

# Event Based Surveillance

## Module 2 : Identifying EBS Signals for Priority Diseases



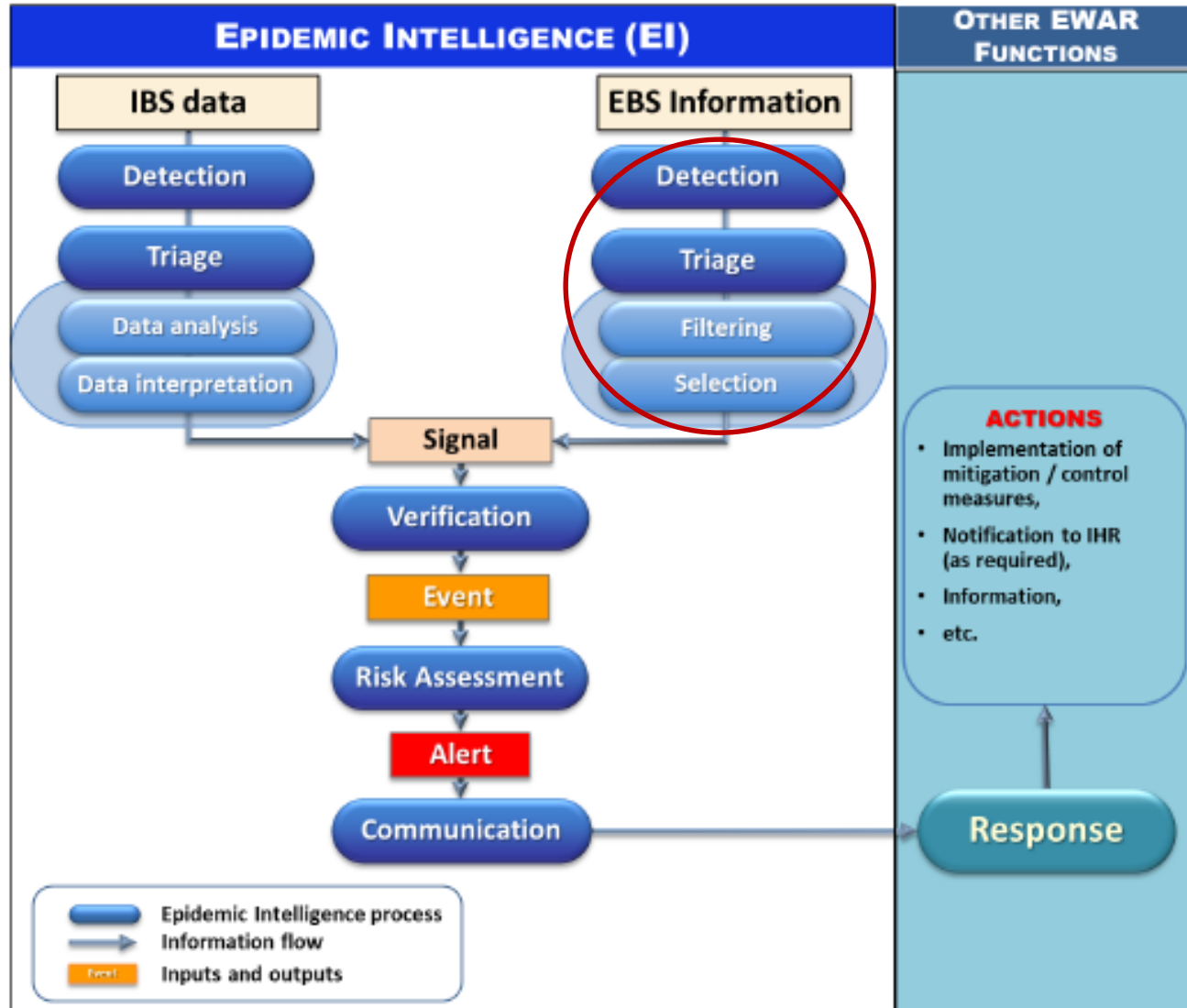
# Module 2 Learning Objectives

- 2.1 Describe EBS work protocols for detection of signals
- 2.2 Describe types of electronic or digital information that can be used as non-traditional/unstructured sources of data on public health event
- 2.3 Use publicly accessible international sources to identify events of potential public health significance

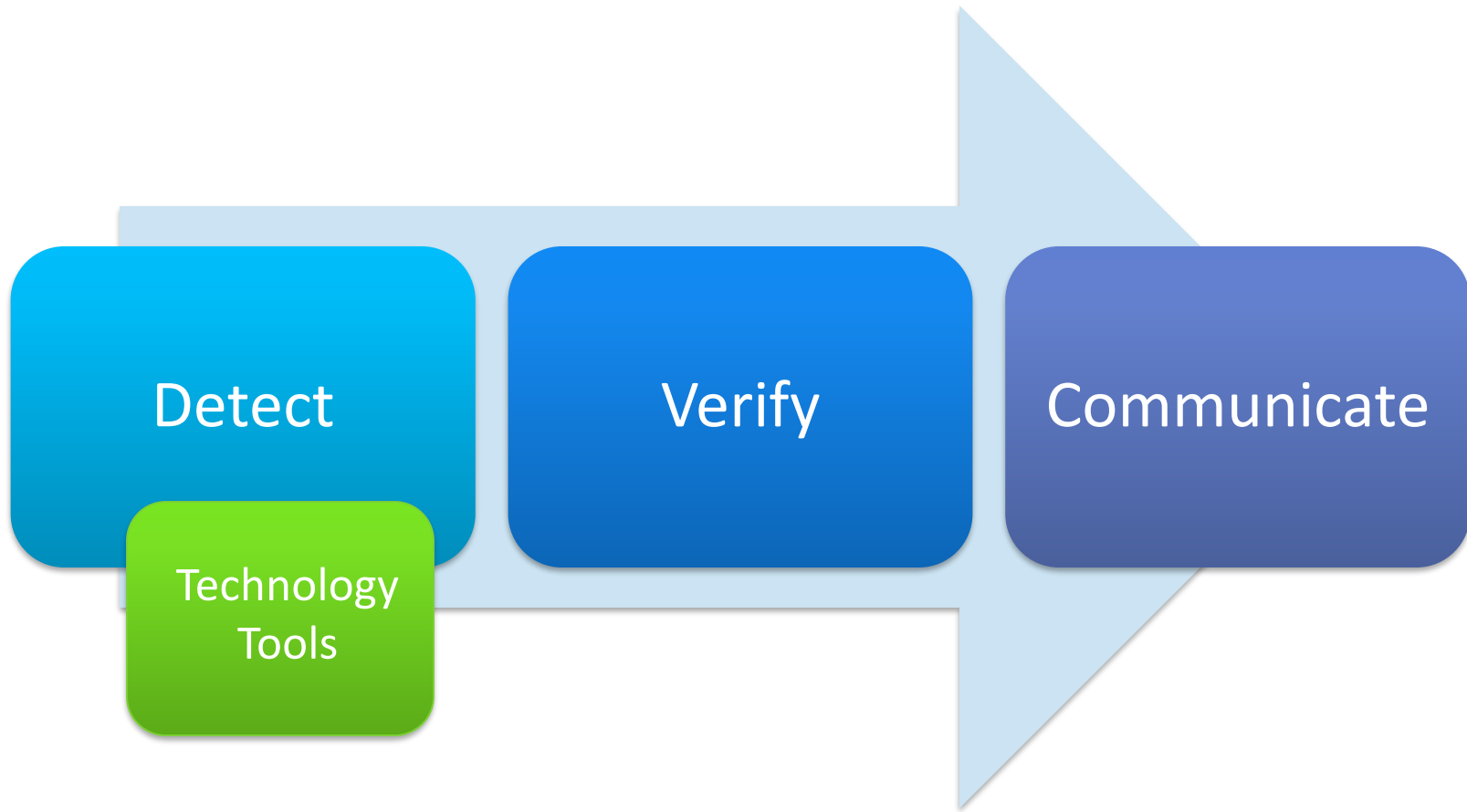


# ***PROCESS:***

## **Epidemic intelligence (EI) within EWAR**

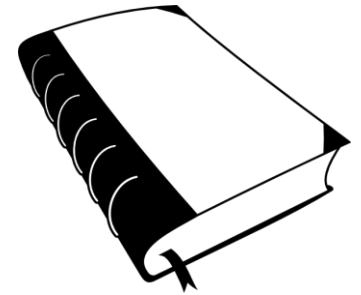


# Phases of Event-Based Surveillance



# ***DEFINITION:***

## **Signal**



- Data and/or information considered by the Early Warning and Response (EWAR) system as representing a potential acute risk to human health.
  - When it has been verified, a signal becomes an “event.”

