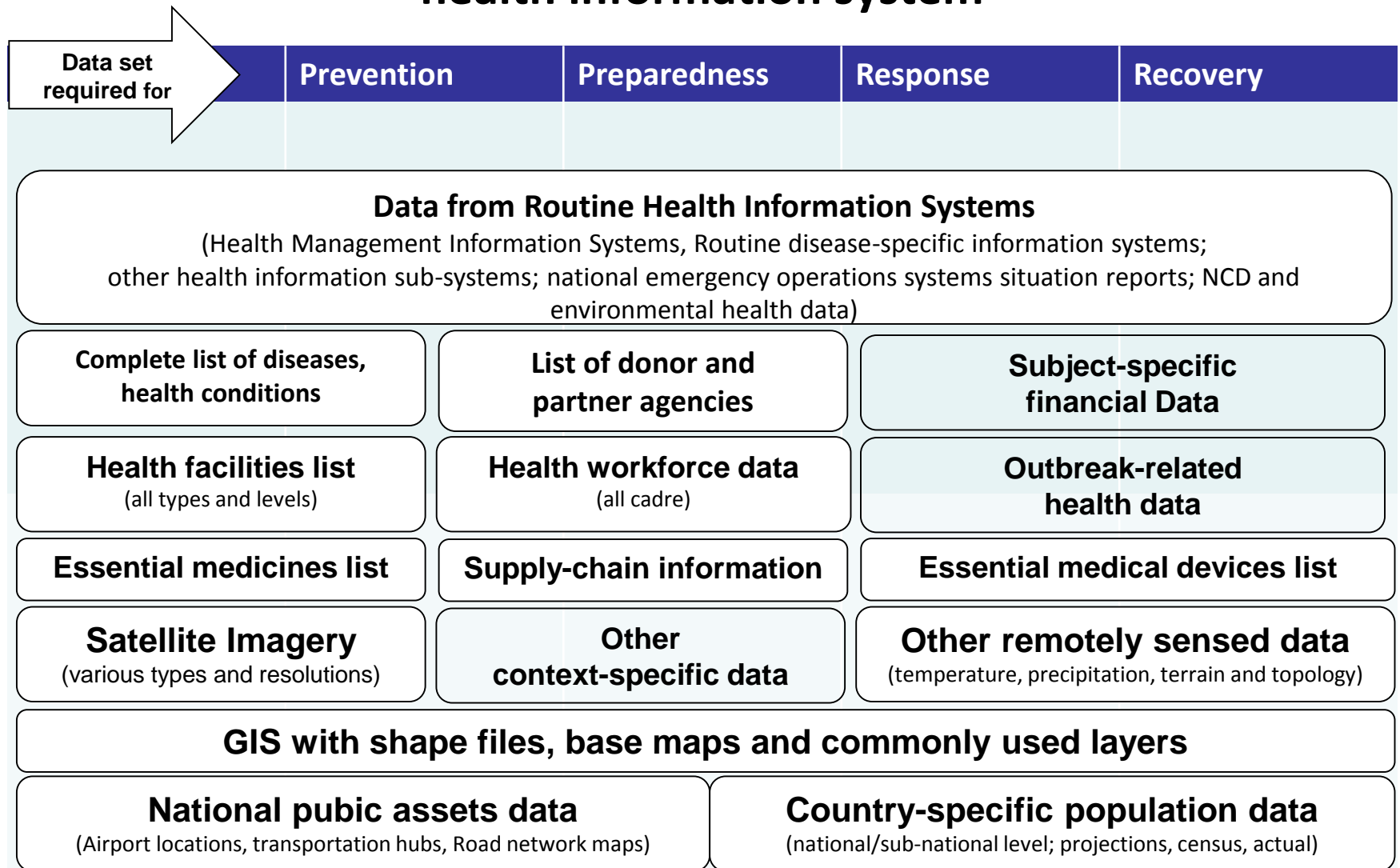
# Examples of earth observation data

*Near-real-time health-relevant earth observation data obtained from satellites*

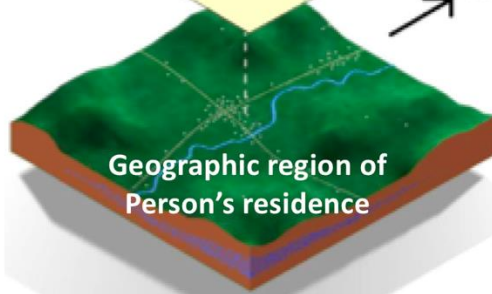
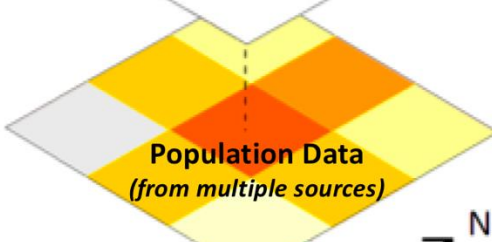
375 m Active Fire	Nitrous Oxide
Aerosols	Ocean Wind Speed
Brightness Temperature	Ozone Profile
Carbon Monoxide	Ozone
Cloud motion vectors (Winds)	Precipitation
Cloud Top Pressure	Radiances
Clouds and Trace Gases	Retrieved Carbon Monoxide <i>(Thermal Infrared Radiances)</i>
Clouds/Aerosols	Sea Ice Concentration
Columnar Cloud Liquid Water over ocean	Sea Ice
Columnar Water Vapor over ocean	Snow Cover
Corrected Reflectance Imagery	Snow Water Equivalent
Dust	Soil Moisture
Fire	Sulfur Dioxide
Global Rainfall	Temperature
Global Total Precipitation	Total Column Ozone and Aerosol Index
Land Surface Reflectance	Total Precipitable Water
Land Surface Temperature	Water Vapor
Moisture Profiles	
Nitric Acid	

Source: NASA, 2017. <https://earthdata.nasa.gov/earth-observation-data/near-real-time/download-nrt-data>

# Example of dataset required for national unified health information system



Geo-tagging data for area specific rapid response



# Integrated Health Surveillance Portal

## Integrated Disease Surveillance Programme

Ministry of Health and Family Welfare

Near real-time, web-enabled, person-centric, national health surveillance portal to track data for routine surveillance, early warning signals, outbreak investigation, special surveillance, facility and lab reporting status, media scanning, customized dashboards