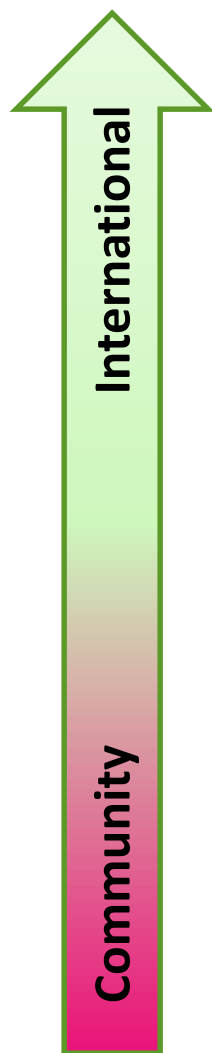


# **INFORMATION SOURCES**

Introduction to tools for EBS –  
Identifying types of information



# EBS information may come from numerous sources across sectors and levels



Electronic biosurveillance data systems  
Supranational networks  
International agency early warning systems  
Law enforcement

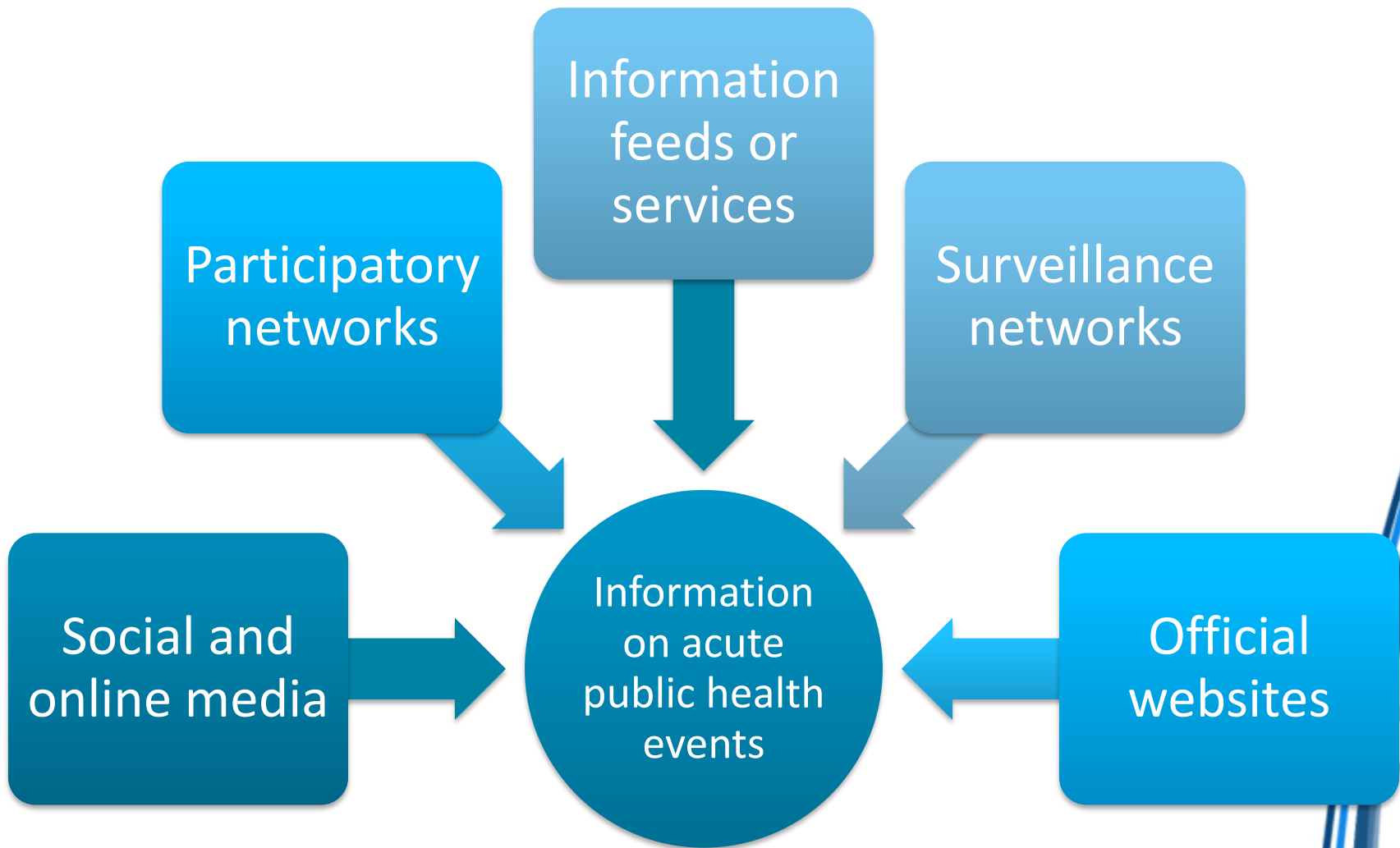
Veterinary services  
Chemical or radiation safety authorities  
Food safety agencies  
Pharmacy/drug supply agencies  
Laboratories

Water and sanitation authorities  
Health facilities  
Poison control centers  
Schools and businesses

Community leaders  
Community health workers  
Non-traditional practitioners  
Social media and participatory reporting



# Various types of electronic or online sources can provide information for EBS





# EBS information sources include official, formal and informal

## Official sources

- Any subnational, national, or international organization that is accredited by governments or by agreement to provide information

## Formal sources

- Actors directly involved in an event (for example, providing patient consultations, healthcare, or diagnostic services) as part of formal roles and responsibilities

## Informal sources

- Not associated with any organized activity related to the event

# EBS information may come from **official or formal** sources - examples



A list of online resources is included in your participant materials.

# EBS information may come from **unofficial or informal** sources - examples



A list of online resources is included in your participant materials.

# Official websites are sources of regularly updated information – Ex: WHO



System	Type	Content
IHR Event Information System (EIS)	Closed	Full information on reported events – open to National IHR Focal Points
Disease Outbreak News (DON)	Open	Information stripped of specific details (names, facilities)
Epidemic and Pandemic Alert and Response – regional offices	Open	Not updated daily, but includes useful details



<http://www.who.int/csr/don/en/>



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## Emergencies preparedness, response

### Novel Coronavirus – Republic of Korea (ex-China)



Disease outbreak news  
21 January 2020

On 20 January 2020, National IHR Focal Point (NFP) for Republic of Korea reported the first case of novel coronavirus in the Republic of Korea. The case is a 35-year-old female, Chinese national, residing in Wuhan, Hubei province in China.

The case-patient had developed fever, chill, and muscle pain on 18 January while in Wuhan. She visited a local hospital in Wuhan and was initially diagnosed with a cold. On 19 January, the case-patient was detected with fever (38.3 °C) upon arrival at the Incheon International Airport. The case-patient was transferred to a national designated isolation hospital for testing and treatment. She was tested positive for pancoronavirus reverse transcriptase-polymerase chain reaction (RT-PCR) assay, and subsequently was confirmed positive for novel coronavirus (2019-nCoV) on 20 January by sequencing at the Korea Centers for Disease Control and Prevention (KCDC). Upon detection, the patient had chills, runny nose, and muscle pain.

The case-patient did not report visiting any markets, including Huanan Seafood Wholesale Market, nor did she have known contact with confirmed 2019 nCoV.

- Home
- Alert and response operations
- Diseases
- Biorisk reduction
- Disease outbreak news

# Other official websites can be sources of information on outbreaks or events

Official websites

## Inter-governmental organizations

UN Food and Animal Organization (FAO)

World Animal Health Organization (OIE)

International food safety authorities network (INFOSAN)

International Atomic Energy Agency (IAEA)