Home About Manage IDSP Forms Special Surveillance Reports View Map IHR

Data entry from phone or computer from anywhere in India

ARI/Influenza Like Illness (ILI)

ARI/Severe Acute Respiratory Infection (SARI)

Acute Diarrhoeal Disease

Male

≤ 5 Yr > 5 Yr To

22 0 22

**Add New Patient Record** **Add Death Patient Record**

**Patient Details:**

First Name\* Middle Name Last Name

Patient Phone Number DOB\* Sex\*

Search Facility

Facility Type: Health Sub Centre

State: Karnataka

District: BAGALKOT

Sub-District: [Select]

Village/Ward: [Select]

Facility Name: [Text]

Reset

Health Facility Details | Essential Medical Supplies | Officer in Charge | Health Workforce Details

Facility Name: SOMMANAGI

Address: To be updated. To be updated

Name Identified: null

Facility Type: Health Sub Centre

State: null

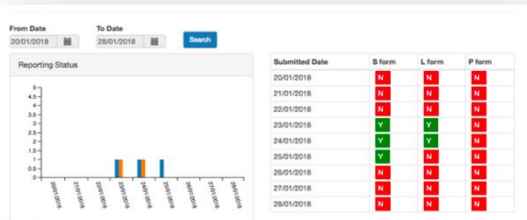
District: Bagalkote

State: Karnataka

Latitude: 16.2824

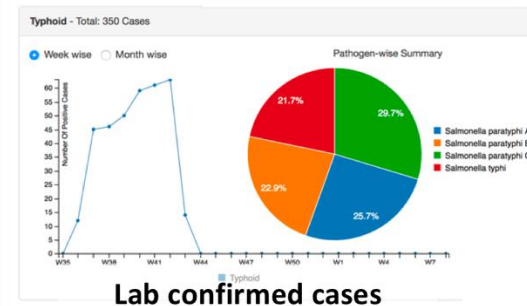
Longitude: 76.0105

### Nation-wide monitoring for compliance



Sr#	Action	Name	Provisional Diagnosis	Test Performed	Date of Onset	Date of Sample Collection	Type Of Sample	Specimen Id	Date of Test Performed	Results
1	Edit	Raja M L	Leptospirosis	IgM ELISA	03/01/2018	18/01/2018	Blood-Plasma	a12344		
2	Edit	Raja M L	Leptospirosis	IgM ELISA	05/01/2018	20/01/2018	Blood-Plasma	a12344		
3	Edit	K Lost	Measles	IgM ELISA	04/01/2018	10/01/2018	Biopsy (mention type)	8736aw		
4	Edit	Rejeshwari M I	Dengue	NS1 by ELISA	10/01/2018	14/01/2018	Blood Film	s123		

### System generated reports



GPS Location of cases

Aggregate report

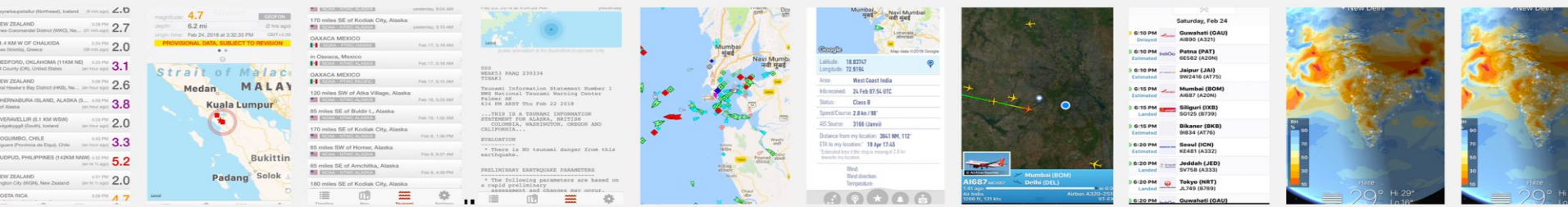
Data Table-Typhoid

Export Date	28/08/2017	04/09/2017	11/09/2017	18/09/2017	
P	L	P	L	P	L
0	0	1	1	1	2

Person Name Provisional Diagnosis Test Date of Onset Date Of Collection

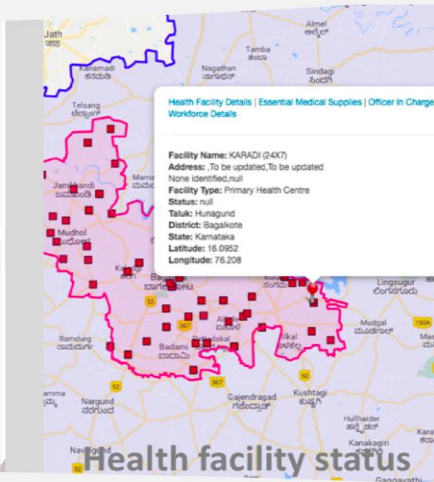
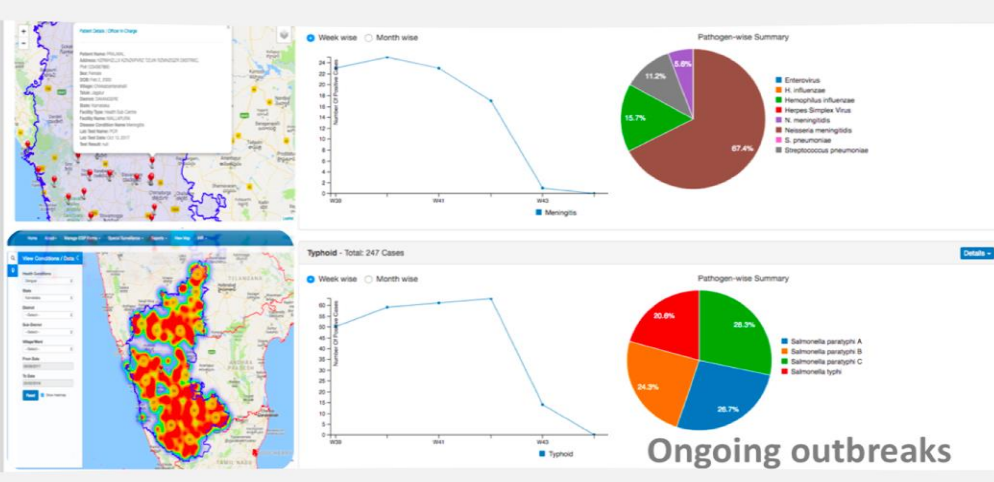
VENKATACHARI M	Typhoid	Widal	Step 12, 2017	Step 19, 2017
SHAMALA D	Typhoid	Culture	Step 14, 2017	Step 18, 2017