## Government agencies and services

MOH websites

Travel health sites

Other ministries

## Non-governmental organizations

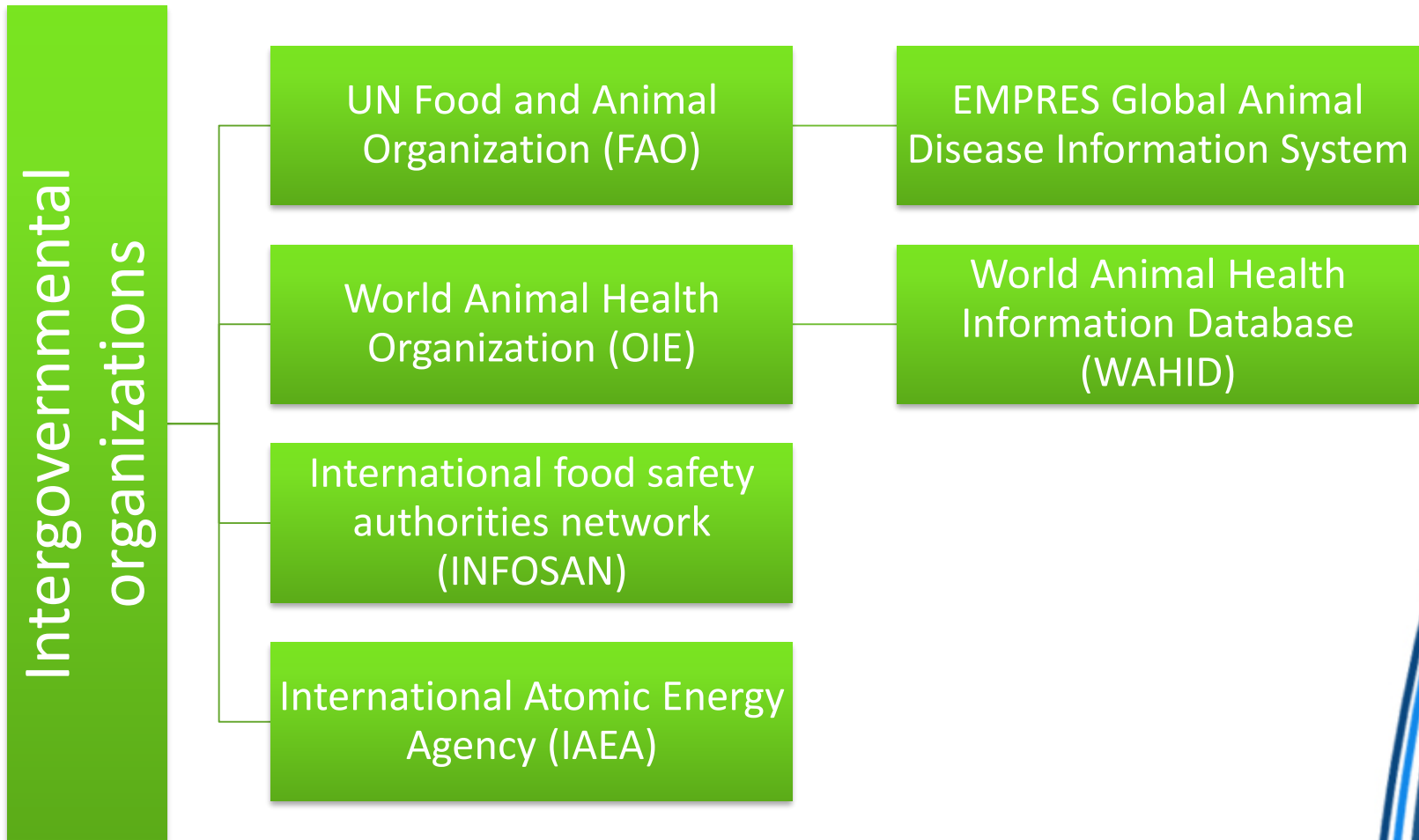
ReliefWeb

IRIN

International SOS

# Other official websites: intergovernmental organizations

Official websites



# Other official websites: governmental and non-governmental organizations

Official websites

Government agencies and services

MOH websites

Travel health sites

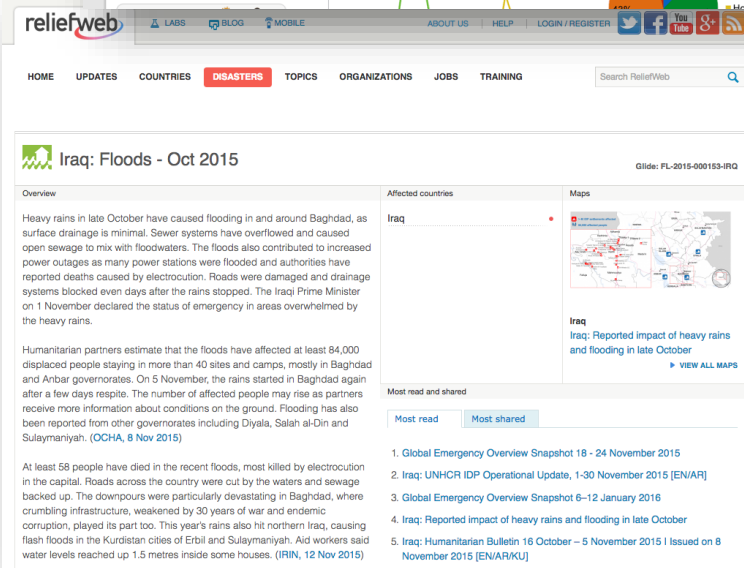
Other ministries

Non-governmental organizations

ReliefWeb

IRIN

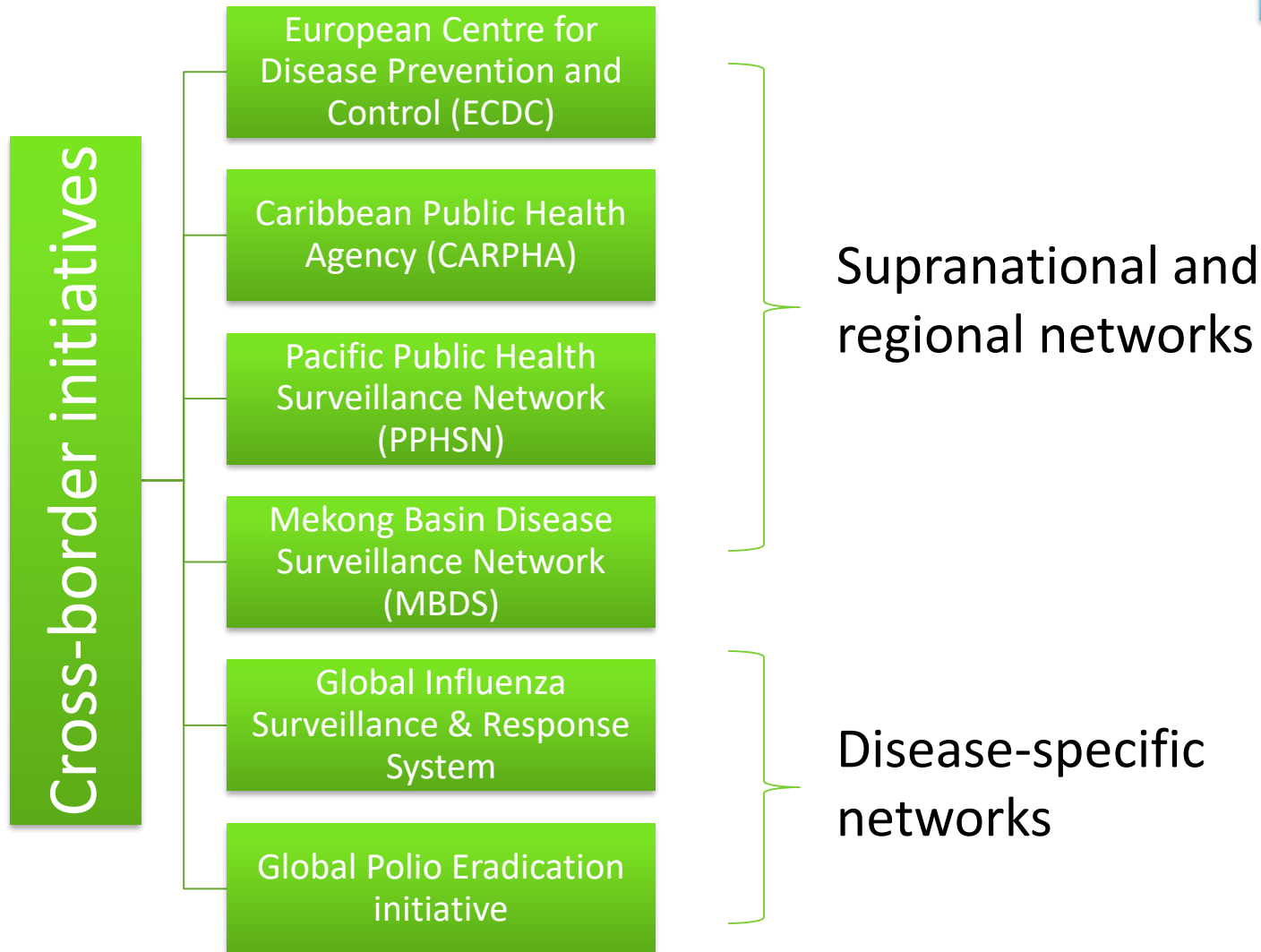
International SOS





# Cross-border surveillance networks organized by region or by disease

Surveillance networks



# Cross-border surveillance networks can offer context or a snapshot of ongoing events

Epidemic and emerging disease alerts in the Pacific as of 28 January 2020



Pacific Community  
Communauté  
du Pacifique  
For the Pacific Public  
Health Surveillance  
Network (PPHSN)

Legend

- Red dot: Cases reported are increasing or peaking.
- Blue dot: Cases reported are decreasing or circulation is ongoing.
- Grey dot: Awaiting confirmation of aetiology.

DEN : Dengue

An interactive version of the map is available online at: [www.spc.int/phd/epidemics/](http://www.spc.int/phd/epidemics/)

# Platforms for community-based surveillance information

Participatory  
networks

Surveillance  
networks

- Community leaders and community health workers can be engaged in reporting acute public health events and risks directly

Lay case  
definitions

Outreach and  
training to  
stakeholders

Mechanisms  
for reporting

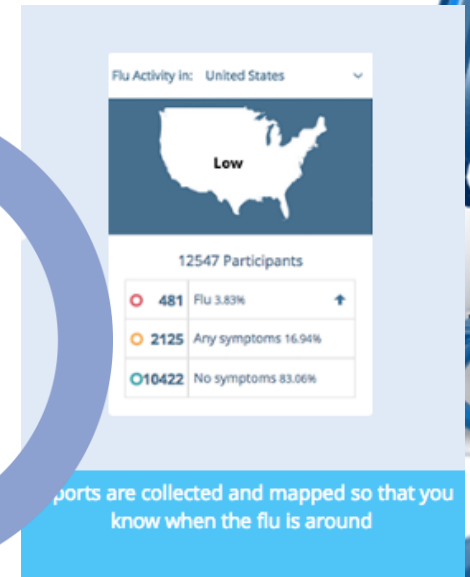
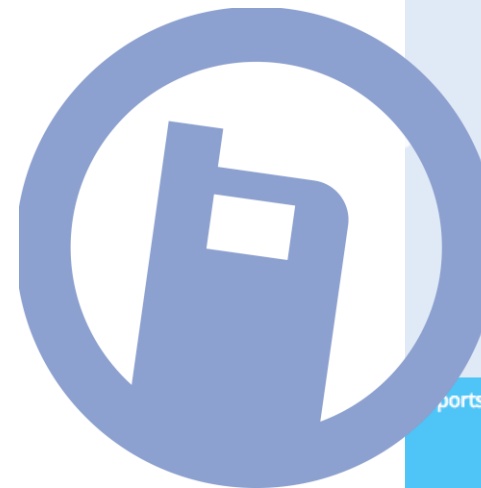
Unstructured  
information



# Participatory surveillance: individual reporting of priority syndromes

Participatory networks

- Participatory surveillance
  - Self-reporting by individuals through mobile phone app or website
  - User-generated data
  - Advantages: low-cost complement to other sources
  - Challenges: user engagement, sample size



# Social content and media may offer a direct window onto events

Social and  
online  
media



## News media

- Online content from traditional media

## Social networks

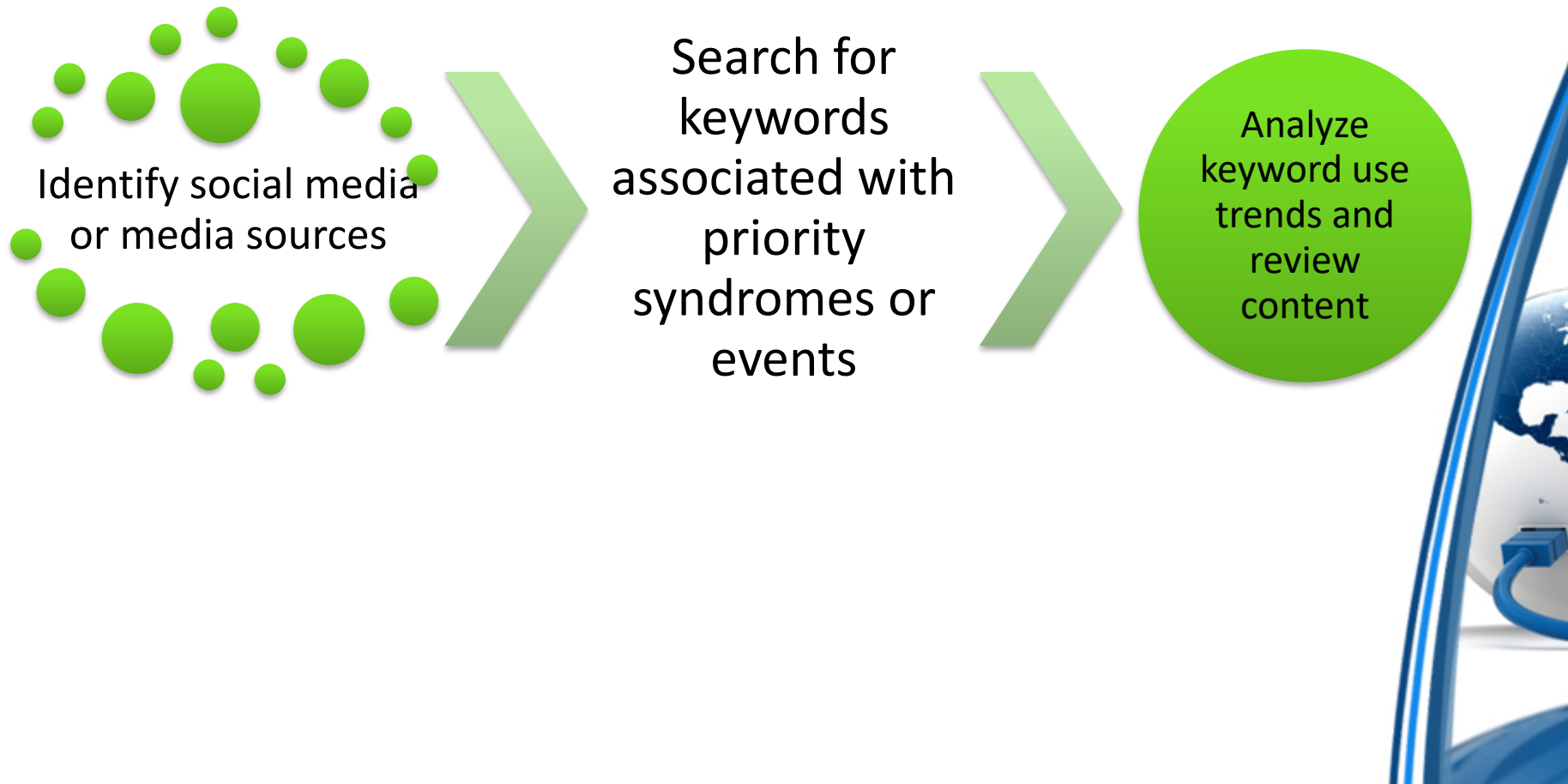
- Facebook
- Blogs
- Twitter
- WhatsApp groups

## Social content

- User-generated queries of wikis, search engines
- Google Alert

# Social content and media may offer a direct window onto events

Social and  
online  
media



# Information feeds or services: RSS feeds

Information  
feeds or  
services



Rich site summary  
(RSS) feeds

- Publish frequently updated information from favorite online sources



Standardized software tools to publish frequently updated information from websites

- The user identifies a favorite website that publishes an RSS feed
- The user pastes the feed's URI into an RSS reader (a free/low-cost app) which:
  - Constantly monitors the selected website
  - Informs the user of any updates
  - Can automatically download new data

# Information feeds or services: RSS feeds

Information  
feeds or  
services



## WHO news via RSS



### WHO news

Latest news releases, notes for the media, statements, media briefings and announcements



### WHO news on Zika

Latest news releases, notes for the media, statements, situation reports



### Governing Body documentation

Documentation in all official languages of WHO for Executive Board sessions and Health Assemblies



### Emergencies and disasters news

Latest news and updates on public health emergencies and disasters



### Disease Outbreaks

Latest news on outbreaks of disease across the world



### Avian influenza

Latest news on the avian influenza situation in humans around the world

- RSS feeds eliminate the need to visit favorite websites individually
- Users must identify the websites and subscribe to feeds




# Information feeds or services: information platforms or services

Data “scrapers” or aggregators take advantage of information available on the internet

- Algorithms designed to extract data-downloaded pages which can be stored and/or manipulated in a database
- Data can be extracted from wide range of official and unofficial sources

Information  
feeds or  
services



Information platforms  
or services

- Tailored software tools that collect information relevant to biosurveillance or health security from online resources



# **AGGREGATING ANALYSIS**

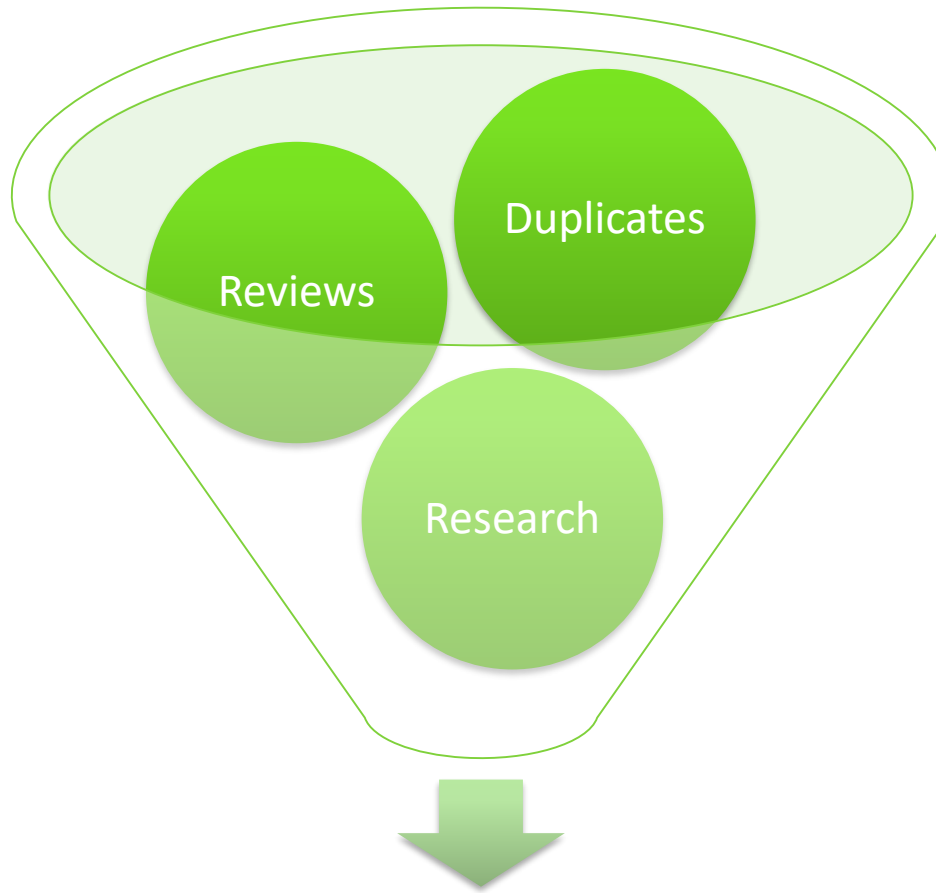
Using information platforms and services as sources