Near real-time data gathering ability from 36 States, 707 districts, 6267 sub-districts, and 655075 villages



Name	Provisional Diagnosis	Test Performed	Date of Onset	Date of Sample Collection	Type of Sample
ATLACHIM M	Typhoid	Widal	Sep 12, 2017	Sep 19, 2017	
ALA D	Typhoid	Culture	Sep 14, 2017	Sep 18, 2017	

**Contact tracing**



# Integrated Health Surveillance Dashboard Strategic Health Operations Center

Modified after - Source: WHO. Artist rendering, 2015

**EARTHQUAKE 2\* 4\***

**TODAY'S EVENTS**

- GRIMSEY (14.5 KM NNE)** Akureyrarkaupstaður (Northeast), Iceland 6:01 PM (9 min. ago) **2.6**
- NEW ZEALAND** Thames-Coromandel District (WKO), Ne... (31 min. ago) **2.7**
- 21.4 KM W OF CHALKIDA** Thebes (Voiotia), Greece 5:34 PM (36 min. ago) **2.0**
- MEDFORD, OKLAHOMA (11KM NE)** Grant County (OK), United States 5:25 PM (an hour ago) **3.1**
- NEW ZEALAND** Central Hawke's Bay District (HKB), Ne... (an hour ago) **2.6**
- CHERNABURA ISLAND, ALASKA (5...** Gulf of Alaska 4:59 PM (an hour ago) **3.8**
- HVERAVELLIR (8.1 KM WSW)** Bláskógabyggð (South), Iceland 4:50 PM (an hour ago) **2.0**
- COQUIMBO, CHILE** La Higuera (Provincia de Elqui), Chile 4:43 PM (an hour ago) **3.3**
- PAGUDPUD, PHILIPPINES (142KM NNW)** 4:32 PM (an hr ½ ago) **5.2**
- NEW ZEALAND** Wellington City (WGN), New Zealand 4:31 PM (an hr ½ ago) **2.0**

**EARTHQUAKE**

**Northern Sumatra, Indonesia**  
North Sumatra, Indonesia

magnitude: **4.7** **Phuket** **GEOFON**

depth: **6.2 mi** (2 hrs ago)

origin time: Feb 24, 2018 at 3:32:35 PM GMT+5:30

**PROVISIONAL DATA, SUBJECT TO REVISION**

**Tsunami Bulletins (NOAA only)**

**INFORMATION**

- 55 miles SW of Chignik, Alaska** NOAA - NTWC ALASKA yesterday, 9:04 AM
- 170 miles SE of Kodiak City, Alaska** NOAA - NTWC ALASKA yesterday, 3:10 AM
- OAXACA MEXICO** NOAA - PTWC HAWAII Feb 17, 5:16 AM
- in Oaxaca, Mexico** NOAA - NTWC ALASKA Feb 17, 5:16 AM
- OAXACA MEXICO** NOAA - PTWC PACIFIC Feb 17, 5:15 AM
- 120 miles SW of Atka Village, Alaska** NOAA - NTWC ALASKA Feb 16, 5:33 AM
- 85 miles SE of Buldir I., Alaska** NOAA - NTWC ALASKA Feb 10, 1:32 AM
- 170 miles SE of Kodiak City, Alaska** NOAA - NTWC ALASKA Feb 9, 1:56 PM
- 65 miles SW of Homer, Alaska** NOAA - NTWC ALASKA Feb 9, 6:37 AM
- 65 miles SE of Amchitka, Alaska** NOAA - NTWC ALASKA Feb 8, 4:39 PM
- 180 miles SE of Kodiak City, Alaska**

**PUBLIC TSUNAMI INFORMATI...**

**55 miles SW of Chignik, Alaska** Feb 23, 2018 at 9:04:28 AM yesterday

000  
WEAK53 PAAQ 230334  
TIBAK1

Tsunami Information Statement Number 1  
NWS National Tsunami Warning Center  
Palmer AK  
634 PM AKST Thu Feb 22 2018

...THIS IS A TSUNAMI INFORMATION STATEMENT FOR ALASKA, BRITISH COLUMBIA, WASHINGTON, OREGON AND CALIFORNIA...