# The same event may be described in multiple sources

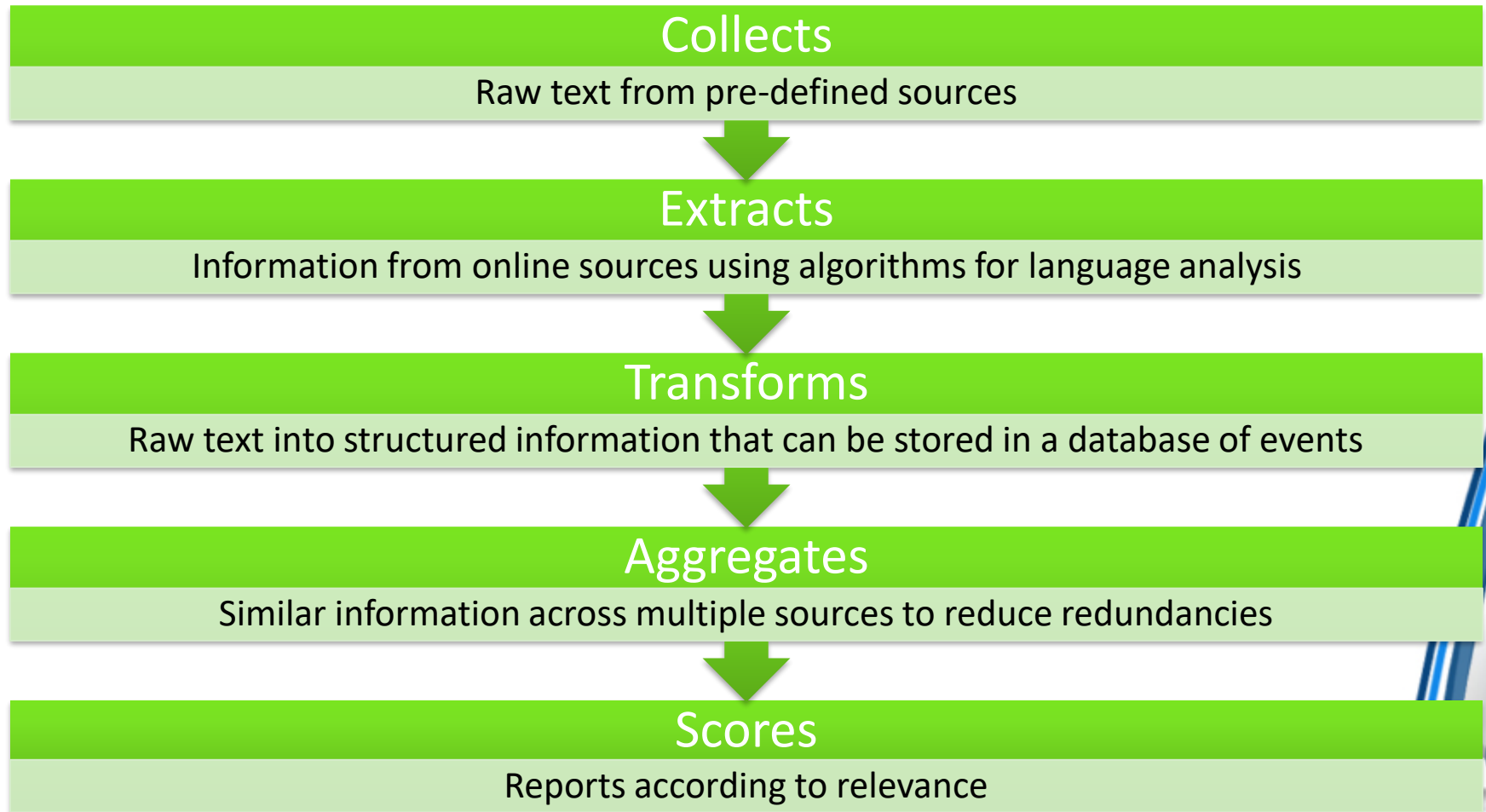
Health Incident	Structured	Unstructured
Unexpected deaths	Death registry data	Reports of unexpected deaths from community leader
Illness in children	School absenteeism monitoring	Media reports of illness among schoolchildren
Priority syndrome	Sentinel surveillance for influenza-like illnesses	Social media posts and internet searches with the keyword “flu”
Outbreak in neighboring country	Notification to WHO and neighboring country NFPs	Reports on a ministry website or collected by an electronic data network

**Filtering** - screening out duplicates and irrelevant information



**Relevant Signals**






# Scrapers and aggregators: general process of automated analysis



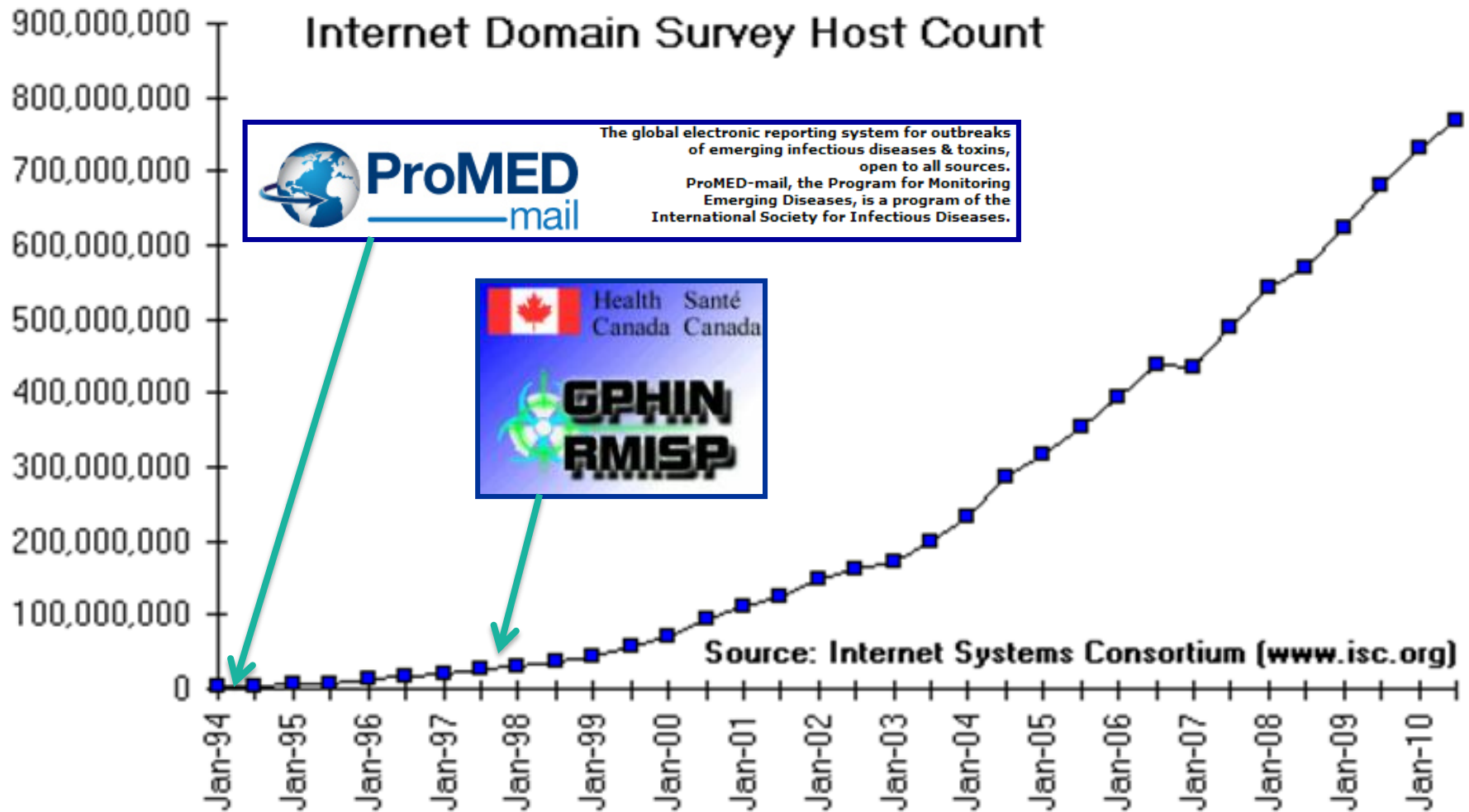
# Scrapers and aggregators include closed and open platforms

System	Manager	Access
HealthMap	Team based at Boston Children's Hospital	Open
Global Public Health Network (GPHIN)	Public Health Agency of Canada	Freely accessible to national public institutions by request
Medical Information System (MEDISYS)	European Commission Joint Research Centre	Open
Pattern-based Understanding and Learning System (PULS)	University of Helsinki	Open – partnership with MEDISYS
Emergency and Disaster Information Service (EDIS)	National Association of Radio Distress-Signaling and Infocommunications (RSOE) - Hungary	Summary content open; detailed content accessible to national institutions by request

# Internet Event-based Surveillance Systems

System Name		Country	No. Languages	Moderated
EIOS		Global	>50	No
GPHIN		Canada	9	Yes
HealthMap		US	7	No
MedISys		EU	26	No
ProMED		US	4	Yes

# Growth of the Internet 1994-2010





# Information feeds or services: contributor-based sources



ISID.org ↗

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HOME ABOUT OUR TEAM PARTNERS FROM THE FIELD SEARCH POSTS



ProMED-mail Português Español Русский Mekong Basin Afrique Francophone Anglophone Africa South Asia Middle East/North Africa

Latest Plants Hot Topics Errata

## Latest Posts On ProMED-Mail

28 Jan 2020 [Crimean-Congo hem. fever- Africa \(02\): Uganda \(QI\)](#)

27 Jan 2020 [Novel coronavirus \(21\): China, Canada, Sri Lanka ex China](#)

27 Jan 2020 [Black spot, citrus - Tunisia: 1st report](#)

27 Jan 2020 [Novel coronavirus \(20\): China, wildlife trade ban](#)

26 Jan 2020 [Novel coronavirus \(19\): China \(HU\) transmission dynamics](#)

[View printable version](#) Share this post:

Published Date: 2020-01-28 11:25:51

Subject: PRO/AH/EDR> Crimean-Congo hem. fever- Africa (02): Uganda (QI)

Archive Number: 20200128.6924924

CRIMEAN-CONGO HEMORRHAGIC FEVER - AFRICA (02): UGANDA (KAGADI)

A ProMED-mail post

<http://www.promedmail.org>

ProMED-mail is a program of the  
International Society for Infectious Diseases

<http://www.isid.org>

[1]

Date: Tue 27 Jan 2020

Source: EpiCore Global Surveillance Project [edited]

# ProMED-mail

- The Program for Monitoring Emerging Diseases (ProMED-mail) reports on outbreaks of diseases of infectious or toxic etiology, whether natural or intentionally released
- Open to all sources and free of charge, ProMED-mail exploits the speed and ubiquity of the Internet to serve as an early warning system for the detection of emerging disease outbreaks
- ProMED-mail monitors diseases of plants and animals of agricultural importance in addition to zoonoses because of their key role in disease emergence

- Source: CID 2004:39 (15 July)



# ProMED-mail facts

- Reports are screened and placed in an appropriate context by commentary and references from a panel of expert moderators
- Reports are posted to the Web and sent by e-mail to subscribers
- Reports are selected and interpreted by a panel of specialist moderators who provide expert commentary, supply references to previous reports and to the scientific literature, and put the report in perspective
- Supported by donations and foundation grants



# ProMED's focus

- Newly described or unknown diseases, epidemics, and outbreaks
- Emergence of diseases in new areas or populations
- Emphasis on diseases of plants and animals that might affect human populations
- Upholds “One Health” and recognizes the importance of diseases that affect plants and animals of agricultural importance, as well as zoonoses



# ProMED caveats

- Very sensitive reporting system
- Media reports are included in distribution
- Media reports may not contain verified information
  - Moderator may note this in context provided







Latest	Plants	Hot Topics	Errata
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28 Jan 2020 <a href="#">Crimean-Congo hem. fever- Africa (02); Uganda (QI)</a>			
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26 Jan 2020 <a href="#">Hemorrhagic septicemia - India: (OR) water buffalo</a>			
26 Jan 2020 <a href="#">MERS-CoV (05); research</a>			
26 Jan 2020 <a href="#">Poliovirus update (11); Pakistan (KP) tribal districts</a>			

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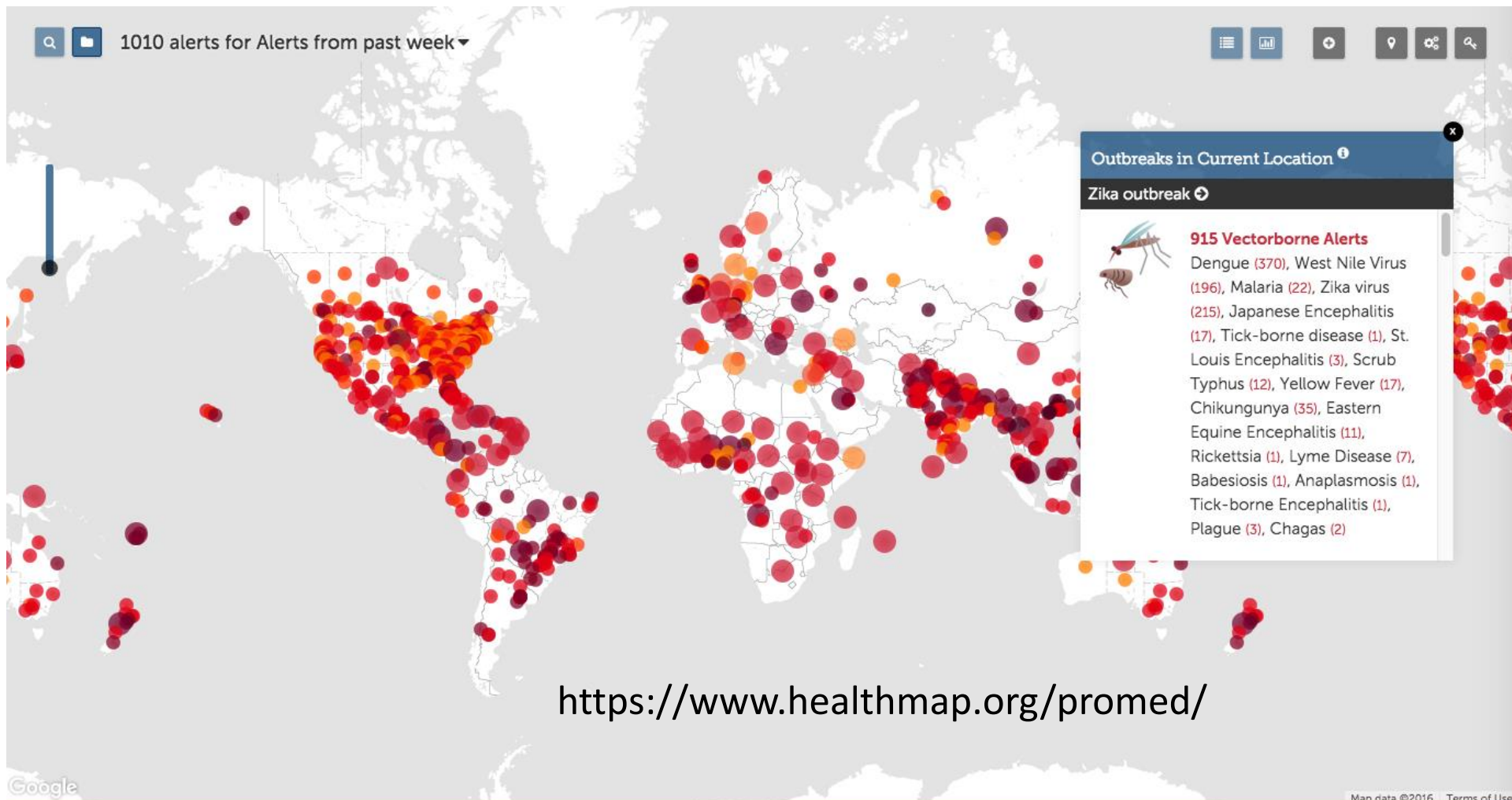
PHE description

Social media have reported a confirmed case of Crimean-Congo hemorrhagic fever [CCHF] in Kagadi (Uganda), in addition to 4 more suspect cases reported from the same district. An RFI has been sent to the members in order to verify the event and collect more information on cases, occupational exposure and implemented public health response measures.

EpiCore network has confirmed the event. Following a direct information from the National Public Health Institute a CCHF case has been confirmed in a 23-year-old patient in Kagadi District while results from samples taken from 4 suspected cases from the same area are pending; in addition, 9 contacts have been line listed and are under observation. The Dis... [Read More](#)