**EVALUATION**  
\* There is NO tsunami danger from this earthquake.

**PRELIMINARY EARTHQUAKE PARAMETERS**  
\* The following parameters are based on a rapid preliminary assessment and changes may occur.

## Dashboard A - Public Health Emergency Monitoring

**WYNONA**

Vessel Voyage Position Port Calls

Latitude: 18.83747  
Longitude: 72.9194

Area: West Coast India

Info received: 24 Feb 07:54 UTC

Status: Class B

Speed/Course: 2.8 kn / 98°

AIS Source: 3166 (Janvi)

Distance from my location: 3641 NM, 112°  
ETA to my location: 19 Apr 17:45  
\*Estimated time if the ship is moving at 2.8 kn towards my location

Wind:  
Wind direction:  
Temperature:

flightradar24

**Mumbai (BOM)**  
**Delhi (DEL)**

**A1687** AIC687  
1:41 ago  
Air India  
1266 ft, 131 kts

in 0:03  
Airbus A320-251N  
VT-EXV

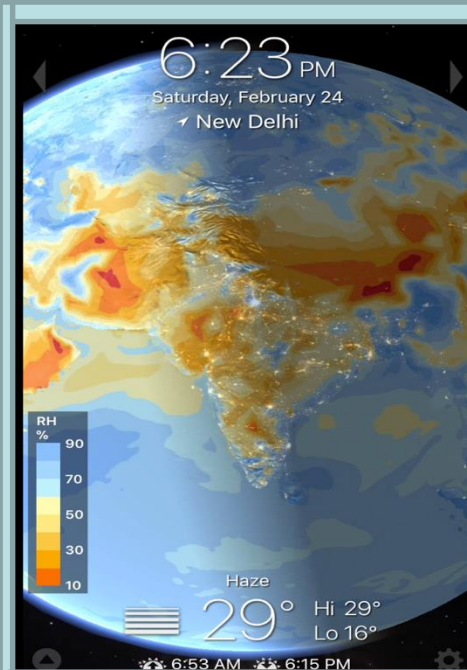
**Delhi Indira Gandhi Int'l Airport**

**6:06 PM (IST)** Saturday, Feb 24

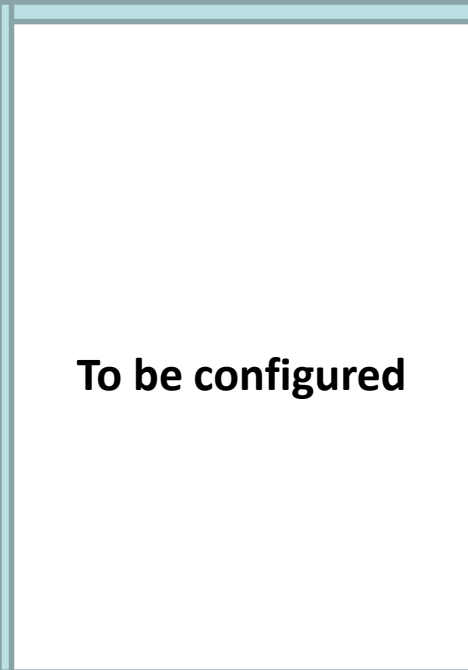
Saturday, Feb 24

- 6:10 PM** **Guwahati (GAU)** A1890 (A321) **Delayed**
- 6:10 PM** **Patna (PAT)** 6E582 (A20N) **Estimated**
- 6:10 PM** **Jaipur (JAI)** 9W2416 (AT75) **Estimated**
- 6:15 PM** **Mumbai (BOM)** A1687 (A321) **Estimated**
- 6:15 PM** **Siliguri (IXB)** SG125 (B739) **Landed**
- 6:15 PM** **Bikaner (BKB)** 9I834 (AT76) **Estimated**
- 6:20 PM** **Seoul (ICN)** KE481 (A332) **Estimated**
- 6:20 PM** **Jeddah (JED)** SV758 (A333) **Landed**
- 6:20 PM** **Tokyo (NRT)** JL749 (B789) **Landed**

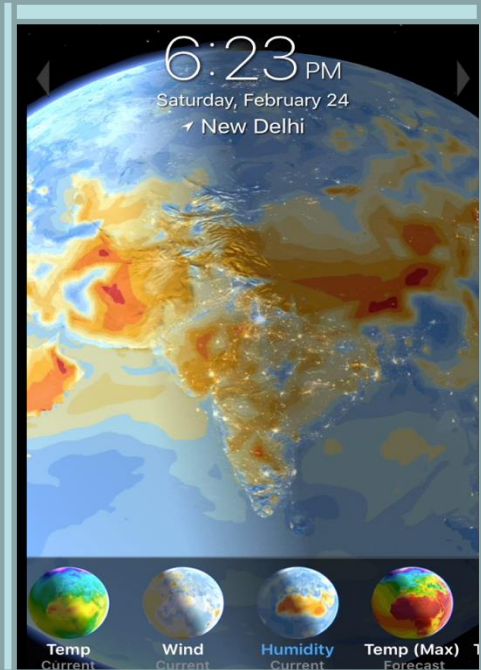
## Dashboard B - Points of Entry Monitoring



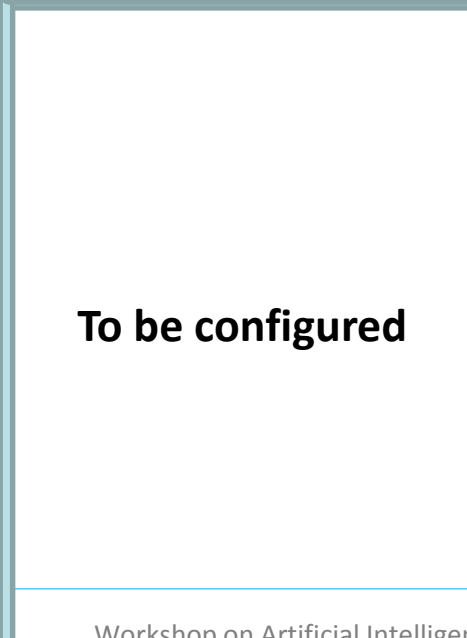
To be configured



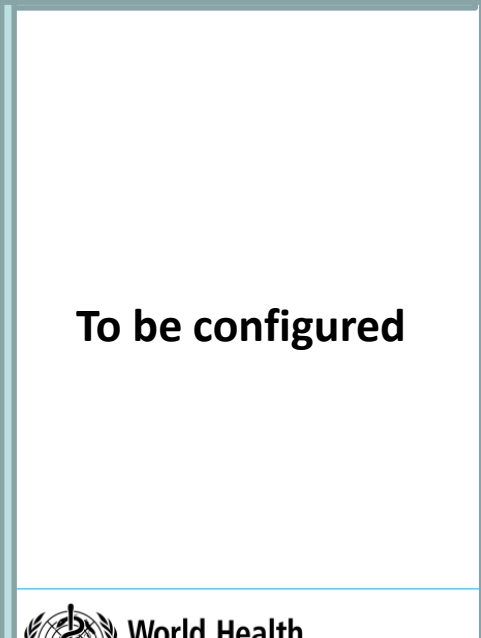
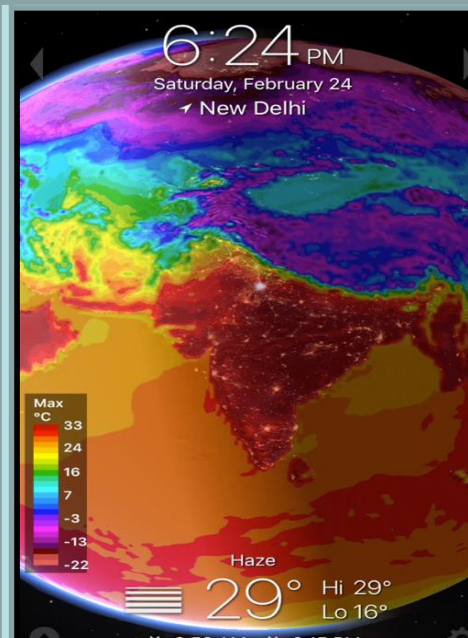
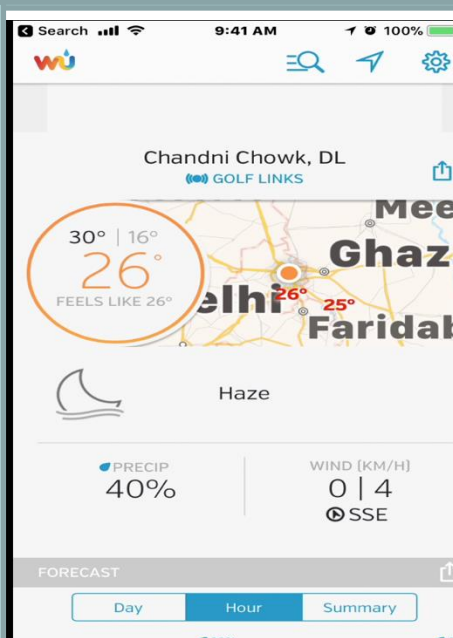
To be configured