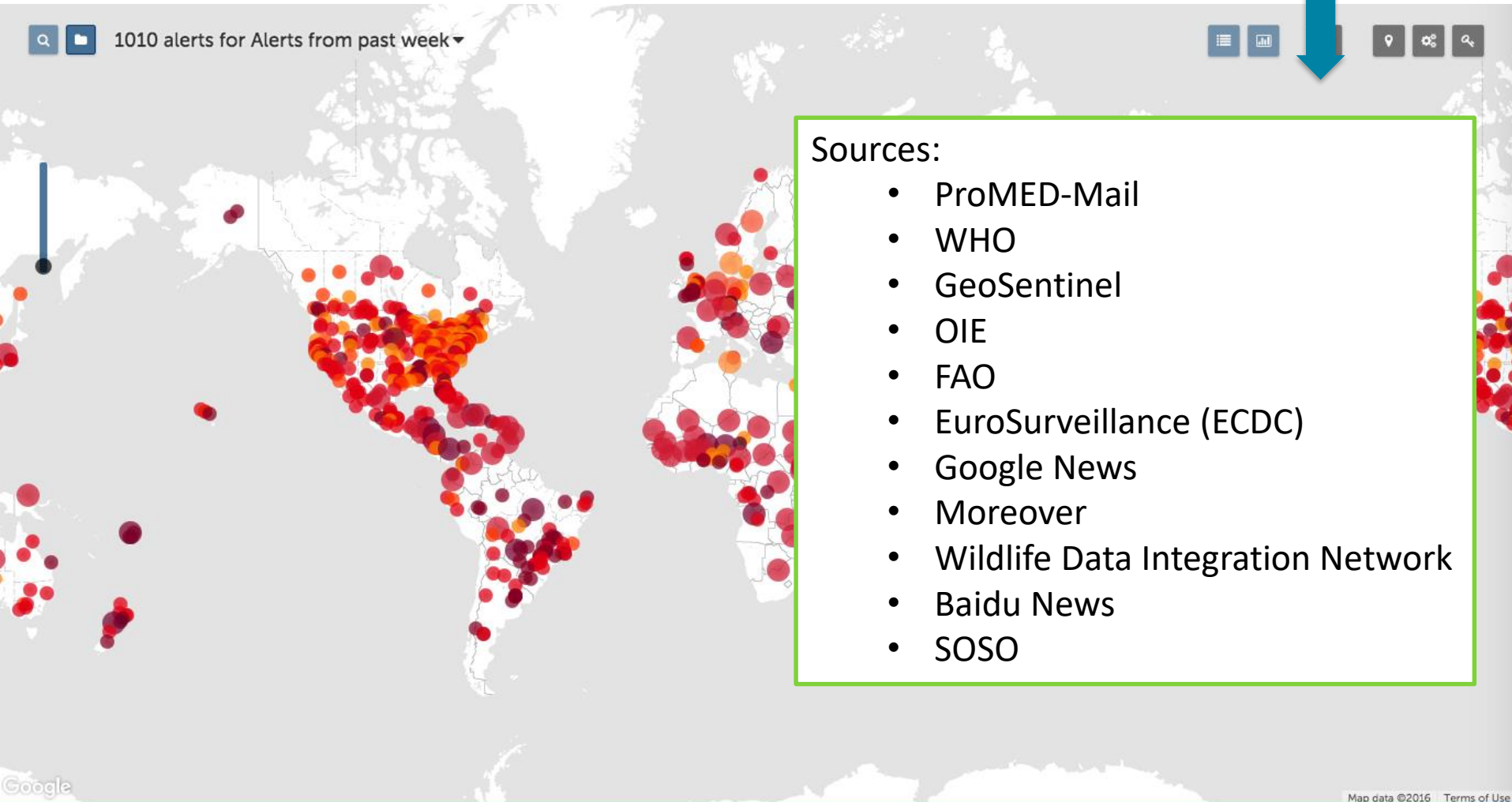


# HealthMap focuses primarily on infectious diseases



# HealthMap uses open sources and tools

Information  
feeds or  
services



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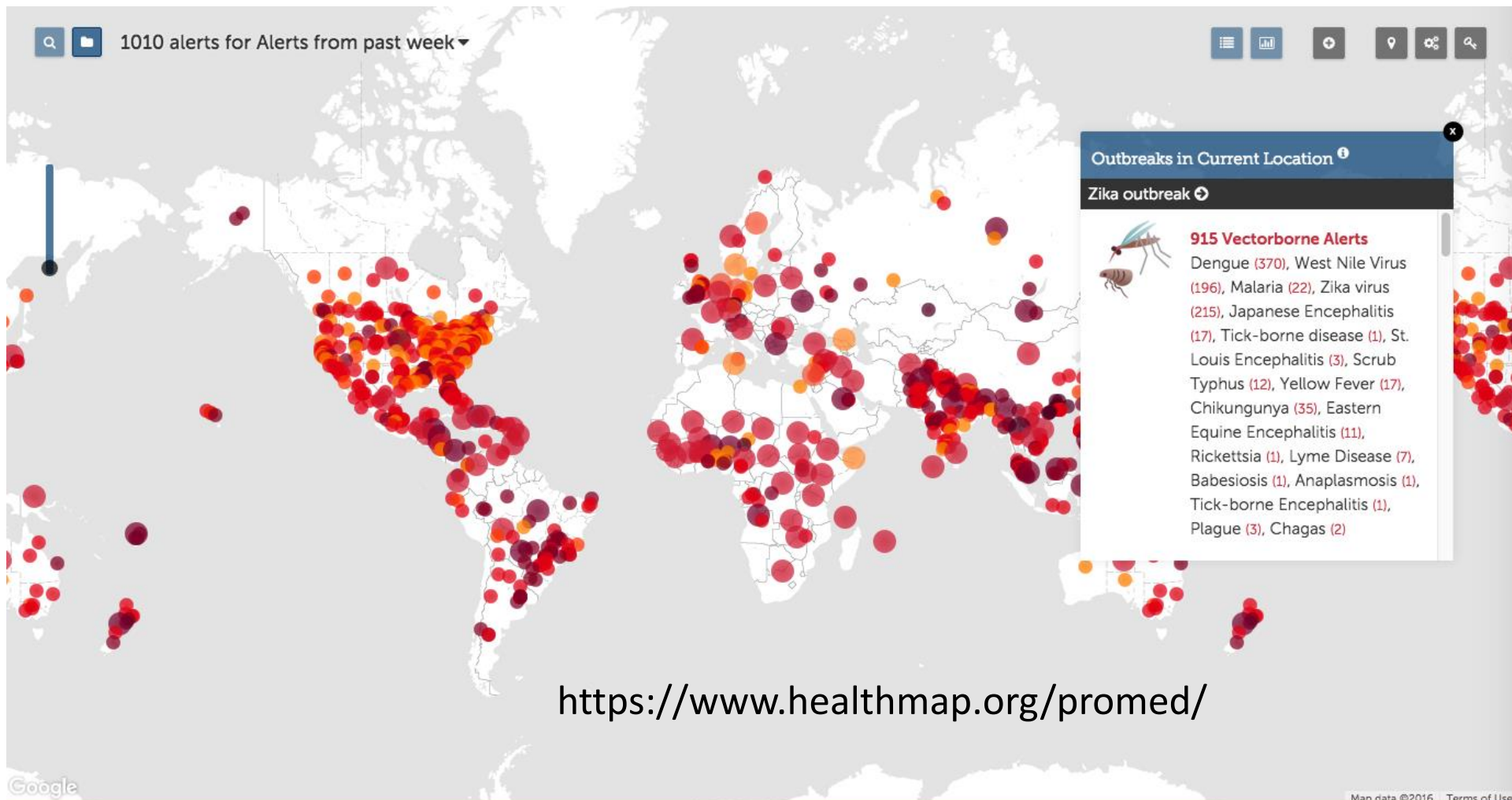
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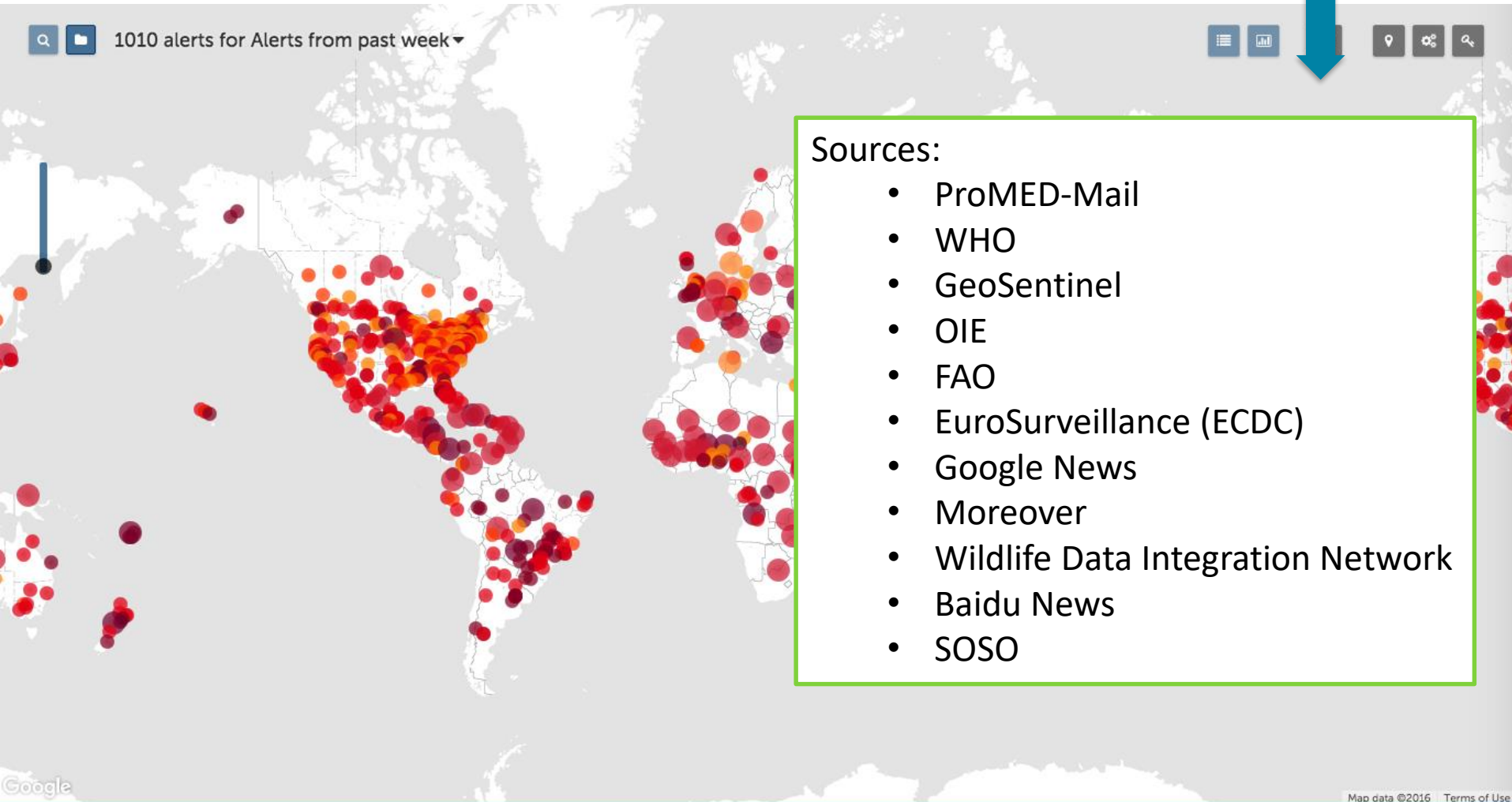
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Information  
feeds or  
services