## Dashboard C - Public Health Environment Monitoring



To be configured



To be configured



## Dashboard D – To be configured

# Participation in FG-AI4H





Committed to connecting the world

#ICT4SDG

What would you like to search for?

ITU	General Secretariat	Radiocommunication	Standardization	Development	ITU Telecom	Members' Zone	Join ITU
About ITU-T	Study Groups	Events	All Groups	Join ITU-T	Standards	Resources	Regional Presence

# Focus Group on "Artificial Intelligence for Health"

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- [Focus Group on Machine Learning for Future Networks including 5G](#)
- [Focus Group on Application of Distributed Ledger Technology](#)
- [Focus Group on Digital Currency including Digital Fiat Currency](#)

## FG-AI4H

The ITU-T Focus Group on Artificial Intelligence for Health (AI4H) was established by ITU-T Study Group 16 at its meeting in Ljubljana, Slovenia, 9-20 July 2018. The Focus Group will work towards a standardized assessment of AI4H solutions, in partnership with the World Health Organization.

Participation in the FG-AI4H is free of charge and open to all. To receive updates and announcements related to this group, please subscribe to the FG-AI4H mailing list (see the "FG-AI4H Mailing lists" tab on the right of this page).

**Parent group:** ITU-T Study Group 16

[Terms of reference >](#)

The Programme for the first workshop (25 September, WHO, Geneva) is now online.

Meetings and Related Events	Focus Group News	Focus Group Videos
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### WHO, Geneva, Switzerland 25-27 September 2018

[Workshop](#) on Artificial Intelligence for Health (25 and 1st meeting of FG-AI4H (26-27)

- [Announcement letter](#)
- [Registration](#) (deadline 19 September 2018)
- Submit written contributions by email to [tsbfgai4h@itu.int](mailto:tsbfgai4h@itu.int) (deadline 19 September 2018)
- [Visa Information](#)
- [Link for preferential hotel rate](#)
- [Workshop on Artificial Intelligence for Health](#)

[All meetings >](#)

# Membership to Focus Group Workstreams

- The WHO and ITU strongly encourages individual with motivation, interest and expertise to join one or more of the following technical workstreams of the FG-AI4H. The terms of references for each of the technical workstreams are provided in the annex.
- Interested individuals can submit their candidacy for consideration or they can be nominated by an entity on or before November 1, 2018.

# Membership to Focus Group Workstreams

- Following documents are necessary for review of candidacy:
- A complete resume highlighting your technical expertise and experience in AI
- Cover letter articulating your motivation to be part of the FG-AI4H workstream
- Full contact details and email addresses of 3 references
- Please submit the aforementioned via email to the ITU Secretariat

# Method of selection and notification

- The selection committee includes the Chair and Co-chairs of the FG-AI4H, who will determine the membership based on the technical expertise. The notice of membership will be informed via email by December 1, 2018.

# Conflict of Interest Disclosure

- All FG-AI4H members are required to complete a conflict of interest disclosure form.

# Key Message

- Application of AI in healthcare is most effective when it helps achieve national health-related Sustainable Development Goals.
- National and sub-national governments are encouraged to have appropriate policy and governance mechanisms to ensure ethical and safe use of Artificial Intelligence (AI) in Healthcare without hindering innovation.