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# GPHIN is a secure internet-based early warning system

Data retrieved from news feeds every 15 minutes

More than 30,000 sources worldwide in 9 languages

Feeds from a large variety of national and local newspapers

Algorithms scan and filter results

About 3,000 hits per day

Systems automatically

- Aggregate data
- Eliminate duplicates
- Insert metadata
- Categorize
- Score relevancy
- Automatically publish highly scored data

Human analysts assess results

Multilingual, multidisciplinary GPHIN analyst team evaluates reports below publish threshold

Decide to publish, issue an alert, or dismiss

Additional analysis





# GPHIN focuses on a broad range of public health threats

## Areas covered:

- disease outbreaks
- infectious diseases
- contaminated food and water
- Bioterrorism
- exposure to chemicals
- natural disasters
- issues related to the safety of products, drugs and medical devices
- radioactive agents

The screenshot shows the GPHIN web interface. At the top, there's a navigation bar with 'All languages' and 'All articles' buttons. Below this is a 'Filter Results' section with a dropdown menu showing '(custom)'. There are two main sections: 'Use existing query:' and 'Or import query in JSON format:'. The 'Use existing query:' section has several dropdown menus for 'Date received', 'WHO region', and 'Title/Text', along with a 'Search' button. The 'Or import query in JSON format:' section has an 'Import query' button. Below the filter section, there are buttons for 'Save query', 'Delete query', 'Set as default', and 'Export query'. At the bottom, there's a table of search results with columns for 'Date', 'Title', 'Publication Name', 'Source Language', 'Relevance', and other metadata. The table shows 8 entries, with the first entry being 'Onus of teaching children health standards rests upon parents' from 'Daily News'.

Date	Title	Publication Name	Source Language	Relevance	Star	Flag	HAO
2016-10-09 07:44 UTC	Onus of teaching children health standards rests upon parents	Daily News	EN	0.618	No	No	HAO
2016-10-07 17:03 UTC	The cholera epidemic declared in the North-Ubangi	All Africa	FR	0.744	Yes	No	HAO
2016-10-06 13:42 UTC	At the gates of Kinshasa - who cholera awareness shipowners and managers of ports	All Africa	FR	0.613	Yes	No	HAO
2016-10-05 00:28 UTC	RIP vaccination against cholera in Nampula	Jornal Noticias	PT	0.59	Yes	No	HA
2016-10-04 13:02 UTC	NAMPULA/RIP VACCINATION CAMPAIGN AGAINST CHOLERA	Agencia de Informacao de Moçambique	PT	0.631	No	No	HA

# Searching MEDISYS

[advanced search](#)

- Top Stories
- Event Extraction
- Recent Disease Incidents
- Alert Statistics >
- Communicable Diseases >
- Symptoms >
- Bioterrorism >
- Nuclear >
- Chemical >
- ECDC >
- EISA >
- EMCDDA >
- ENV\_RISKS >
- Medical Devices >
- VSN >
- Other >
- Continents >
- Official Sources >
- Sources List

## Most Active Topics - Diseases

### Zika Virus

In combination with: [Russian Federation](#);

[Viruses, Vol. 10, Pages 184: Arbidol \(Umifenovir\): A Broad-Spectrum Antiviral Drug That Inhibits Medically Important Arthropod-Borne Flaviviruses](#)

[mdpi](#) Tuesday, April 10, 2018 10:10:00 AM CEST | [info](#) [\[other\]](#)

Abstract Arthropod-borne flaviviruses are human pathogens of global medical importance, against which no effective small molecule-based antiviral therapy has currently been reported. Arbidol (umifenovir) is a broad-spectrum antiviral compound approved in Russia and China for prophylaxis and treatment of influenza....

[Об итогах XI Съезда Всероссийского научно-практического общества эпидемиологов, микробиологов и паразитологов](#)

[rospotrebnadzor-Krasnodar-Krai](#) Tuesday, April 10, 2018 9:15:00 AM CEST | [info](#) [\[en\]](#) [\[other\]](#)

16-17 ноября в Москве состоялся XI Съезд Всероссийского научно-практического общества эпидемиологов, микробиологов и паразитологов (ВНПОЗМП) по теме «Обеспечение эпидемиологического благополучия: вызовы и решения». Период между X и XI съездами ВНОЗМП характеризовался ростом осознания мировым.....

### Yellow Fever

In combination with: [Russian Federation](#);

[О ситуации по инфекциям за рубежом. Меры профилактики инфекционных и паразитарных заболеваний](#)

[rospotrebnadzor-Krasnodar-Krai](#) Tuesday, April 10, 2018 9:45:00 AM CEST | [info](#) [\[en\]](#) [\[other\]](#)

Управление Роспотребнадзора по Краснодарскому краю информирует, что в ряде стран Азии, Африки, Южной Америки и др. сохраняется напряженная эпидемиологическая ситуация по опасным инфекционным заболеваниям. По информации Всемирной организации здравоохранения в настоящее время отмечается ухудшение.....

[Об итогах XI Съезда Всероссийского научно-практического общества эпидемиологов, микробиологов и паразитологов](#)

[rospotrebnadzor-Krasnodar-Krai](#) Tuesday, April 10, 2018 9:15:00 AM CEST | [info](#) [\[en\]](#) [\[other\]](#)

16-17 ноября в Москве состоялся XI Съезд Всероссийского научно-практического общества эпидемиологов, микробиологов и паразитологов (ВНПОЗМП) по теме «Обеспечение эпидемиологического благополучия: вызовы и решения». Период между X и XI съездами ВНОЗМП характеризовался ростом осознания мировым.....

#### Tools

Tuesday, April 10, 2018  
6:53:00 PM CEST

[manage](#)

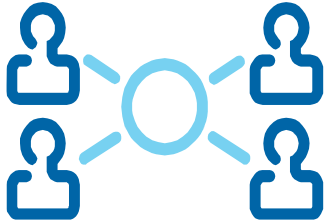
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#### Languages

Select your languages

am	ar	az	be	bg	bs
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km	ko	ku	ky	lb	lo
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no	pap	pl	ps	pt	ro
ru	rw	se	si	sk	sl
sq	sr	sv	sw	ta	th
tr	uk	ur	vi	zh	
all					

Interface: en - English



**More to come!**

## **Epidemic Intelligence from Open Sources (EIOS)**

- **A “system of systems”: One stop shop for IB EBS**
  - Existing media aggregators just reviewed will feed into EIOS
- **EIOS System Training – 28-30 October, 2019**
  - WHO HQ and WHO AFRO to facilitate



# **PRIORITIZING DISEASES & CONDITIONS FOR SURVEILLANCE**



# Triage of EBS raw information helps minimize analysis of duplicate or irrelevant signals

**Filtering** - the process of screening out duplicates and information which is not relevant for EWAR

- **Identifying duplicates** (the same event reported by the same source)
- **Identifying and discarding information not relevant to EWAR** (information that matches the criteria for public health events but is irrelevant for early warning, such as a generic review of a disease)

**Selection:** the sorting out of information according to national priority criteria

- **Discarding information that is not relevant for early warning** (for example, reports related to a non-prioritized mild disease or an increase in disease cases that is consistent with known trends and seasonal variations)



# National context of priority public health events for EBS

- The national EWAR surveillance objectives will depend on the characteristics of the disease or hazard, such as:
  - Diseases (e.g. measles)
  - Syndromes (e.g. hemorrhagic fevers)
  - Hazards (e.g. contamination of drinking water source)
  - Unexpected/unusual events (e.g. unexplained mortality)



# National context of priority public health events for EBS (cont.)

- The objectives will also depend on the characteristics of the disease or hazard, such as:
  - Attack rate
  - Morbidity and mortality
  - Environment
  - Mode of transmission, including but not limited to:
    - Person-to-person
    - Point source
    - Toxin exposure
    - Public health interventions required to mitigate spread.



# International context of priority public health events for EBS

- International obligations – for example, potential public health emergencies of international concern, as defined in Annex 2 of the International Health Regulations (IHR)





# Considerations for developing a list of priority diseases for EBS

- No country can monitor every potential source of information for every potential event. A country-specific list of priority diseases for EBS should be established.
- Ensuring sensitivity of EBS program: disease coverage
  - Are we selecting all important events?
- Ensuring sustainability of EBS program: human resource bandwidth
  - How easily can the defined surveillance program be maintained over time without undermining other public health programs?



# **Thank you!**

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